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THE EFFECTS OF PERSONALITY AND SIMULATED NEGOTIATION ON NEGOTIATION EFFECTIVENESS

by

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This research sought to determine what, if any, effect the primary personality characteristics exhibited by contract negotiators have on negotiation outcome. Additionally, this research sought to determine what, if any, effect the buyer's engaging in preparatory mock negotiation has on negotiation outcome. If it were found that certain personality characteristics or buyer-seller personality similarity/dissimilarity correlated significantly

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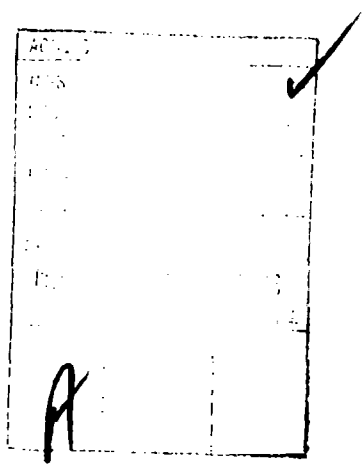
with desirable negotiation outcomes, then knowledge of those characteristics or similarity/dissimilarity and their respective correlations with negotiation outcomes could enhance negotiator selection, training, and effectiveness in DOD. Likewise, if it were found that the buyer's engaging in preparatory mock negotiation resulted in a significantly improved negotiation outcome in actual negotiation, then the conduct of such preparatory mock negotiation in DOD could enhance negotiator effectiveness. Toward making these determinations, 70 negotiations involving 56 contract negotiators were conducted at 11 DOD activities and three defense contractors' facilities. Data collected from these negotiations included the prices negotiated and an assessment of each negotiator's personality. These data were then processed and analyzed using established statistical methods. Based on these analyses, it could be concluded neither that personality characteristics exhibited by the negotiators, nor that the buyer's engaging in preparatory mock negotiation affected negotiation outcomes significantly.



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The Effects of Personality and Simulated Negotiation on Negotiation Effectiveness

by

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ABSTRACT

This research sought to determine what, if any, effect the primary personality characteristics exhibited by contract negotiators have on negotiation outcome. Additionally, this research sought to determine what, if any, effect the buyer's engaging in preparatory mock negotiation has on negotiation outcome. If it were found that certain personality characteristics or buyer-seller personality similarity/dissimilarity correlated significantly with desirable negotiation outcomes, then knowledge of those characteristics or similarity/dissimilarity and their respective correlations with negotiation outcomes could enhance negotiator selection, training, and effectiveness in DOD. Likewise, if it were found that the buyer's engaging in preparatory mock negotiation resulted in a significantly improved negotiation outcome in actual negotiation, then the conduct of such preparatory mock negotiation in DOD could enhance negotiator effectiveness. Toward making these determinations, 70 negotiations involving 56 contract negotiators were conducted at 11 DOD activities and 3 defense contractors' facilities. Data collected from these negotiations included the prices negotiated and an assessment of each negotiator's personality. These data were then processed and analyzed using established statistical methods. Based on these analyses, it could be concluded neither that personality characteristics exhibited by the negotiators, nor that the buyer's engaging in preparatory mock negotiation affected negotiation outcomes significantly.

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I. INTRODUCTION

A. THE ROLE OF NEGOTIATION IN DEPARTMENT OF DEFENSE ACQUISITIONS

Negotiations play a significant role in the acquisition of goods and services by the Department of Defense. During Fiscal Year 1978 alone, the Department of Defense expended a total of $55.6 billion in acquiring goods and services; $45.4 billion of that total represented acquisition by means of negotiation.[1] From another point of view, that $45.4 billion represented almost nine million acquisition actions accomplished by means of negotiation.[2]

To the lay person, negotiation is considered to be limited to initial pricing and agreement of contract terms and conditions.[3] In fact, however, negotiation plays a far greater role in Department of Defense acquisition. Indeed, the following, although by no means an exhaustive list, is exemplary of the areas in which the Department of Defense and the contractor negotiate before award and during contract administration.[4]

1. The price, terms, and conditions of the original contract.
2. Contract interpretation after award.
3. Adjustments pertaining to government-furnished property facilities, and special tooling.
4. Changes in delivery points, drawings and specifications, and the equitable adjustment pertaining thereto.
5. Variations in quantity.
6. Determinations as to whether items produced satisfy the specifications.

7. Price revision under redetermination, escalation, and incentive provisions.

8. Problems associated with the acceptability of individual items of cost under cost-type contracts.

9. Negotiation of overhead rates for cost-type contracts.

10. Acceptability of accounting, inspection, and purchasing systems.

11. Approval of "make or buy" programs and individual subcontracts.

12. Negotiation of problems in connection with the patent and technical-data provisions of the contract.

13. Termination settlements and problems associated with the disposal of property.

The range and magnitude of negotiation's role in Department of Defense acquisitions are great. The degree of effectivity that the Department of Defense attains in its acquisition-related negotiations significantly affects, cost-wise and otherwise, the accomplishment of its mission to provide for the defense of the United States.

B. FACTORS THAT AFFECT NEGOTIATION

The importance of procurement negotiations in providing for the defense of the United States suggests the need for a continuing effort in the Department of Defense to improve negotiation effectiveness and, thereby, to improve the outcomes attained through negotiation. A requisite first step in this effort would appear to be identifying the factors, or variables, which affect negotiation effectiveness. Subsequent steps would include determining the impact of the variables, individually and jointly, and, with this knowledge, attempting to control the variables, and thereby the outcomes of negotiations.

With respect to these steps, Rubin and Brown sought, in their review of more than one thousand research and other publications, to discover a theory of negotiation, or, failing that, at least a single organizing conceptual framework for developing such a theory.[5] They found neither; but, as a major part of their effort, they reviewed a wealth of research pertaining to the effects of "independent variables," e.g., the negotiator's attitude, motivation, power, etc., on the "dependent variable," negotiating effectiveness.[6] The independent variables considered by Rubin and Brown are presented in Table I,[7] which, additionally, provides descriptions of terms used in the following paragraphs.

TABLE I

INDEPENDENT VARIABLES OF THE NEGOTIATION RELATIONSHIP

A. SOCIAL COMPONENTS OF THE NEGOTIATION STRUCTURE
   1. The Presence of Audiences
   2. The Availability of Third Parties
   3. The Number of Participants Involved

B. PHYSICAL COMPONENTS OF NEGOTIATION
   1. The Location of the Negotiation Site
   2. The Physical Arrangements at the Site
   3. The Availability and Use of Communication Channels
   4. Time Limitations

C. ISSUES
   1. Tangible Issues
   2. Intangible Issues

TABLE I, Continued

3. The Number of Issues

4. The Format of the Issues

5. The Presentation of the Issues

6. The Prominence of the Issues

D. THE NEGOTIATORS

1. Interpersonal Orientation

Rubin and Brown defined a negotiator who exhibited high interpersonal orientation as one who was first and foremost responsive to the interpersonal aspects of his relationship with the other and who was both interested in, and reactive to, variation in the other's behavior. They defined a negotiator who exhibited low interpersonal orientation as one who was nonresponsive to the interpersonal aspects of his relationship with the other and who was interested neither in cooperating nor competing with the other but, rather, in maximizing his own gains, regardless of how the other fared.

2. Motivational Orientation

Rubin and Brown defined the negotiator's motivational orientation, i.e., his attitudinal disposition toward the other, in terms of: cooperativeness, i.e., having a positive interest in the other's welfare as well as his own; competitiveness, i.e., having an interest in doing better than the other while doing as well for himself as possible; and individualism, i.e., having an interest in maximizing his own success regardless of how the other fared.

TABLE I, Continued

3. The Distribution of Power in the Relationship (Equal Versus Unequal)

E. SOCIAL INFLUENCE STRATEGIES

1. Opening Moves
2. Further Moves
3. Countermoves
4. Appeals
5. Demands
6. Promises
7. Threats

Source: Rubin, J. Z. and Brown, B. R., The Social Psychology of Bargaining and Negotiations, pp. 1-350, Academic Press, 1970.

Among all of the factors identified, Rubin and Brown focused the preponderance of their attention on the personal characteristics of the negotiator and the effects thereof on negotiation effectiveness.[8] Based on their review of research accomplished, they found that:

1. A cooperative motivational orientation of the negotiator tended to enhance negotiating effectiveness more than an individualistic motivational orientation and, particularly, more than a competitive motivational orientation.
2. More effective negotiation ensued when power among the negotiators was equal rather than unequal.[10]
3. When power among the negotiators was unequal, the party with greater power tended to behave exploitatively, while the party with less power tended to behave submissively.[11]
4. The smaller the discrepancy in negotiators' power, the more effective they were likely to function.[12]

5. The smaller the total amount of power, the more effective the negotiators were likely to function.[13]

6. Negotiators who were induced to be high in interpersonal orientation tended to function more effectively than those who were induced to be low in interpersonal orientation.[14]

7. Negotiators tended to function most effectively when they shared a cooperative motivational orientation and were of equal power, functioning least effectively when they shared a competitive motivational orientation and were, again, of equal power (the interaction of motivational orientation and power).[15]

8. Negotiators tended to function most effectively when they shared a cooperative motivational orientation and were high in interpersonal orientation, functioning least effectively when they shared a competitive motivational orientation and were, again, high in interpersonal orientation (the interaction of motivational orientation and interpersonal orientation).[16]

9. Negotiators tended to function most effectively when they were of equal power and were high in interpersonal orientation, functioning least effectively when they were of unequal power and were, again, high in interpersonal orientation (the interaction of power and interpersonal orientation).[17]

10. Negotiators tended to function most effectively when they shared a cooperative motivational orientation, were of equal power, and were high in interpersonal orientation (the interaction of motivational orientation, power, and interpersonal orientation).[18]

As the findings above indicate, Rubin and Brown observed that the social components, the physical components, and the issues affect negotiating effectiveness in varying degrees but concluded that the personal characteristics of the negotiators affect negotiation effectiveness most significantly. The instant research, as well, while recognizing that other variables affect negotiation effectiveness, focused, in important part, on the personal characteristics of the negotiator.

C. THE ROLE OF THE NEGOTIATOR IN DEPARTMENT OF DEFENSE ACQUISITIONS

As seen in the review of the work by Rubin and Brown, the variables associated with the negotiator were strongly suggested to be key determinants of negotiation outcome. It would follow, therefore, that the role of Department of Defense negotiators is crucially important in maximizing negotiation effectiveness.

Within the Department of Defense, the negotiator may--depending on what aspect of the contract is being negotiated--be the procuring contracting officer, the cost/price analyst, the legal representative, or any of several technical personnel prior to and during the term of the contract; and, during the performance of the contract, the negotiator may be the administrative contracting officer, the auditor, an inspector, a property administrator, a security representative, or any of a host of United States Government personnel concerned with the performance and administration of the contract.[19] (In this research, however, concern was focused principally on the procuring contracting officer, the price analyst, the administrative contracting officer, and the career negotiator--in other words, those personnel who assumed a role of leadership in negotiations.) Entrusted to each of these negotiators was found the responsibility to maximize the interest of the United States Government with respect to national defense;[20] and upon the same negotiators was found dependent, in large measure, the defense capability of the United States. The role of the negotiator in Department of Defense acquisition was, therefore, found to be important indeed.

From a somewhat different perspective, Procurement Associates, Inc., speaking as a contractor, added support to the view that the negotiator is critically important by stating,

> "In no other procedure does so much money change hands based on the ability of single individuals as it does in negotiation. In Government contracting, particularly, a negotiator can make or break the company. He is the most important profit center the company has. He should be chosen, trained, and treated accordingly."[21]

Essentially the same statement might well be made regarding the contract negotiator in the Department of Defense. He is critically important.

Rubin and Brown added additional weight to the importance of the negotiator in negotiation in their conclusion that,

> "It is [the] exchange of information [by negotiators], the attributions to which it leads, and the ways in which it is shaped for the purpose of mutual social influence that represents the fundamental strategic issue in [negotiation]."[21]

Moreover, as stated above, the fact that Rubin and Brown devoted the majority of their effort in the reference cited to research of the variables of the negotiating relationship associated with the negotiators themselves added still more weight to the importance of the negotiator variables vis a vis other variables.

D. THE SELECTION OF NEGOTIATORS IN THE DEPARTMENT OF DEFENSE

In the selection of contracting officers and, coincidentally, negotiators, the Department of Defense instructs the appointing authority to consider the experience, training, education, business acumen, judgment, characteristics, reputation, and ethics of the prospective selectees.[23] Further, the Department of Defense instructs the appointing authority to evaluate, in

considering the prospective selectee's experience, training, and education, the following factors:[24]

1. Experience in a government procurement office, commercial procurement, or related fields.

2. Formal education or special training in business administration, law, accounting, or related fields.

3. Completion of the Defense Procurement Management Course or other procurement courses.

4. Knowledge of the provisions of the Armed Services Procurement Regulations and of other applicable regulations.

It is acknowledged, first, that these Department of Defense instructions to the appointing authority were written with all aspects of the contracting officer's duties and responsibilities in mind--of which negotiation is only one, albeit an important one. It is acknowledged, further, that all of the factors required by the Department of Defense to the considered are certainly germane to the selection of a qualified contracting officer. However, the absence of more emphasis on personal characteristics was found to be notable--particularly in light of the emphasis placed on such characteristics by virtually every author who has discussed negotiation or negotiators.

Rubin and Brown in their research, for example, considered the interpersonal orientation, the motivational orientation, and the power of the negotiator to be of primary importance, allocating their greatest emphasis to these personal characteristics.[25]

Bearden and Chipman, in their effort to identify and rank personal characteristics in terms of their relative importance, summarized the personal characteristics considered significant by six notable writers as presented in Table II.[26] They,

themselves, employing a Delphi methodology, considered and ranked 27 personal characteristics compiled by Novak and Whitley[27] and evaluated by recognized contract negotiators at the three divisions of the Air Force Systems Command.[28] These 27 personal characteristics are presented in ranked order in Table III.

In addition to the cited writers who sought to identify and/or rank or correlate personal characteristics with negotiator effectiveness, numerous other writers have researched, or otherwise treated such characteristics in relation to negotiator effectiveness. It was considered important at this point, however, only to note the importance, suggested by the volume of research accomplished, of personal negotiator characteristics as determinants of negotiator effectiveness and the importance of considering such characteristics in the selection of negotiators.

E. THE NEGOTIATOR'S PREPARATION FOR NEGOTIATION

Considering the numerous variables that affect negotiating effectiveness, Procurement Associates, Inc., concluded that, for a negotiator with any given personality characteristics, preparation was the most important prerequisite to effective negotiation and that no amount of experience, skill, or persuasion could compensate for the lack thereof.[29] They stated, further, speaking from the buyer's point of view, that the extent of preparation for negotiation, together with the amount of competition present among sellers and the adequacy of the cost or price analysis, was a principal element of bargaining strength.[30]

TABLE II

Negotiator Background Variables as Presented by Different Writers

BACKGROUND VARIABLES	KARRASS	CONSTANTINO	LEE AND DOBLER	NIERENBERG	BAILY	HERMONE
Authority	X			X		
Beliefs			X			
Deliberate	X	X				
Education	X	X	X			
Empathy	X	X	X			
Experience				X		
Expertise	X		X			X
Good Listener	X		X	X	X	
High Expectations	X			X		
Integrity	X	X				
Patient	X	X	X	X		
Persuasive		X	X			
Planning Ability	X			X	X	X
Rational	X		X	X	X	X
Realistic	X					
Self-Confident	X	X	X	X		
Self-Control	X		X		X	
Self-Esteem	X			X		
Sense of Timing		X		X		
Skepticism	X					
Status	X					
Tactful			X			
Verbal Skill	X		X			

Source: Bearden, J. G. and Chipman, J.C., Personal Characteristics of Force Contract Negotiators, M. S. Thesis, Air Force Institute of Technology, Wright-Patterson AFB, 1977, p. 7.

TABLE III

Final Rank-Order of Personal Characteristics

RANK	CHARACTERISTIC	ASD RANK	ESD RANK	SAMSO RANK	SUM
1	Self-Confidence	1.	1.5	1.5	4.
2	Adaptability	2.5	5.5	1.5	9.5
3	Rational	4.	1.5	5.	10.5
4	Verbal Skill	6.	4.	9.5	19.5
5	Integrity	2.5	8.	9.5	20.
6	Experience	7.	11.5	3.	21.5
7	Self-Control	8.	3.	11.	22.
8	Realistic	5.	10.	7.5	22.5
9	Task Orientation	13.5	5.5	4.	23.
10	Planning Ability	10.	7.	13.	30.
11 (tie)	Deliberate	15.5	13.	6.	34.5
11 (tie)	Authority	9.	11.5	14.	34.5
12	Good Listener	11.5	9.	15.5	36.
13	Persuasive	13.5	14.	15.5	43.
14	Reputation	20.	18.	7.5	45.5
15	Self-Esteem	11.5	16.5	21.	49.
16	Tactfulness	19.	19.5	12.	50.5
17	Skepticism	18	16.5	18.	52.5
18	Sense of Timing	21.	15.	18.	54.
19	Patience	17.	21.5	18.	56.5
20	High Expectations	15.5	21.5	20.	57.
21	Expertise	22.	19.5	22.	63.5
22	Empathy	23.	23.	23.	69.
23	Education	25.	24.	24.	73.
24	Academic Discipline	24.	25.	25.	74.
25	Status	26.	26.	26.	78.
26	Beliefs	27.	27.	27.	81.

Source: Bearden, J. G. and Chipman, J. C., Personal Characteristics of Air Force Contract Negotiators, M. S. Thesis, Air Force Institute of Technology, Wright-Patterson AFB, 1977, p. 22.

Procurement Associates, Inc., generalized the major steps in preparing for negotiations as:[31]

1. Gathering the facts, including, most importantly, gaining a clear and comprehensive understanding of what is being acquired.
2. Analyzing the facts and the intangibles that will affect subsequent negotiations.
3. Establishing the negotiation objectives, based on the analysis.
4. Planning the strategy and tactics necessary to achieve the objectives during negotiation.

Beyond the four steps suggested by Procurement Associates, Inc., it was speculated that the negotiator might well seek to test his readiness for negotiation prior to implementing his negotiation plan during actual negotiation. One means found to be in use to test the negotiator's preparation and plan was the submittal of his plan to his organizational superior(s) for in-depth review and approval or disapproval.[32] Another means found to be in use was "murder-boarding" the plan, i.e., a procedure whereby a group of persons sufficiently familiar with the prospective negotiation sought to identify weaknesses in the preparation and plan and to offer constructive changes for the improvement thereof.[33] A third means considered was engaging in a simulated negotiation with another person sufficiently familiar with the prospective negotiation to play the role of the seller. Brosius and Erickson reported that this latter role-playing means of preparation had been employed in the legal profession, in the labor relations field, and in the aerospace industry and was found within those groups to enhance the attainment of the goals and objectives sought.[34]

A review of the literature revealed that role-playing has been employed extensively in education, training, problem-solving, and therapy.[35] The employment of role-playing as a preparation technique for procurement negotiations, however, was not found to be reported. Of note, nevertheless, was a rating by training directors of the effectiveness of role-playing vis a vis other techniques as a method of training for attaining various training objectives. This rating was reported by Carroll, et al, in Personnel Psychology, and is presented in Table IV.[36] The rating involved 117 training directors from the 200 United States firms employing the largest number of persons.[37] Of particular importance in this study was the finding that role-playing was ranked second among nine training methods employed in improving interpersonal skills.[38] Ruling out sensitivity training (which was ranked first among the nine methods) as an appropriate method of preparing for negotiation, role-playing emerged as a potentially excellent technique for enhancing negotiator preparation--particularly in light of the research accomplished by Rubin and Brown and their emphasis on the importance of the interpersonal-orientation variable in negotiations.[39]

With interest in exploring the effect of the role-playing technique in preparing for negotiations, Brosius and Erickson conducted an experiment in 1974 to measure the effect of simulated negotiations on final negotiated results.[40] This experiment is believed to be the first attempt to isolate and measure the effect of preparatory role-playing, simulated negotiations

TABLE IV

RATINGS OF TRAINING DIRECTORS ON EFFECTIVENESS OF ALTERNATIVE TRAINING METHODS FOR VARIOUS TRAINING OBJECTIVES

TRAINING METHOD	KNOWLEDGE ACQUISITION		CHANGING ATTITUDES		PROBLEM SOLVING SKILLS		INTER-PERSONAL SKILLS		PARTICIPANT ACCEPTANCE		KNOWLEDGE RETENTION	
	MEAN	MEAN RANK	MEAN	MEAN RANK	MEAN	MEAN RANK	MEAN	MEAN RANK	MEAN	MEAN RANK	MEAN	MEAN RANK
Case Study	3.56[h]	2	3.43[d]	4	3.69[h]	1	3.02[d]	4	3.80[d]	2	3.48[e]	2
Conference (discussion) method	3.33[d]	3	3.54[d]	3	3.26[e]	4	3.21[d]	3	4.16[a]	1	3.32[f]	5
Lecture (with questions)	2.53	9	2.20	8	2.00	9	1.90	8	2.74	8	2.49	8
Business games	3.00	6	2.73[f]	5	3.58[b]	2	2.50[e]	5	3.78[d]	3	3.26[f]	6
Movie films	3.16[g]	4	2.50[f]	6	2.24[g]	7	2.19[g]	6	3.44[g]	5	2.67[h]	7
Programmed instruction	4.03[h]	1	2.22[h]	7	2.56[f]	6	2.11[g]	7	3.28[g]	7	3.74[a]	1
Role Playing	2.93	7	3.56[d]	2	3.27[e]	3	3.68[b]	2	3.56[e]	4	3.37[f]	4
Sensitivity training (t group)	2.77	8	3.96[a]	1	2.98[e]	5	3.95[b]	1	3.33[g]	6	3.44[f]	3
Television lecture	3.10[g]	5	1.99	9	2.01	8	1.81	9	2.74	9	2.47	9

a More effective than methods ranked 2 to 9 for this objective at .01 level of signifieance.
b More effective than methods ranked 3 to 9 for this objective at .01 level of significance.
c More effective than methods ranked 4 to 9 for this objective at .01 level of significance.
d More effective than methods ranked 5 to 9 for this objective at .01 level of significance.
e More effective than methods ranked 6 to 9 for this objective at .01 level of significance.
f More effective than methods ranked 7 to 9 for this objective at .01 level of significance.
g More effective than methods ranked 8 to 9 for this objective at .01 level of significance.
h More effective than method ranked 9 for this objective at .01 level of significance.

SOURCE: Stephen J. Carroll, Jr., Frank T. Paine, and John J. Ivancevich, "The Relative Effectiveness of Training Methods -- Expert Opinion and Research," Personnel Psychology, 25:495-509 (Autumn 1972), p. 498.

on actual negotiated outcome (defined as the price the buyer would pay). Brosius and Erickson employed, as participants in the experiment, Department of Defense procurement careerists. As a vehicle for the experiment, one role-playing, buyer vs seller, contract-negotiation case was used for training in Department of Defense procurement management courses.[41] Essentially, they divided the participants into two groups, experimental and control. Experimental-group participants playing the role of buyer engaged in mock negotiations with participants playing the role of the buyer's supervisor preparatory to "actual" negotiations. Experimental-group buyers then negotiated with participants playing the role of the seller in "actual" negotiations. Next, control-group participants playing the role of buyer negotiated with participants playing the role of seller in the "actual" negotiation. Control-group buyers negotiated only once in the "actual" negotiation. Likewise, participants playing the role of seller negotiated only once in the "actual" negotiation. Brosius and Erickson then statistically compared the price that the experimental-group buyers, with the benefit of preparatory mock negotiation, negotiated in an "actual" negotiation with the price that the control group, without the benefit of preparatory mock negotiation, negotiated in an "actual" negotiation. The result of the comparison was, surprisingly, a finding that the experimental-group buyers, who had engaged in preparatory, role-playing, mock negotiation negotiated a significantly higher (less desirable) price than the control-group buyers, who had not engaged in mock negotiations.[42]

Upon review of Brosius and Erickson's experimental design and methodology, several possible explanations arose as to why the outcomes indicated that the effect of the buyer's having engaged in preparatory mock negotiations resulted in a higher negotiated price in the "actual" negotiation. These explanations are addressed below. In short, a review of the Brosius and Erickson experiment revealed that their finding was inconclusive; therefore, at this stage of the instant research, the effect of mock negotiation as a means of preparing for actual negotiation remained unknown.

F. KEY ELEMENTS OF NEGOTIATOR EFFECTIVENESS

Based on the literature reviewed thus far, it appeared safe to assume that among all of the variables that affected negotiation effectiveness--the social components, the physical components, the issues, and the negotiators themselves--those pertaining to the negotiator were the most important. In the range of variables pertaining to the negotiator and negotiator effectiveness, which for convenience might be categorized as background characteristics, personality characteristics and preparation, Procurement Associates, Inc., stated that the most important variable was negotiator preparation.[43] Rubin and Brown considered the negotiator's personality characteristics to be most important.[44] Finally, all writers reviewed considered the background variables and the personality-characteristics variables to be significantly important. Additionally, Brosius and Erickson and others addressed the potential benefit of employing role-playing, mock negotiations as a preparation technique.

Among the key elements of negotiator effectiveness, then, preparation and personality characteristics were prominent; and mock negotiation was prominent as a potentially excellent preparation technique. It is with this orientation that this research sought to explore further the effect of preparatory mock negotiation and personality characteristics on negotiations.

II. THE BASIS OF THE RESEARCH

A. STATEMENT OF THE PROBLEM

Negotiation is of crucial importance in Department of Defense acquisitions. The selection, training, guidance, and performance of contract negotiators by the Department of Defense have been continuing concerns, as indicated by the Report of the Commission on Government Procurement in 1972.[45] Furthermore, the personality characteristics of and the preparation by the negotiator are believed by a number of writers to be key elements of negotiator effectiveness. Further, mock negotiation was found to be potentially prominent among various preparation techniques. However, the personality characteristics considered by the writers--students of negotiation--were found to be without consensus as to which were important and as to the relative importance among them. Moreover, an indicative measurement of the effect of the various personality characteristics and of preparatory mock negotiations on negotiation effectiveness in the area of Department of Defense acquisition contracts was not found to exist except that inconclusive measurement calculated by Brosius and Erickson.[46] Thus, the Department of Defense has had available no universal set of personality characteristics on which to focus in negotiator selection, training, and guidance. Nor has it had available a credible and indicative measurement of the effect of mock negotiations on negotiation effectiveness. Availability of this information to the Department of Defense might well, it appeared,

provide the basis for enhancement of selection, training, guidance, and, significantly, performance of contract negotiators.

Accordingly, it was the purpose of this research to seek to identify a credible and universally recognized set of measurable personality characteristics and to measure the effects thereof on negotiation effectiveness. Additionally, the purpose of this research was to measure the effects of mock negotiation, employed by the buyer as a preparation technique, on negotiation effectiveness.

B. SCOPE OF THE RESEARCH

As indicated above, this research sought:

1. To identify a credible and universally recognized set of measurable personality characteristics.
2. To measure the effects of that set of personality characteristics on negotiation effectiveness, defined herein as the price negotiated.
3. To measure the effects, if any, of mock or simulated negotiations employed by the buyer on negotiation effectiveness.

This research did not attempt to determine the effect of other variables of negotiation effectiveness, such as those structural, physical, issue, or other negotiator variables identified by Rubin and Brown.[47] Moreover, it did not attempt to measure the effects of personality characteristics or mock negotiation on negotiation effectiveness when such effectiveness is defined as other than price. (Although, in light of the effect on price, one might surmise what the effects would be on other negotiation outcomes, i.e., other terms and conditions of the contract.) Further this research focused on

negotiation as it was found to be employed by Department of Defense personnel in obtaining defense contracts with firms. It did not consider other negotiations, e.g., labor negotiations, although the results of this research might apply equally or similarly to those negotiations.

C. LIMITATIONS OF THE RESEARCH

This research was limited principally by the practical impossibility of identifying and controlling all variables affecting negotiating effectiveness. Those elusive variables included: those associated with the experimental environment's being contrived in lieu of actual; those associated with the physical aspects of the negotiating environment and the differences thereof among the locations at which the experiment was conducted; those associated with the differences in age, education, and experience among the participants within and among participating activities; and those associated with other, unrecognized factors.

D. THE RESEARCH QUESTIONS

The research questions were:

1. Does a credible, universally recognized set of measurable personality factors exist in the current state of knowledge?
2. If a credible, universally recognized set of measurable personality factors exists, then what, if any, effects do these factors have on negotiation effectiveness?

E. THE RESEARCH HYPOTHESIS

The research hypotheses were:

1. The Null Hypothesis, Ho: Mock, or simulated, negotiation employed by the buyer and not by the seller does not affect negotiation effectiveness.

2. The First Alternative Hypothesis, H_1: Mock, or simulated negotiation employed by the buyer and not by the seller affects negotiation effectiveness positively, i.e., correlates significantly with a lower price.

3. The Second Alternate Hypothesis, H_2: Mock or simulated negotiation employed by the buyer and not by the seller affects negotiation effectiveness negatively, i.e., correlates with a higher price.

III. DESIGN OF THE RESEARCH

A. THE BASIC DESIGN OF THE RESEARCH

1. The Brosius and Erickson Experiment

The design of the instant research evolved from the test structure employed by Brosius and Erickson to isolate, and measure the effect of, negotiator background variables and the use of mock negotiation as a preparation technique on negotiation effectiveness.[48] The model of their test structure was as follows:[49]

GROUP:	SIMULATED NEGOTIATIONS	"ACTUAL" NEGOTIATIONS
Experimental	Buyer #1 vs Buyer #2	Buyer #1 vs Seller #1
Control	None	Buyer #3 vs Seller #2

Basically, their model provided for comparing the price negotiated by Buyer #1, who had previously employed simulated negotiation with Buyer #2 as a preparation technique, with that negotiated by Buyer #3, who had not employed simulated negotiation as a preparation preparation technique. The instrument used to generate both the mock negotations and the "actual" negotiations was a structured, role-playing contract negotiation case in use as a training aid in contract administration courses conducted by the Continuing Education Division, School of Systems and Logistics, Air Force Institute of Technology, Wright-Patterson AFB, Ohio.[50] Thus, if the mean price negotiated by the participants playing the role of Buyer #1 was statistically significantly different from the mean price negotiated by participants playing the role

of Buyer #3, it could be concluded that mock negotiation affected negotiation effectiveness, i.e., price negotiated, when employed by the buyer and not by the seller as a preparation technique for negotiation.[51]

Additionally, in the Brosius and Erickson experiment, the participants completed background questionnaires identifying:[52]

1. Their branch of service, i.e., U. S. Air Force or other.
2. Their Civil Service or Military Rank.
3. Their years of formal education.
4. Their ages.
5. Their years of service in the procurement career area.
6. The number of Department of Defense procurement-related courses completed.
7. The number of negotiations involving an examination of cost or pricing data in which the participant had been engaged during the past year.
8. The number of companies with which the participant had negotiated during the past year.
9. The largest contract (in terms of dollar value) that the participant had negotiated during the past year.
10. Whether or not the participant had experience as a negotiator in commercial marketing or sales.
11. Their creativity as measured by a test developed by Dr. E. Paul Torrence and Mr. Joe Khatena of the University of Georgia.

The independent variables, i.e., preparatory simulated negotiation and the background variables, were then regressed against the dependent variable, price, representing negotiation effectiveness, to ascertain whether any of the independent variables significantly affected, statistically, the dependent variable, price.[53]

The results of the Brosius and Erickson experiment were as follows:[54]

1. Buyer #1's employment of simulated negotiation as a preparation technique was significantly associated with a higher negotiated price ($3368 higher than the mean of $160,510).

2. Among the other independent variables, the following background characteristics were found to be statistically significant:

   a. The negotiator's age (younger buyers were associated with lower negotiated prices).

   b. The years of government service in the procurement career area (relative to the seller's experience, more experienced buyers were associated with significantly lower negotiated prices).

   c. The number of separate companies with which the buyer participant had negotiated relative to the number of separate companies with which the seller had negotiated (relative to the seller, the buyer with a greater number of negotiations with companies was associated with a significantly lower negotiated price).

With respect to the effect of simulated negotiation on "actual" negotiation effectiveness, one might have found the results of the Brosius and Erickson experiment intuitively disturbing. It was anticipated by Brosius and Erickson that the use of simulated negotiations by the buyer and not by the seller would correlate with a decrease in the price "actually" negotiated, instead of an increase; this suspicion was, in fact, the alternate hypothesis on which their experiment was based.[55] Accordingly, upon seeing the results of their experiment, they analyzed the background data of each negotiator to determine whether the traits of the participants playing the role of the seller and/or the role of Buyer #3 (control group) were dominant, thus nullifying the effect of Buyer #1 (experimental group)

preparation by means of simulated negotiation; and they concluded that the traits of all participants were evenly distributed, thus appearing to be random.[56] Beyond this analysis, Brosius and Erickson considered the following possible explanations as to why the results indicated that simulated negotiations correlated with an increase in price instead of a decrease:[57]

1. The motivations of non-volunteer participants could have been quite different from those of contract negotiators engaged in actual negotiations.

2. The instrumental test negotiation case could have possessed an unforeseen amount of bias in terms of negotiating "power" in favor of the control-group buyers and/or the experimental-group sellers.

3. Test procedures and time constraints could have affected negotiation effectiveness in favor of the control-group buyers

4. Simulated negotiation might have resulted in an intuitively more palatable effect on negotiation effectiveness if supervisors, instead of colleagues, had played the role of "Devil's Advocate."

Finally, they stated, "Many other potential 'boundary variables' could be listed; however, their influence on the outcomes of the experiment are unknown."[58]

In addition to the unknown effects of the variables considered by Brosius and Erickson, the design of the test structure used in their experiment was examined. This examination led to the question as to whether the structure of the test as designed adequately provided for isolating the basic differences between the experimental-group participants playing the role of Buyer #1 and the control-group participants playing the role of Buyer #3. It appeared that it did not. Brosius and Erickson obtained the background and creativity characteristics of the

participants playing the roles of Buyer #1 and Buyer #3, respectively, and based their assessment of basic negotiator-capability differences thereon. However, the number of background and creativity characteristics considered by Brosius and Erickson was extremely limited and by no means exhaustive of even the very significant negotiator characteristics identified by the more prominent writers/students of negotiation and negotiators discussed in Chapter I. This number was, therefore, believed to be inadequate to ascertain, with acceptable validity, the basic difference between the negotiating abilities of the two buyers. Isolation of this difference was a necessary prerequisite for isolating the effect of simulated negotiations on "actual" negotiations. If this basic difference was not isolated and defined, then the effect thereof on negotiation effectiveness must necessarily have been commingled with the effect of simulated negotiations. Thus, it appeared that ascertaining neither the effect of the basic difference in negotiator abilities on negotiation effectiveness nor the effect of simulated negotiations on negotiation effectiveness was possible. Rather, the design of the experiment provided, generally, only for identifying the combined effect of both the basic difference in negotiator abilities and simulated negotiations on negotiation effectiveness.

Additionally found to be notable in the design of the Brosius and Erickson experiment was their statement that:[59]

> "Multiple repetitions of the test situation involved a major complication. A key element in any negotiation is the degree of uncertainty which exists about the final outcome; without this element, the negotiation would cease to be a negotiation, per se, and would degenerate to an enactment or re-enactment of a role-playing situation

> within the context of the scenario. This is because an individual is capable of true, creative negotiation in a given case only once. The test scenario presents a valid negotiating atmosphere only if each repetition is performed with entirely different negotiators."

These statements, if true, appeared to render the entire experiment suspect. Buyer #1 did, indeed, negotiate the same instrumental test case twice--once during simulated negotiation with Buyer #2 and, again, during "actual" negotiation with Seller #1. If it were true that an individual were "capable of true, creative negotiation in a given case only once," then Buyer #1 would have been capable of "true, creative negotiation" only during simulated negotiations and not during "actual" negotiations; thus, presumably, the value of simulated negotiations with respect to Buyer #1 would have been nil, at best, or negative. These statements were, however, found to be unsupported and unacceptable. Such statements were considered analagous to stating that beyond reaching a deadlock in negotiation, the negotiators were incapable, insofar as creativity was concerned, of resolving the points of conflict and negotiating a final satisfactory agreement.

On the contrary, the fact that in the experimental design of Brosius and Erickson, Buyer #1 and Buyer #3 negotiated with different sellers was considered to frustrate and even render impossible any attempt to isolate the effect of simulated negotiation. As discussed, above, the unknown difference between the abilities of Buyer #1 and Buyer #3 was complicated by the difference between the abilities of Seller #1 and Seller #2; and when these two differences were further complicated by the simulated-negotiation variable, the three variables, i.e., the

two differences and the simulated-negotiation variable, became confounded, thus rendering isolation and measurement of the effect of simulated negotiations practically impossible. Consequently, it was considered imperative in the instant experiment that the difference between the abilities of Buyer #1 and Buyer #3 be identified and defined and that the basic ability of the seller be held constant insofar as was possible. Otherwise, it was considered, any attempt to isolate and measure the effect of simulated negotiations would be frustrated by the commingling of uncontrolled variables constituting the negotiators' basic abilities.

2. The Instant Experiment

To seek answers to the research questions and to test the hypotheses in the instant research, a search was made for a credible and universally acceptable set of personality characteristics and a means by which to measure the characteristics. Such a set and the means by which to measure it were found in the Sixteen Personality Factor Questionnaire (16PF), developed principally by Dr. Raymond B. Cattell and published by the Institute for Personality and Ability Testing, Champaign, Illinois. The 16PF was found to be appropriate for use in measuring primary source traits, i.e., factors affecting large areas of the overt personality behavior, such as intelligence, emotional stability, superego strength, surgency, and dominance,[60] and, thereby, providing a basis for determining the effect of the source traits on negotiation effectiveness.

To test the hypotheses in the instant research, the experimental design described and developed by Brosius and

Erickson was modified in an effort to improve control of the independent variables. The model of the experimental design that evolved from the modification was as follows:

	PHASE I CASE #1	PHASE II CASE #2	PHASE III CASE #2
GROUP	"ACTUAL" NEGOTIATION	SIMULATED NEGOTIATION	"ACTUAL" NEGOTIATION
Experimental	Buyer #1 vs Seller #1	Buyer #1 vs Seller #2	Buyer #1 vs Seller #1
Control	Buyer #2 vs Seller #1	None	Buyer #2 vs Seller #1

This model described, basically, in the sequence of events followed:

1. Buyer #1 and Seller #1 negotiating Case #1 in "Actual" negotiation.
2. Buyer #2 and Seller #1 negotiating Case #1 in "Actual" negotiation.
3. Buyer #1 and Seller #2, playing the role of Buyer #1's Supervisor, negotiating Case #2 in simulated negotiation preparatory to Buyer #1's "Actual" negotiation of the same case with Seller #1.
4. Buyer #2 preparing for his negotiation of Case #2 with Seller #1 in any manner desired by him--except by means of simulated negotiation--during the negotiation of Case #2 by Buyer #1 and Seller #1.
5. Buyer #2 and Seller #1 negotiating Case #2 in "Actual" negotiation.

This sequence was followed in fifty percent of the four-participant iterations of the experiment described by the model. In the complementary fifty percent of the iterations, the sequence was modified such that Seller #1 negotiated Case #1 first with Buyer #2 and second with Buyer #1 and, then, negotiated Case #2 first with Buyer #2 and second with Buyer #1.

This model was designed, basically, to provide for:

1. Creating motivation for the negotiators to negotiate, by employing structured role-playing contract negotiation cases, or "scenarios," sufficiently representative of actual negotiation cases, or scenarios, to generate among the experiments participants motivation to negotiate approximating that motivation that they would experience in actual negotiation in the "real world."

2. Holding constant the oppositional, Seller #1 negotiator-related variables confronting both buyers in each iteration of the experiment by structuring the experiment such that Buyers #1 and #2 negotiated with only one Seller #1 in Phases I and III.

3. Employing Case #1 to isolate the "Baseline" difference between Buyer #1 negotiator effectiveness and Buyer #2 negotiator effectiveness and Case #2 to isolate the effect of simulated negotiation on actual negotiation effectiveness, i.e., the dependent variable, Price.

4. Minimizing the effect of Seller #1's negotiating each case more than once on the constancy of the oppositional negotiator-related variables confronting both Buyers by counterbalancing the sequence of negotiations in each iteration of the experiment, as described above.[61]

B. DESCRIPTION OF THE INSTRUMENTS USED

1. The Sixteen Personality Factor Questionnaire (16PF Test)

The 16PF Test selected for use in this research was found to be prominent among instruments currently employed to assess most of the important dimensions of personality and, possibly, to be "the best personality inventory there is."[62] Essentially, the test was found to be based on the personality-sphere concept developed by R. B. Cattell, an eminent psychologist, and to be designed to ensure coverage for all behavior commonly entering ratings and the dictionary descriptions of personality.[63] Finally, the 16PF Test was found to be based on a "series of interlocking researches over twenty-five years,

directed to locating unitary, independent, and pragmatically important 'source traits' both in ratings and questionnaires."[64] ("Source traits" referred to "factors affecting large areas of the overt personality behavior, such as intelligence, emotional stability, superego strength, surgency, and dominance."[65]) In sum, the 16PF Test was designed as an all-purpose instrument, bringing to applied psychology the concepts central to general personality theory, including, for general usefulness, a measure of intelligence but excluding any measurement of motivation and interest.[66] The primary source traits measured by the 16PF Test are presented in Table V.

2. The Role-playing, Contract-negotiation Cases

As indicated, above, in the model describing the design of the instant experiment, two role-playing, contract negotiation cases, or scenarios, were employed. Both cases were similar in that they involved the acquisition of special-production-run hardware by negotiation at prices of greater than $100,000 and less than $500,000. Additionally, both cases involved essentially a negotiation of labor hours (involving learning curve), labor rates, material rates, overhead, and profit. Finally, both cases involved a negotiation of contract type and delivery schedule.

Case #1, entitled "Galvanometer" and employed in Phase I iterations of the experiment, was a scenario constructed solely for use in the instant experiment. It was based principally and liberally on a case contained in Government Prime Contracts and Subcontracts Service,[67] and was used with the permission of the publishers. The case consisted of the role of the buyer and the

TABLE V

THE PRIMARY SOURCE TRAITS COVERED BY THE 16PF TEST

FACTOR	LOW STEN SCORE DESCRIPTION (1-3)	HIGH STEN SCORE DESCRIPTION (8-10)
A	Reserved, detached, critical, aloof, stiff Sizothymia	Outgoing, warmhearted, easy-going, participating Affectothymia
B	Dull Low intelligence (Crystallized, power measure)	Bright High Intelligence (Crystallized, power measure)
C	Affected by feelings, emotionally less stable, easily upset, changeable Lower ego strength	Emotionally stable, mature, faces reality calm Higher ego strength
E	Humble, mild, easily led, docile accommodating Submissiveness	Assertive, aggressive, competitive, stubborn Dominance
F	Sober, taciturn, serious Desurgency	Happy-go-lucky, enthusiastic Surgency
G	Expedient, disregards rules Weaker superego strength	Conscientious, persistent, moralistic, staid Stronger superego strength
H	Shy, timid, threat-sensitive Threctia	Venturesome, uninhibited, socially bold Parmia
I	Tough-minded, self-reliant, realistic Harria	Tender-minded, sensitive, clinging, overprotected Premsia
L	Trusting, accepting conditions Alaxia	Suspicious, hard to fool Protension
M	Practical, "down-to-earth" concerns Praxernia	Imaginative, bohemian, absent-minded Autia
N	Forthright, unpretentious, genuine but socially clumsy Artlessness	Astute, polished, socially aware Shrewdness
O	Self-assured, placid, secure, complacent, serene Untroubled adequacy	Apprehensive, self-reproaching, insecure, worrying, troubled Guilt proneness
Q_1	Conservative, respecting traditional ideas Conservativism of temperament	Experimenting, liberal, free-thinking Radicalism
Q_2	Group dependent, a "joiner" and sound follower Group adherence	Self-sufficient, resourceful, prefers own decisions Self-sufficiency
Q_3	Undisciplined self-conflict, lax, follows own urges, careless of social rules Low self-sentiment integration	Controlled, exacting will power, socially precise, compulsive, following self-image High strength of self-sentiment
Q_4	Relaxed, tranquil, torpid, unfrustrated, composed Low ergic tension	Tense, frustrated, driven, overwrought High ergic tension

Source: Cattell, R.B., Eber, H.W., and Tatsuoka, M.M., Handbook for the Sixteen Personality Factor Questionnaire, 1970 ed., Institute for Personality and Ability Testing, Champaign, Illinois, 1970, p. 16A.

role of the seller, thus lending itself well to determining the "baseline" difference between the negotiator effectiveness of Buyer #1 and Buyer #2 and to determining the effect of negotiator personality characteristics on negotiation effectiveness. A complete copy of the "Galvonometer" Case is presented in Appendix A.

Case #2, entitled "Apex Aviation" and employed in Phase II and Phase III iterations of the experiment, was a role-playing scenario designed by Dr. D. N. Burt to develop negotiating skills and was used with his permission. This case was found to be ideally suitable for use in that it consisted of the role of the buyer, the role of the buyer's supervisor, and the role of the seller and in that its design provided for the buyer's negotiating first in a simulated negotiation with his supervisor playing the role of seller, but with no more information than the buyer had and for the buyer's negotiating second in an "actual" negotiation with the seller. Thus, this case lent itself well to the design of the experiment to determine the effect of simulated negotiation on actual negotiation effectiveness. A complete copy of the Apex Aviation Case is presented in Appendix B.

C. THE SELECTION OF PARTICIPANTS

The selection of participants to play the roles of Buyers #1 and #2 and Sellers #1 and #2 was accomplished by soliciting the participation of military activities and commercial corporations on the West Coast. These organizations were sufficiently large and sufficiently experienced in negotiating Department of Defense contracts to employ contract negotiators, contracting

officers, contract administrators, and/or cost-price analysts experienced in negotiating contracts of the type represented by the role-playing, contract-negotiation cases employed in the experiment. Eleven military activities and three commercial corporations, identified in Appendix C, responded affirmatively. These activities and corporations, in turn, solicited the participation of personnel employed therein and judged by their supervisors to be qualified, with respect to knowledge and experience, to negotiate contracts for greater than $100,000. A total of 56 employees agreed to participate in the experiment. These participants were then assigned to play the roles of Buyer #1, Buyer #2, etc., on an indiscriminate basis. Among these 56 employees, ages, educational attainments, organizational positions, and professional background and experience levels varied. However, all were sufficiently knowledgeable of Department of Defense contract negotiations to negotiate the contracts contemplated in the role-playing cases employed, and all were sufficiently experienced to have participated previously in a Department of Defense contract negotiation. Thus, selection of participants was accomplished on a pragmatic, opportunistic, rather than technically preferable strictly random basis; and, accordingly, the resultant sample of elementary units, or participants, was of the category which may be classified as a combination of convenience and judgment[68]--convenient in that the sample was restricted to contract negotiators located on the West Coast and agreeable and available to participate, and judgmental in that the sample was restricted to contract

negotiators judged by their supervisors to be sufficiently knowledgeable and experienced to negotiate the type of contract contemplated in the role-playing cases employed in the experiment. Therefore, the results of the instant experiment were subject both to possible sampling error, i.e., "the differences between the sample and the population that are due solely to the particular elementary units that happen to have been selected," and sampling bias, i.e., the "tendency [however unconscious] to favor the selection of elementary units having particular characteristics."[69]

On the other hand, there was no awareness of any reason to believe that the participants in the instant experiment were not representative of the population of contract negotiators in the area of Department of Defense contract negotiations; and, therefore, the selection of participants was assumed to be random.

D. THE SEQUENCE OF THE EXPERIMENT

The instant experiment was conducted employing two sequences of events. In seven of the 14 four-participant iterations of the experiment, one sequence, "A", applied; in the complementary seven, another sequence, "B", applied. The model representing the two sequences that were employed is presented below:

ROLE PLAYER	HOUR #1 PHASE I	HOUR #2 PHASE I	HOUR #3 PHASE II	HOUR #4 PHASEIII	HOUR #5 PHASE III
SEQUENCE A					
B1 #'s1-7	CASE#1 B1 vs S1	16PF	CASE#2 B1 vs S2	CASE#2 B1 vs S1	
B2 #'s15-21	16PF	CASE#1 B2 vs S1			CASE#2 B2 vs S1
S1 #'s29-35	CASE#1 B1 vs S1	CASE#1 B2 vs S1	16PF	CASE#2 B1 vs S1	CASE#2 B2 vs S1
S2 #'s43-49	16PF		CASE#2 B1 vs S2		

ROLE PLAYER	HOUR #1 PHASE I	HOUR #2 PHASE I	HOUR #3 PHASE II	HOUR #4 PHASE III	HOUR #5 PHASE III
SEQUENCE B					
B1 #'s8-14	16PF	CASE #1 B1 vs S1	CASE #2 B1 vs S2		CASE #2 B1 vs S1
B2 #'s 22-28	CASE #1 B2 vs S1	16PF		CASE #2 B2 vs S1	
S1 #'s36-42	CASE #1 B2 vs S1	CASE #1 B1 vs S1	16PF	CASE #2 B2 vs S1	CASE #2 B1 vs S1
S2 #'s50-56	16PF		CASE #2 B1 vs S2		

From the point of view of the experimenter, this model described the activities of each participant in each five-hour, four-participant iteration of the experiment. In those iterations in which Sequence A was employed, participant activities were as follows:

1. Hour #1. During hour #1 of the iteration:

a. Buyer #1 and Seller #1 negotiated Case #1 and reported the results to the experimenter.

b. Buyer #2 and Seller #2 completed the 16PF Questionnaire.

2. Hour #2. During hour #2 of the iteration:

a. Buyer #1 completed the 16PF Questionnaire.

b. Buyer #2 and Seller #1 negotiated Case #1 and reported the results to the experimenter.

3. Hour #3. During hour #3 of the iteration:

a. Buyer #1 and Seller #2 negotiated Case #2 and reported the outcome to the experimenter.

b. Seller #1 completed the 16PF Questionnaire.

4. Hour #4. During hour #4 of the iteration:

Buyer #1 and Seller #1 negotiated Case #2 and reported the outcome to the experimenter.

5. Hour #5. During hour #5 of the iteration:

Buyer #2 and Seller #1 negotiated Case #2 and reported the outcome to the experimenter.

In those iterations in which Sequence B was employed, participant activities were as follows:

1. Hour #1. During hour #1 of the iteration:

a. Buyer #1 and Seller #2 completed the 16PF Questionnaire.

b. Buyer #2 and Seller #1 negotiated Case #1 and reported the results to the experimenter.

2. Hour #2. During hour #2 of the iteration:

a. Buyer #1 and Seller #1 negotiated Case #1 and reported the results to the experimenter.

b. Buyer #2 completed the 16PF Questionnaire.

3. Hour #3. During hour #3 of the iteration:

a. Buyer #1 and Seller #2 negotiated Case #2 and reported the results to the experimenter.

b. Seller #1 completed the 16PF Questionnaire.

4. Hour #4. During hour #4 of the iteration:

Buyer #2 and Seller #1 negotiated Case #2 and reported the results to the experimenter.

5. Hour #5. During hour #5 of the iteration:

Buyer #1 and Seller #1 negotiated Case #2 and reported the results to the experimenter.

In connection with the description of the sequences of events above, it should be noted that the buyer or seller roles for both Case #1 and Case #2 were distributed to the participants, as

appropriate, at least 24 hours prior to the beginning of the iteration. Thus, each participant was given at least 24 hours prior to the negotiations to study this role and prepare a negotiating position for each case. It should be noted further that while Buyer #1 engaged in preparatory mock negotiation with Seller #2 in each iteration, Buyer #2 was free to review or "fine tune" his negotiating position for Case #2 or to take an additional break, as he chose.

Finally, it is again emphasized that the objective in employing two sequences instead of just one was to equalize, insofar as was possible among 14 iterations of the experiment, the ability of Seller #1 with respect to the number of times he had previously negotiated each (and both) case(s) when negotiating each case with each buyer. For example, in Sequence A, when Buyer #2 and Seller #1 negotiated Case #2, Seller #1 had previously negotiated Case #2 once and Case #1 twice for a total of three negotiations; however, when Buyer #1 and Seller #1 negotiated Case #2, Seller #1 had previously negotiated Case #2 never and Case #1 twice for a total of only two negotiations. By employing one sequence of events during seven iterations and the other sequence of events during the complementary seven iterations, the ability of Seller #1 with respect to the number of times he had previously negotiated was equalized between the Buyer #1's and Buyer #2's negotiating with him within Phase I and within Phase II.

E. INSTRUCTIONS TO THE PARTICIPANTS

At the beginning of each iteration of the experiment, each participant was given the following instructions in addition to the information contained in the role-playing cases:

1. That he should attempt to play the buyer or seller role assigned--unencumbered, insofar as was possible, by his actual employment role of contract administrator, price analyst, etc.

2. That his objective was to acquire the product if he were playing the role of buyer or to sell the product if he were playing the role of seller.

3. That he had complete authority to negotiate an agreement at whatever price he determined to be acceptable.

4. That he had one hour to reach agreement.

5. That he should use the information available to him as given and as he determined to be most advantageous to him.

In addition to these instructions and the information contained in the role-playing cases, the participants were provided answers to general questions that they asked regarding coffee breaks, lunch periods, etc. After receiving answers to their questions, they commenced the negotiations, following the sequences described above.

IV. ANALYSIS OF DATA

A. DATA COLLECTION

A total of 56 procurement careerists representing eleven military activities and three commercial corporations participated in the experiment. Data were collected pertaining to the participants' personalities and to the price-outcome of the negotiations. The data pertaining to the participants' personalities consisted of the raw score for each of the 16 primary personality factors assessed in the 16PF Questionnaire for each buyer and seller participant. The data pertaining to the price-outcome of the 56 negotiations consisted of the dollar amounts negotiated and agreed upon by each buyer-seller negotiation pair for each role-playing case negotiated except the mock-negotiation case. All of the data collected during the 14 iterations of the experiment are presented in Tables VI and VII.

Table VI, 16PF RAW SCORES FOR NEGOTIATION PAIRS, identifies each of the 16 primary personality factors assessed by the 16PF Questionnaire and describes in layman terms the personality characteristic indicated by a low or high raw score, in a range of 0 to 12, for each factor. Beyond identifying and describing the 16 personality factors, Table VI presents the raw score generated by each of the participants for each factor. Table VI is arranged to facilitate comparing the factor scores of each buyer-seller negotiation pair within each group of buyers, experimental and control.

TABLE VI - 16PF RAW SCORES FOR NEGOTIATION PAIRS

A. EXPERIMENTAL GROUP

16PF FACTOR	LOW SCORE DESCRIPTION	HIGH SCORE DESCRIPTION	BUYER/SELLER (PARTICIPANT NUMBERS) RAW SCORES													
			01	02	03	04	05	06	07	08	09	10	11	12	13	14
			29	30	31	32	33	34	35	36	37	38	39	40	41	42
A	Reserved	Outgoing	7	8	10	10	8	9	9	9	10	8	8	7	8	9
			10	7	7	9	10	10	6	8	7	3	10	8	7	6
B	Dull	Bright	6	3	5	5	2	6	6	7	5	6	4	5	6	4
			6	2	6	5	5	6	6	5	4	3	6	5	6	6
C	Affected By feelings	Emotionally Stable	10	6	9	4	11	8	5	7	12	8	7	9	7	10
			11	8	4	10	6	5	10	6	6	10	8	7	8	9
E	Humble	Assertive	8	4	9	7	9	6	1	8	8	9	4	9	7	5
			7	6	8	6	7	9	2	7	6	9	6	4	5	5
F	Sober	Happy-Go-Lucky	6	3	2	4	8	5	6	3	10	4	5	11	8	7
			6	4	6	10	6	9	3	6	7	10	6	6	6	6
G	Expedient	Conscientious	6	10	8	5	8	3	10	8	2	4	9	5	6	11
			8	12	4	9	7	5	8	5	8	7	7	7	5	10
H	Shy	Venturesome	3	5	11	6	6	6	10	5	8	7	5	10	4	10
			5	6	5	8	6	11	3	5	4	12	8	6	6	6
I	Tough-minded	Tenderminded	4	7	8	8	6	5	1	5	8	9	6	8	6	6
			8	10	8	2	3	8	4	10	8	8	7	8	4	6
L	Trusting	Suspicious	10	3	4	4	5	5	2	7	3	5	4	9	7	2
			6	2	4	4	6	7	3	6	5	5	6	6	3	7
M	Practical	Imaginative	5	8	4	8	7	5	3	3	11	6	6	8	9	7
			10	5	7	2	6	6	3	6	8	3	8	5	8	3
N	Forthright	Astute	5	3	3	4	4	6	7	8	2	5	5	2	8	5
			6	6	5	5	4	6	7	6	6	3	6	6	2	5
O	Self-assured	Apprehensive	9	6	3	7	2	8	7	4	4	6	8	7	6	2
			7	6	10	4	4	4	5	0	11	0	3	6	4	4
Q_1	Conservative	Experimenting	7	6	6	10	4	9	2	7	12	7	5	10	10	11
			10	8	10	4	3	9	3	8	11	5	7	5	9	10
Q_2	Group-Dependent	Self-Sufficient	11	3	0	3	2	4	6	10	6	5	7	8	6	2
			6	8	8	1	2	4	6	12	4	7	4	7	10	5
Q_3	Undisciplined Self-conflict	Controlled	10	10	10	5	7	8	9	7	12	3	10	8	9	10
			6	12	4	8	7	9	11	12	10	8	7	8	8	8
Q_4	Relaxed	Tense	9	4	2	8	4	6	4	7	3	3	5	7	8	0
			6	6	10	3	4	7	3	2	7	2	4	9	4	5

TABLE VI - 16PF RAW SCORES FOR NEGOTIATION PAIRS (CONTINUED)

B. CONTROL GROUP

16PF FACTOR	LOW SCORE DESCRIPTION	HIGH SCORE DESCRIPTION	BUYER/SELLER (PARTICIPANT NUMBERS) RAW SCORES													
			15	16	17	18	19	20	21	22	23	24	25	26	27	28
			29	30	31	32	33	34	35	36	37	38	39	40	41	42
A	Reserved	Outgoing	12	7	9	10	8	12	6	8	8	10	10	11	10	9
			10	7	7	9	10	10	6	8	7	8	10	8	7	6
B	Dull	Bright	8	7	5	4	6	4	7	6	5	6	6	6	7	3
			6	2	6	5	5	6	6	5	4	3	6	5	6	6
C	Affected By feelings	Emotionally Stable	12	5	9	9	9	6	7	9	10	7	10	12	11	8
			11	8	4	10	6	5	10	6	6	10	8	7	8	9
E	Humble	Assertive	4	4	2	7	2	5	3	5	7	4	7	7	6	4
			7	6	8	6	7	9	2	7	6	9	6	4	5	5
F	Sober	Happy-Go-Lucky	6	7	5	5	4	8	8	7	6	5	5	8	8	5
			6	4	6	10	6	9	3	6	7	10	6	6	6	6
G	Expedient	Conscientious	8	7	7	11	6	8	7	9	6	5	11	8	10	8
			8	12	4	9	7	5	8	5	8	7	7	7	5	10
H	Shy	Venturesome	5	4	3	9	6	11	8	7	5	3	8	11	9	9
			5	6	5	8	6	11	3	5	4	12	8	6	6	6
I	Tough-minded	Tender-minded	10	8	7	6	6	4	6	8	12	4	7	8	6	8
			8	10	8	2	3	8	4	10	8	8	7	8	4	6
L	Trusting	Suspicious	7	3	4	6	6	4	5	2	6	5	5	3	6	7
			6	2	4	4	6	7	3	6	5	5	6	6	3	7
M	Practical	Imaginative	4	4	4	5	8	5	6	5	4	7	4	6	8	5
			10	5	7	2	6	6	3	6	8	3	8	5	8	3
N	Forthright	Astute	2	2	8	2	2	4	4	9	4	6	7	3	6	6
			6	6	5	5	4	6	7	6	6	3	6	6	1	5
O	Self assured	Appre-hensive	4	6	9	3	3	4	0	5	0	8	3	2	8	4
			7	6	10	4	4	6	5	0	11	0	3	6	4	4
Q_1	Con-servative	Experi-menting	8	5	2	7	6	10	7	5	12	8	7	12	9	0
			10	8	10	4	8	9	3	8	11	5	7	5	9	10
Q_2	Group-Dependent	Self-Sufficient	4	6	4	3	7	0	4	4	8	3	5	4	2	6
			6	8	8	1	2	4	6	12	4	7	4	7	10	5
Q_3	Undisciplined Self-conflict	Controlled	10	6	11	10	8	12	8	8	10	8	9	8	8	10
			6	12	4	8	7	9	11	12	10	10	8	7	8	8
Q_4	Relaxed	Tense	7	5	9	5	1	5	2	7	6	3	4	5	5	5
			6	6	10	3	4	7	3	2	7	2	4	9	4	5

TABLE VII

THE PRICES NEGOTIATED

PARTICIPANT NUMBER BUYER	SELLER	SEQUENCE (A OR B)	PHASE I CASE #1	PHASE III CASE #2	PRICE DIFFERENCE
A. EXPERIMENTAL GROUP					
01	29	A	63,000	337,500	274,500
02	30	A	85,000	316,991	231,991
03	31	B	71,500	395,000	323,500
04	32	A	92,500	402,500	310,000
05	33	A	138,000	401,400	263,400
06	34	A	95,000	402,800	307,800
07	35	A	90,000	351,000	261,000
08	36	B	78,000	392,500	314,500
09	37	B	95,000	377,860	282,860
10	38	B	95,000	410,000	315,000
11	39	B	67,000	365,000	298,000
12	40	A	115,000	409,000	294,000
13	41	B	71,226	390,000	318,774
14	42	B	111,000	363,055	252,055
B. CONTROL GROUP					
15	29	A	65,000	307,000	242,000
16	30	A	90,000	350,000	260,000
17	31	B	88,360	387,000	298,640
18	32	A	92,500	432,500	340,000
19	33	A	99,000	414,000	315,000
20	34	A	90,000	404,000	314,000
21	35	A	71,500	400,000	328,500
22	36	B	78,000	399,500	321,500
23	37	B	85,870	377,812	291,942
24	38	B	99,000	409,000	310,000
25	39	B	67,060	364,250	297,190
26	40	A	103,000	425,000	322,000
27	41	B	73,680	303,990	230,310
28	42	B	118,000	303,632	185,632

TABLE VII (Continued)

SUMMARY DATA FOR THE PRICES NEGOTIATED

SEQUENCE	PHASE I/CASE #1 MEAN (STD DEV'N)	PHASE III/CASE #2 MEAN (STD DEV'N)	PRICE DIFFERENCE MEAN (STD DEV'N)
A. EXPERIMENTAL GROUP			
A	96,928.5714 (23,728.3736)	374,455.8571 (38,138.5008)	277,527.2857 (28,277.535)
B	84,103.7143 (16,408.0762)	384,773.5714 (17,021.8180)	300,669.8571 (25,603.791)
TOTAL	90,516.1429 (20,697.8881)	379,614.7143 (28,874.1546)	289,098.5714 (28,562.433)
B. CONTROL GROUP			
A	87,285.7143 (13,975.7443)	390,357.1429 (45,444.7598)	303,071.4286 (37,002.735)
B	87,138.5714 (17,146.5161)	363,597.7143 (43,300.2050)	276,459.1429 (49,488.145)
TOTAL	87,212.1429 (15,028.2361)	376,977.4287 (44,847.6380)	289,765.2857 (44,192.256)
C. EXPERIMENTAL AND CONTROL GROUPS			
A	92,107.1429 (19,366.0871)	382,406.5000 (41,141.0395)	290,299.3571 (34,302.6008)
B	85,621.1429 (16,199.7249)	374,185.6429 (33,463.3663)	288,564.5000 (39,883.8111)
TOTAL	88,864.1429 (17,828.0582)	378,296.0714 (37,035.5403)	289,431.9286 (36,513.3647)

Table VII, THE PRICES NEGOTIATED, identifies each buyer-seller negotiation pair, the sequence of negotiations that applied in the iteration of the experiment in which the pair participated, the price negotiated for Case #1, "The Galvanometer Case," the price negotiated for Case #2, "The Apex Aviation Case," and the price difference, representing the difference between the price negotiated for Case #1 and the price negotiated for Case #2 (computed by subtracting the Case #1 price from the Case #2 price). With respect to sequence, described above, Sequence A consisted of Seller #1's negotiating Case #1 first with Buyer #1 (experimental group) and second with Buyer #2 (control group) followed by his negotiating Case #2 first with Buyer #1 and second with Buyer #2. Sequence B consisted of Seller #1's negotiating Case #1 first with Buyer #2 and second with Buyer #1 followed by his negotiating Case #2 first with Buyer #2 and second with Buyer #1. With respect to the price difference, the objective in computing and displaying the difference was to facilitate, in each iteration of the experiment and, later, for all iterations, determining whether the experimental-group buyer, having engaged in preparatory mock negotiation, had improved his negotiating effectiveness from Case #1 to Case #2 relative to the control-group buyer, considering the baseline difference between the two buyers in the price negotiated in Case #1.

In addition to the raw data, summary data for the prices negotiated and the price differences are presented in Table VII. These data include for each group and the two groups combined, by each sequence and by both sequences combined, the mean and the standard deviation computed for the prices

negotiated for Case #1 in Phase I, the prices negotiated for Case #2 in Phase III, and the price differences.

The Personality-factor data contained in Table VI and the negotiated-price data contained in Table VII, then, comprised all of the data collected during the experiment. These data were used to seek answers to the research questions as to the effects of various personality factors on negotiation effectiveness and as to the effect of the buyer's engaging in preparatory mock negotiation on actual negotiation outcome.

B. DATA PROCESSING AND ANALYSIS

Upon completion of the 14 four-participant, five-negotiation iterations of the experiment, the data collected and presented in Tables VI and VII were processed as a first step toward obtaining answers to the research question as to what, if any, effect measurable personality factors have on negotiation effectiveness and toward testing the research hypotheses relating to what, if any, effect engaging in preparatory mock negotiations has on actual negotiation effectiveness. Data processing was accomplished by employing the Statistical Package for the Social Sciences (SPSS),[70] a system of computer programs for statistical procedures which facilitated the correlation analyses and the analysis of variance required during the research. Upon completion of the data processing, the results thereof were analyzed to find answers to the research questions and hypotheses.

1. Data Processing

To seek an answer to the research question as to what, if any, effect measurable personality factors (considered

synonymous with personality characteristics) have on negotiation effectiveness (as indicated by the price negotiated), first, the price negotiated by each buyer participant and the raw scores for each of the 16 personality factors of each buyer were processed to determine whether or not a correlation existed between any of the raw scores and the price and, if so, the direction and strength of the correlation. Such data processing would, for example, facilitate determining whether or not greater buyer-negotiator effectiveness (i.e., lower negotiated price) correlated positively or negatively, weakly or strongly with higher intelligence, 16PF Questionnaire Factor B. To accomplish this processing, Pearson CORR, a sub-program of SPSS,[71] was employed.

The Pearson CORR sub-program basically calculates Pearson product-moment correlations for pairs of variables, producing the Pearson correlation coefficient r, which measures the strength of the relationship between the two variables, indicating both the goodness of fit of a linear regression line to the data and, in r^2, the proportion of variance in one variable explained by the other,[72] i.e., the extent to which variation in one variable is linked to variation in the other variable.[73] Additionally, the Pearson CORR sub-program conducts and reports a test of the significance of the correlation ccefficient, using the student's t with N-2 degrees of freedom for the computed quantity

$$r \qquad \frac{N - 2}{1 - r^2} \quad {}^1/_2 \ .^{74}$$

The formula employed by SPSS to compute the Pearson correlation coefficient is:

$$r = \frac{\sum_{i=1}^{N} X_i Y_i - \left(\sum_{i=1}^{N} X_i\right)\left(\sum_{i=1}^{N} Y_i\right)/N}{\left\{\left[\sum_{i=1}^{N} X_i^2 - \left(\sum_{i=1}^{N} X_i\right)^2/N\right]\left[\sum_{i=1}^{N} Y_i^2 - \left(\sum_{i=1}^{N} Y_i\right)^2/N\right]\right\}^{1/2}}$$

where x_i = ith observation of variable x, for example, price

y_i = ith observation of variable y, for example, raw score, Factor B.[75]

The Pearson CORR sub-program thus produced r values, r^2 values, and significance-test results for each price (negotiated for Case #1) - factor raw score (for each buyer participant) pair of variables contained in Tables VI and VII, e.g., price-factor A raw score, price - Factor B raw score, price - Factor C raw score, etc. The results of the processing of these data are presented in Table VIII and are discussed below in the Data Analysis Section.

The next step in processing the data to determine the effect, if any, of personality factors on negotiator effectiveness consisted of applying the Pearson CORR sub-program as described above to the variable, price difference, representing the difference in the price negotiated by each buyer participant for Case #1 and the price negotiated by him for Case #2, and the raw score produced by each buyer for each of the 16PF Questionnaire personality factors. This processing of data was accomplished to facilitate determining the strength of correlations of improvement in buyer-negotiator effectiveness from Case #1 to Case #2 and the raw score of each personality characteristic, for example, whether or not a smaller price difference, indicating relatively greater improvement, correlated with a higher raw score for 16PF Factor B, intelligence. The results of processing

these data are presented in Table IX and are discussed below in the Data Analysis Section.

The next step in processing data collected consisted of applying, for each buyer-seller negotiating pair, the Pearson CORR sub-program to the variables representing the buyer's raw scores for all 16 personaltiy factors and the seller's raw scores for all 16 personality factors and producing thereby a composite correlation coefficient, r, representing the degree of similarity or dissimilarity between the personalities of the buyer and the seller. These correlation coefficients then were compared, by application of the Pearson CORR sub-program, with the prices negotiated for Case #1, with the prices negotiated for Case #2, and with the price differences between the prices negotiated for Case #1 and Case #2. The objective of this approach to processing the data was to determine the strength of the correlation of the variable representing the personality similarity-dissimilarity of each buyer-seller negotiation pair, i.e., the correlation coefficient, and the variable representing the price negotiated by each buyer-seller negotiation pair. This processing was accomplished, in other words to facilitate determining whether or not, for example, buyer-seller-negotiation-pair personality similarity or dissimilarity correlated positively or negatively with lower or higher negotiated prices, or, in the case of the price difference, greater or less improvement in buyer negotiator effectiveness. The results of this data processing are presented in Table X and are discussed below in the Data Analysis Section.

TABLE VIII

CASE #1 PRICE-BUYER PARTICIPANT 16PF PERSONALITY FACTOR RAW SCORE CORRELATIONS

16PF FACTOR	FACTOR DESCRIPTION	NUMBER OF CASES	CORRELATION COEFFICIENT	PROBABILITY
A	Reserved vs Outgoing	28	-0.0420	.416
B	Dull vs Bright	28	-0.5777	.001
C	Affected by Feelings vs Emotional Stability	28	0.0792	.244
E	Humble vs Assertive	28	0.1109	.287
F	Sober vs Happy-Go-Lucky	28	0.0844	.335
G	Expedient vs Conscientious	28	-0.1565	.213
H	Shy vs Venturesome	28	0.2530	.097
I	Tough-minded vs Tender-minded	28	0.0110	.478
L	Trusting vs Suspicious	28	-0.1168	.277
M	Practical vs Imaginative	28	0.2717	.081
N	Forthright vs Astute	28	-0.2241	.126
O	Self-Assured vs Apprehensive	28	-0.1805	.179
Q_1	Conservative vs Experimental	28	-0.0654	.370
Q_2	Group-Dependent vs Self-Sufficient	28	-0.1770	.184
Q_3	Undisciplined Self-Conflict vs Controlled	28	-0.1834	.175
Q_4	Relaxed vs Tense	28	-0.2706	.082

TABLE IX

CASE #1 - CASE #2 PRICE DIFFERENCE

-- BUYER PARTICIPANT 16PF

PERSONALITY FACTOR RAW SCORE CORRELATIONS

16PF FACTOR	FACTOR DESCRIPTION	NUMBER OF CASES	CORRELATION COEFFICIENT	PROBABILITY
A	Reserved vs Outgoing	28	-0.0093	.481
B	Dull vs Bright	28	0.2268	.123
C	Affected by Feelings vs Emotional Stability	28	-0.1090	.290
E	Humble vs Assertive	28	0.2403	.109
F	Sober vs Happy-Go-Lucky	28	0.0854	.333
G	Expedient vs Conscientious	28	-0.2485	.101
H	Shy vs Venturesome	28	0.0144	.471
I	Tough-minded vs Tender-minded	28	-0.0630	.375
L	Trusting vs Suspicious	28	-0.0528	.395
M	Practical vs Imaginative	28	-0.0358	.428
N	Forthright vs Astute	28	0.0393	.421
O	Self-Assured vs Apprehensive	28	-0.1327	.250
Q_1	Conservative vs Experimental	28	0.3277	.044
Q_2	Group-Dependent vs Self-Sufficient	28	-0.0351	.430
Q_3	Undisciplined Self-Conflict vs Controlled	28	-0.1804	.179
Q_4	Relaxed vs Tense	28	0.0293	.441

To seek an answer to the research question as to what, if any, effect preparatory mock negotiation has on actual negotiation effectiveness, the price difference between the price negotiated for Case #1 and the price negotiated for Case #2 for each buyer in the experimental group was compared with the price difference for each buyer in the control group. Such processing of the data would facilitate determining whether or not the mean price difference for the experimental-group buyers and the mean price difference for the control-group buyers were the same or different, statistically, and coincidentally determining whether or not preparatory mock negotiations had any effect on actual negotiation outcome with respect to price. To accomplish this processing, ANOVA, a sub-program of SPSS, was employed.[76]

As applied to the experimental model

SEQUENCE	BUYER GROUP	
	EXPERIMENTAL	CONTROL
A	Price differences	Price differences
B	Price differences	Price differences

where price difference is the dependent, or criterion, variable, and buyer group and sequence are categorical independent variables, or factors, the ANOVA sub-program decomposes the total variation in price difference, which may be represented by SS_y, into three independent components: the portion of the total variation in SS_y due to the variation in the two means of the experimental and control categories of the Buyer-Group factor, respectively, which may be denoted SS_A; the portion

TABLE X

CORRELATION OF BUYER-SELLER PERSONALITY SIMILARITY WITH CASE #1 PRICES, CASE #2 PRICES, AND CASE #1 PRICE--CASE #2 PRICE DIFFERENCES

BUYER-SELLER NUMBERS	BUYER-SELLER PERSONALITY CORRELATION/ PROBABILITY	CORRELATION WITH CASE #1 PRICES/PRO-BABILITY	CORRELATION WITH CASE #2 PRICES/PRO-BABILITY	CORRELATION WITH CASE #1 -CASE #2PRICE DIFFERENCE/ PROBABILITY
A. EXPERIMENTAL - GROUP BUYERS				
01-29	0.0073/.489			
02-30	0.7461/.000			
03-31	-0.4097/.058			
04-32	-0.1824/.249			
05-33	0.5613/.012			
06-34	0.3224/.112			
07-35	0.5511/.013			
08-36	0.3916/.067			
09-37	0.2833/.144			
10-38	0.2494/.176			
11-39	0.2207/.206			
12-40	-0.1390/.304			
13-41	0.2562/.169			
14-42	0.6486/.003			
		0.0555/.390	-0.1843/.174	-0.2140/.137
B. CONTROL-GROUP BUYERS				
15-29	0.4939/.026			
16-30	0.3611/.085			
17-31	-0.1609/.276			
18-32	0.6641/.003			
19-33	0.3249/.110			
20-34	0.7317/.001			
21-35	0.2680/.158			
22-36	0.0313/.454			
23-37	0.1208/.328			
24-38	-0.1676/.267			
25-39	0.7202/.001			
26-40	0.0667/.403			
27-41	0.1472/.293			
28-42	0.1092/.344			

of the total variation in SS_y due to the variation in the two means of the A and B categories of the sequence factor, respectively, which may be denoted SS_B; and the portion of the total variation in SS_y due to the interaction of the Group and Sequence factors, which is the variation in the two means of the experimental group, Sequence A and control group, Sequence B cells pooled and the experimental group, Sequence B and control group, Sequence A cells pooled, respectively, and which may be denoted SS_{AB}. (Generally, if differences in the Group categories produced the same effect whether the participants followed Sequence A or Sequence B, and if differences in the sequence followed produced the same effect whether the participants were in the experimental group or the control group, then the interaction component would tend to be nil.)[77] Thus, the model for the ANOVA sub-program is $SS_y = SS_A + SS_B + SS_{AB} + SS_{error}$[78] (the SS_{error} representing variation not accounted for by either the factors or their interaction, i.e., the variation of individual prices about the means of the cells in which they are located).

Upon completion of calculating the SS components, the ANOVA sub-program computes degrees of freedom (df) for each of the SS components. For the group factor, SS_A, df equals the number of categories minus one (2-1=1); for the sequence factor, SS_B, df equals the number of categgries minus one (2-1=1); for the interaction of the two factors, SS_{AB}, df equals (the number of categories of factor A minus one) times (the number of

categories of factor B minus one), or (2-1)(2-1) = 1; for the total, SS_y, df equals the total number of data points, i.e., price differences, minus one (28-1 = 27); and for the error term, SS_{error}, df = the df for SS_y minus the df for SS_A minus the df for SS_B minus the df for SS_{AB} (27-1-1-1 = 24).[79]

With the SS components and the degrees of freedom computed, the ANOVA sub-program next calculates the mean square (ms) for SS_y, SS_A, SS_B, SS_{AB}, and SS_{error} by dividing each of the SS calculations by its associated df.[80]

The next step in the processing of the data through the ANOVA sub-program is a calculation of the F ratio and the statistical significance thereof for each of the mean squares calculated except that for MS_{error}, which is the figure by which each of the other mean squares is divided to determine the F ratio. The ANOVA sub-program computes:[81]

$$F = \frac{MS_{A,\ B,\ AB}}{MS_{error}}$$

and the significance thereof to determine whether all of the observed sums of squares, i.e., $SS_A + SS_B + SS_{AB}$, due to factors A and B are likely to have come from a population where no such effects exist, i.e., whether the variation in SS_y equals the variation in SS_{within}, or $_{error}$;

$$F = \frac{MS_{A,B}}{MS_{error}}$$

and the significance thereof, i.e., the significance of the interaction effect;

TABLE XI

RESULTS OF THE ANALYSIS OF VARIANCE OF PRICE DIFFERENCES

A. CELL MEANS

SEQUENCE	G R O U P		
	EXPERIMENTAL	CONTROL	EXPERIMENTAL & CONTROL
A	277,527.25	303,071.38	290,299.31
B	300,669.81	276,459.13	288,564.50
A AND B	289,098.56	289,765.25	

B. ANALYSIS OF VARIANCE

SOURCE OF VARIATIONS	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIFICANCE OF F
Main Effects	24,179,648	2	12,089,824	0.009	0.991
Group (G)	3,111,555	1	3,111,555	0.002	0.962
Sequence (S)	21,068,096	1	21,068,096	0.016	0.900
Interaction (G,S)	4,332,199,936	1	4,332,199,936	3.286	0.082
Explained	4,356,382,720	3	1,452,127,488	1.101	0.368
Error		24	1,318,360,576		
Total		27	1,333,223,680		

C. MULTIPLE CLASSIFICATION ANALYSIS

GRAND MEAN	GRAND MEAN 289,431.88	N	UNADJUSTED DEV'N	UNADJUSTED ETA	ADJUSTED FOR INDEPENDENTS DEV'N	ADJUSTED FOR INDEPENDENTS BETA
VARIABLE/ CATEGORY						
GROUP				0.01		0.01
EXPERIMENTAL		14	-333.31		-333.44	
CONTROL		14	333.38		333.25	
SEQUENCE				0.02		0.02
A		14	867.44		867.31	
B		14	-867.38		-867.56	
MULTIPLE R^2						0.001
MULTIPLE R						0.026

$$F = \frac{MS_A}{MS_{error}}$$

and the significance thereof, i.e., the significance of the Factor A (Group) effect; and

$$F = \frac{MS_B}{MS_{error}}$$

and the significance thereof, i.e., the significance of the factor B (Sequence) effect.

The results of the processing of data through the ANOVA sub-program of SPSS are presented in Table XI and are discussed in the Analysis Section, below.

2. Data Analysis

The analysis of the data processed as described in the Data Processing Section, above, consisted of culling the results of the various SPSS sub-programs employed and discerning from them their meaning as applicable to the research questions and hypotheses on which the research was based. The analyses that follow are keyed to the research questions and hypotheses formulated above.

a. Research Question: Does a credible universally recognized set of measurable personality factors exist in the current state of knowledge?

This research question required no analysis but did require investigation. Such an investigation was conducted, as discussed previously, and it was found that a credible, universally recognized set of measurable personality factors did exist and was available for use in personality-factor assessment in the

16PF Questionnaire. This questionnaire was used in assessing, or measuring, the personalities of the participants in the research.

b. Research Question: If a credible, universally recognized set of measurable personality factors exists, then what, if any, effects do these factors have on negotiation effectiveness?

To answer this question, the data in Tables VIII through X were analyzed as follows:

(1) Analysis of Table VIII, Case #1 Price-Buyer Participant 16PF Personality Factor Raw Score Correlations.

Table VIII, introduced above, presented the correlations between the buyer participants' 16 personality factors and the prices negotiated by those buyer-participants for Case #1. For each 16PF factor, the table provided a description of the factor in layman terms, indentified the number of pairs of factor-Case #1 price correlated, specified the correlation coefficient resulting from the correlation, and stated the probability associated with the correlation coefficient. The correlation coefficient specified indicated the "goodness of fit" of a linear regression line to the factor-score and the Case #1-price data. In the case of a perfect fit, the coefficient would acquire the value of +1.0 or -1.0 where the sign of the correlation coefficient and that of the regression coefficient were the same. A positive correlation would indicate that the factor score and the Case #1 price tended to increase or decrease together. A negative correlation coefficient

would indicate that as the factor score became larger, the Case #1 price tended to become smaller, or vice versa. Where there was a poor fit of the regression line to the data, the correlation coefficient tended to be close to zero.[82] The probability associated with each correlation coefficient indicated the probability that the correlation coefficient produced from the sample data collected resulted from sample variability or chance and not from the strength of the association of the two variables;[83] thereby, the probability thus reported provided information for use in determining whether to accept or reject the correlation coefficient as an indicator of the relationship between the two variables. (The probabilities were derived from the use of the Student's t with N-2 degrees of freedom for the computed quantity.)[84]

An inspection of the data contained in Table VIII resulted in finding no factor-Case #1 price correlation significant except that correlation of the dull-vs.-bright scores, i.e., the buyers' intelligence scores, and the Case #1 prices. The coefficient of that correlation was -0.5777 with a probability of .001 and indicated that as the buyers' intelligence scores increased, the price negotiated by the buyers for Case #1 decreased or vice versa. The intelligence factor-Case #1 price correlation was considered even more significant than the face value of probability indicated because the correlation emerged without any conscious consideration or control of the intelligence of the sellers with whom the buyers were negotiating.

(2) Analysis of Table IX, Case #1-Case #2 Price Differences - Buyer Participant 16PF Personality Factor Raw Score Correlations.

Table IX presented the correlations between the buyer-participants' 16 personality factors and the price differences produced by those buyer-participants in negotiating Case #1 and Case #3. Table IX, then, was identical in structure to Table VIII except that in Table IX the difference between the prices negotiated for the two role-playing cases was the object under consideration instead of the prices negotiated for a single role-playing case. An inspection of the data contained in Table IX resulted in finding, at the .044 level of significance, a correlation coefficient of 0.3277 for the correlation of factor Q_1 and the price difference. This correlation indicated that those buyers who tended to be experimental, liberal, and free-thinking, or characterized by radicalism, tended to improve their performance less from Case #1 to Case #2 than those buyers who tended to be conservative and respectful of traditional ideas, or characterized by conservatism of temperament. Other than this correlation, no factor-price difference was found to be statistically significant at the .05 level or better.

(3) Analysis of Table X: Correlation of Buyer-Seller Personality Similarity with Case #1 Prices, Case #2 Prices, and Case #1 Price - Case #2 Price Differences.

Table X presented: first, the correlations of the 16 personality-factor scores of the buyer and the 16 personality-factor scores of the seller in each buyer-seller

negotiation pair, i.e., a correlation coefficient for each buyer-seller pair representing the similarity or dissimilarity of their personalities; second, the correlation of the buyer-seller similarity coefficients with the prices negotiated for Case #1; third, the correlation of the buyer-seller similarity coefficients with the prices negotiated for Case #2; and finally, the correlation of the buyer-seller similarity coefficients with the price differences between the prices negotiated for Case #1 and the prices negotiated for Case #2. Upon inspection of these results, it was noted that among the 28 buyer-seller pairs there were eight significant buyer-seller personality correlations at the five percent level. All were in the similar direction, as was the trend among the remaining 20 pairs. In other words, except for the 03-31 buyer-seller pair, all pairs were in the range of not dissimilar to highly similar, thus indicating that the entire sample of 42 participants was a relatively homogeneous group of individuals.

It was further noted that there was not any significant correlation in: (1) the correlation of the correlation coefficients representing buyer-seller similarity or dissimilarity and the prices negotiated for Case #1; (2) the correlation of the correlation coefficients representing buyer-seller similarity or dissimilarity and the prices negotiated for Case #2; or (3) the correlation of the correlation coefficients representing buyer-seller similarity or dissimilarity and the price differences between the prices negotiated for Case #1 and the prices negotiated for Case #2.

c. Hypothesis Ho: Mock, or simulated negotiation employed by the buyer and not by the seller does not affect negotiation effectiveness.

To test this hypothesis, the results of the analysis of price-difference variance presented in Table XI were analyzed. It was initially noted, without regard to significance, that among the 14 iterations of the experiment, including both sequences, the experimental-group buyers (with preparatory mock negotiation) produced a smaller mean price difference between the price negotiated for Case #1 and the price negotiated for Case #2 than did the control-group buyers (without preparatory mock negotiation). The difference between the mean price differences produced by the two groups was $666.69 ($289,765.25 - $289,098.56) and indicated, again without regard to significance, the effect of the mock-negotiation variable on the outcome of Case #2, considering the baseline difference in negotiator ability between the experimental-group and control-group buyers. It was additionally noted, upon examination of the cell means, that in the seven iterations of the experiment in which Sequence A applied (where the seller-competition facing the two buyers was biased in favor of the experimental-group buyers in that the seller had already negotiated each case with the experimental-group buyer when he negotiated with the control-group buyer), the mean price difference produced by the experimental-group buyers was lower by $25,544.13 ($303,071.38 - $277,527.25) than that produced by the control-group buyers. Still, without regard to significance, the $25.544.13 difference between the two groups in favor of the experimental-group buyers might be

said to have resulted from the effect of the mock negotiation, in part, and from the effect of the bias, in complementary part.

Similarly, it was noted that in the seven iterations of the experiment in which Sequence B applied (where the seller competition facing the two buyers was complementarily biased in favor of the control-group buyers), the mean price difference produced by the experimental-group buyers was $24,240.68 higher ($300,699.81 - $276,459.13) than that produced by the control-group buyers. Among the iterations of the experiment in which Sequence B was followed, then, it might be said that the effect of the bias in favor of the control group overwhelmed and rendered unrecognizable the effect of the mock negotiation, if any.

Finally, it was noted in the examination of the cell means that the mean price difference produced by those experimental- and control-group buyers following Sequence A was $1,734.81 higher ($290,299.31 - $288,564.50) than that produced by those experimental- and control-group buyers following Sequence B. This $1,734.81 difference suggested that although the biases introduced in the experiment affected those buyers following the two sequences, respectively, somewhat differently, the effects on those buyers' performances, respectively, were fairly equivalent, i.e., introducing bias in favor of the experimental-group buyers in 50 percent of the iterations of the experiment was compensated fairly equivalently by introducing bias in favor of the control-group buyers in the complementary 50 percent of the iterations.

Next, in the analysis of the results presented in Table XI, the analysis of variance of the price differences was examined. Initially, it was noted that the "main effects" were not significant at any acceptable level of significance, thus indicating that the factors of group (and, therefore mock negotiation), sequence, and the interaction thereof in combination produced no effect on the criterion variable, price difference.[85] Next, it was noted that the interaction effect of group and sequence on price difference was significant at the .08 level of significance, thus suggesting that the effect of the group factor could have varied from one category of sequence to the other and vice versa, i.e., the group following the sequence biased in favor of that group performed better than the other group. Next, it was noted that neither the effect of the group factor (mock negotiation) nor the effect of the sequence factor on the price difference was significant at any acceptable level of significance, thus indicating, in sum germane to the research, that there was no difference in the price negotiated in Case #2 between those experimental-group buyers who engaged in preparatory mock negotiation and those control-group buyers who did not, considering the baseline difference between the two buyers in each iteration. This indication was based on the rationale for analysis of variance that, intuitively, if the variation in the means of the categories of the group factor and the sequence factor is less than the variations in the price difference within the categories of the group factor and the sequence factor, respectively, then the effects of group and sequence factors tend to be nil.[86]

Finally, in the analysis of the results presented in Table XI, the "Multiple Classification Analysis" produced by the ANOVA sub-program[87] was examined. In this portion of Table XI, the grand mean of all of the price differences observed was stated; and the number of price differences in each category was given. The "unadjusted" columns presented the deviation of each category of the two factors from the grand mean without adjustment for other factors or for covariates and the "ETA" for each factor which, when squared, indicated the proportion of variation in the price difference explained by the factor that it represented. The group factor, for example, explained only .01% of the total variation in the price differences, and the sequence factor explained only .04% of the total variation in the price difference. The "adjusted" columns presented the deviation of each category from the grand mean when adjustment had been made for the other factor and the "Beta" for each factor, which, in both cases in this analysis of variance was equivalent to the "ETA's" in the "Unadjusted" columns. In addition to the deviations, the "ETA's" and the "BETA's," the multiple classification analysis provided a "Multiple R^2," which indicated the overall relationship between the criterion variable, price difference, and the independent variables, group and sequence, i.e., the group and sequence factors jointly explained 0.1% of the total variation in the price difference.[88] In summary, the multiple classification analysis indicated that: between the two groups, the experimental group buyers produced, on the average, a price difference which

was $333 less than the grand mean of price differences; and the control-group buyers produced, on the average, a price difference which was $333 more than the grand mean of the price difference; between the two sequences, the experimental-and-control-group buyers following Sequence A produced, on the average, a price difference which was $867 more than grand mean of the price difference, and the experimental-and-control-group buyers following Sequence B produced on the average a price difference which was $867 less than the grand mean of the price difference; and, together, the two factors of group and sequence explained very little of the total variation in the price difference.

V. CONCLUSIONS

The conclusions resulting from the research are based on investigations conducted and on the analyses of the data collected during the research and presented in Tables VI and VII. These conclusions are stated below in association with the research questions and hypotheses to which they pertained.

A. THE EFFECT OF PERSONALITY CHARACTERISTICS ON NEGOTIATION EFFECTIVENESS

1. Research Question: Does a credible, universally recognized set of measurable personality factors exist in the current state of knowledge?

a. Conclusion

A credible, universally recognized set of measurable personality factors does exist in the current state of knowledge.

b. Comment on Conclusion

This finding was based primarily on reviews of personality assessment contained in The Sixth Mental Measurement Yearbook and, in particular, the comment included therein that the 16PF "May well be the best personality inventory there is."[89] This is not to say that the 16PF is a complete inventory of personality characteristics nor is it to say that the 16PF Questionnaire is free from flaws or without peer, as the reviews in the yearbook clearly point out.[90] Rather, the 16PF was found to be a credible, universally recognized set of measurable personality factors suitable for use in assessing the personality characteristics of contract negotiators.[91]

2. Research Question: If a credible, universally recognized set of measurable personality factors exists, then what, if any, effects do these factors have on negotiation effectiveness?

a. Conclusions

The personality-factor scores representing the intelligence of each of the buyers correlated reasonably well (-0.5777) with the price negotiated for Case #1 regardless of the intelligence of the seller with whom the buyer negotiated, i.e., the higher the intelligence score of the buyer, the lower the price negotiated and vice versa. None of the remaining 15 personality-factor scores correlated significantly with the price negotiated.

With respect to buyer personality factors - price difference correlations, none of the personality-factor scores of the buyers correlated significantly at any acceptable level with the price differences except the correlation of the conservative-vs-experimental-factor scores and the price differences. That particular correlation produced a coefficient of 0.3277, significant at the .044 level, and indicated that those buyers who tended to be experimental tended to improve their performances less than those buyers who tended to be conservative.

Finally, buyer-seller personality similarity-dissimilarity was found not to correlate significantly with either the prices negotiated for Case #1, the prices negotiated for Case #2, or the price differences between the prices

negotiated for Case #1 and Case #2. This, however, may have been due in part to the fact that buyer-seller pairs in this sample tended to be quite similar to each other.

b. Comment on Conclusions

These conclusions suggested that other unknown variables affect the price negotiated more than the personality factors of the buyer and that buyer-seller pairs in actual negotiations tend to share similar personality characteristics. Perhaps, as inferred by Procurement Associates, Inc., the degree of negotiator preparation produces the greatest effect.[92] Therefore, in the selection of the negotiators, the findings of this research did not support any emphasis beyond that currently directed by the Department of Defense.

B. THE EFFECT OF PREPARATORY MOCK NEGOTIATION ON NEGOTIATION EFFECTIVENESS

1. Research hypothesis Ho: Mock, or simulated, negotiation employed by the buyer and not by the seller does not affect negotiation effectiveness.

a. Conclusion

The null hypothesis should be accepted, based on the results of the analysis of variance.

b. Comment on Conclusion

Although the experimental-group buyers did produce a mean price difference smaller than that of the control-group buyers, thus indicating superficially that mock negotiation did favorably affect the negotiation outcomes, the difference between the two means of the two groups, respectively, was

statistically insignificant; and although segments of the total sample were analyzed separately, the results of the analysis of the total sample were necessarily the only ones fully meaningful, i.e., it was necessary to consider both sequences A and B in the analysis of the results of the total experiment to ensure the counterbalancing of the biases introduced in the experiment. In sum, acceptance of the null hypothesis indicated that engaging in mock negotiation did not affect negotiation outcome.

2. The Alternate Hypotheses

The null hypothesis was found to be acceptable; therefore, any testing of the alternate hypotheses was unnecessary.

VI. ADDITIONAL COMMENTS AND SUGGESTIONS FOR FURTHER RESEARCH

A. THE EFFECT OF PERSONALITY SIMILARITY/DISSIMILARITY ON NEGOTIATION EFFECTIVENESS

1. Comments

The data collected, processed, and analyzed during this research indicated no significant correlation between an individual negotiator's personality characteristics (except possibly intelligence and conservatism) and negotiation outcome. Additionally, the processing of these data produced no significant correlation between the correlation coefficient representing the similarity of the personalities of the buyer-and-seller pairs and negotiation outcome. However, as indicated in the Analysis Section, there was so much personality homogeneity, i.e., similarity, among the participants in the experiment that finding a correlation between buyer-seller personality similarity-dissimilarity and negotiation outcomes was rendered unlikely due to the absence of a sufficient number of dissimilar buyer-seller pairs. Therefore, it can be suggested neither that personality characteristics should, nor that they should not, be accorded more emphasis in the selection of Department of Defense contract negotiators than that currently directed. Nor can it be suggested that attempting to produce, through the selection of negotiators, any particular buyer-seller personality mix would or would not result in improved negotiation outcomes. These suggestions must await research findings that are more nearly conclusive.

In light of the inconclusive results of the instant research, the suggestions of Rubin and Brown, discussed previously, that the combination of the buyer's interpersonal orientation, his motivational orientation, and his power in relation to that combination of the seller's such orientations and power does affect negotiation effectiveness significantly, continue to provide intuitive appeal.

Although personality characteristics, when isolated, appeared to have little or no impact on negotiation effectiveness, it may be, as Rubin and Brown suggested, that in combination with the motivational orientation and power of the two parties to the negotiation, personality characteristics do affect negotiation outcome, as would intuitively seem probable.

2. Suggestions for Further Research

In view of the results of the instant study and the intuitive appeal of the Rubin and Brown discussion, it is suggested that research as to what impact the interpersonal orientation, motivational orientation, and power of each of the parties to contract negotiation, in combination, have on negotiation effectiveness be conducted. Additionally, it is suggested that further research be conducted to determine conclusively what, if any, effect buyer-seller-personality similarity-dissimilarity has on negotiation outcome -- research including buyer-seller pairs with similar and dissimilar personalities.

B. THE VALUE OF MOCK NEGOTIATION AS A PREPARATION TECHNIQUE

1. Comments

This research indicated, in the acceptance of the null hypothesis, that mock negotiations as a preparation technique

did not significantly affect the actual negotiation outcome. However, acceptance of the null hypothesis in this research does not indicate that mock negotiation as a preparation technique is without value; rather, acceptance indicates only that the results are inconclusive and that the outcomes observed might have resulted from: the negotiation cases having been unrealistic; distortions caused by the time constraints imposed; distortions caused by the differences in the physical settings in which the experiment was conducted; the homogeneity of the participants sampled; or other factors. Therefore, mock negotiation as a preparation technique may or may not in fact affect negotiation outcome, but conclusions pertaining thereto must await the results of further research.

In a practical sense, the question as to whether the buyer's engaging in preparatory mock negotiations affected negotiation outcome might have appeared to be trivial. Certainly, it could be argued that if the buyer's engaging in preparatory mock negotiations resulted in his negotiating a significantly lower price, then the seller could surely employ the same method of preparation and, thereby, nullify any advantage that the buyer might have acquired by engaging in preparatory mock negotiations. Although such nullification seemed to the researcher to be plausible and, under such circumstances as described, probable, the question arose as to whether mock negotiation was superior to other methods of preparation, such as individual preparation, preparation including pre-negotiation clearance, or approval, of strategy and position by higher

authority, and preparation including "murder-boarding." The instant research addressed the question as to whether preparatory mock negotiation was superior to individual preparation alone--the type of preparation employed by the control-group buyers--and indicated that mock negotiation, in addition to individual preparation, resulted in neither better nor worse negotiation outcome; it did not include a comparison of preparatory mock negotiation, pre-negotiation clearance, or approval, by higher authority, and "murder-boarding."

2. Suggestions for Further Research

In light of the results of the instant research and the comments above, it is suggested that research as to which, if any, method of preparation for negotiation is most effective be conducted. Included in such research might be a comparison of mock negotiation, pre-negotiation clearance, or approval by higher authority, and "murder-boarding."

APPENDIX A

THE GALVANOMETER CASE

ROLE

of

LARRY LYON, DIRECTOR OF MARKETING, SPARK ELECTRONICS CO.

Your company manufactures, among other major products, galvanometers which you have sold to prime contractors and upper-tier subcontractors and to commercial firms, as well. Recently you received an RFP from the Air Force for 1000 galvanometers identical to a new model which you previously have sold in a quantity of 200 at a price of $150 each, only to Short Electric Co., a major prime contractor. Incident to the RFP, the Air Force has requested that you submit cost and pricing data. You have just been through an audit relating to the establishment of a negotiated final overhead rate for the previous year for use on your cost-type contracts. (See Exhibit I.) Additionally, you have accurate information concerning labor and material costs available from the previous procurement by Short of the 200 galvanometers.

On the first proposal to Short, you had included a burden rate of 157%; however, as a result of reduction in business, your most recent audited manufacturing burden rate was 212.6%.

Your "Customer Service Expense" audited rate was 2.55%; however, the auditor had disallowed approximately 75% of these expenses, including advertising, salaries, commission and expenses in connection with the salesmen.

Your "General and Administrative Expense" audited rate was 8.06% after the auditor had eliminated contributions, patent expenses, credit and collection expenses, and bad debts amounting to $15,600.

Using these rates, the total unit cost on the previous contract was only $82.20. (See Exhibit II.)

In your effort to price the proposal for the1000 units for the Air Force, considerable discussion arose among the management members of Spark. This discussion focused on the following major points:

a. The galvanometer was a new, improved model. The Air Force had requested the RFP. Within reasonable limits, the company could assume that it will be the only bidder.

b. The volatile nature of the company's business prospects because of the effects of the Vietnam War and energy prices on the defense budget.

c. The fact that all economic indicators forecast strong inflationary pressures on wages and prices.

After analysis of the above factors, plus the cost projections furnished by the financial department, you submitted a price of $140.99 per unit. (See Exhibit II.) Your position in the forthcoming negotiation with the Air Force is as follows:

a. Purchased parts. Your projected cost of $1.67 per unit is based on the previous actual unit cost of $1.52 plus a 10% increase. The increase is based on your prediction of increased prices resulting from the copper strike, recent inflationary increases in steel, wage increases in the automobile industry, and statements by the President.

b. Raw material. Same as purchased parts, above.

c. Labor. Your direct labor-hour projections are based on previous actual unit costs. The labor rate of $2.09 per hour is based on actual labor rates for previous production of the same item factored by a 10% increase projected at the estimated midpoint of the effort of the proposed work. The estimated 10% wage increase is based on Spark's prediction of increased costs based on: an analysis of the recent inflationary wage increases granted in the automobile industry; statements by national union leaders that they intend to press for high wage and fringe benefit increases; and statements by the President warning of runaway inflation in the event taxes are not increased.

d. Manufacturing overhead rate. The manufacturing overhead rate is based on Spark's projection of increased overhead costs and decreased labor during the current fiscal year, computed as follows:

1. Calculation of manufacturing overhead increases:

(a) Manufacturing overhead last year

Salaries and wages	$173,136
Other overhead	178,293
Total manufacturing overhead	$351,429

(b) Projected Mfg. Ovhd. current FY

Salaries and wages	$190,449	($173,135 + 10% inc.)
Other overhead	187,207	($178,293 + 5% inc.)
Total	$377,656	

(c) Labor Base: $132,216. The labor base for the current fiscal year is based on your projection of a 20% decline from your previous fiscal year base of $165,270 in the amount of direct labor based on a decline in business and a change in labor/material mix of your contracts.

(d) Projected overhead rate based on (a), (b) and (c), above:

Manufacturing overhead	$377,656
Direct labor	$132,216
Manufacturing overhead rate	285.6%

e. Packaging. See subparagraphs a, b, and c, above.

f. Customer service.

1. Total customer service expense: $88,902. This rate is based on a projection based on your total customer expense of $81,391 for last fiscal year plus an estimated 8% increase in these costs which are composed primarily of labor.

2. Projected material base for the current fiscal year: $151,956. This is based on a projected 10% increase in material costs (See subparagraphs a, b, and c, above.) and an estimated 10% increase in material usage due to expected change in the mix of work. This rationale is consistent with the projected drop in direct labor. (See subparagraph d, above.)

3. Projection of cost of goods manufactured for the current fiscal year:

Material costs	$151,956
Labor costs	132,216
Mfg. Ovhd. costs	377,656
Cost of goods manufactured	$661,828

4. Calculation of projected customer service expense rate:

$$\frac{\text{Customer service expense } \$88,902}{\text{Cost of goods manufactured } \$661,828} = 13.4\%$$

g. General and administrative expense. This rate is based on a projection of the total G & A expense for the last year of $60,516 (including the $8600 disallowed by the auditor) adjusted for salary increases and projected changes in the allocation base, computed as follows:

1. Total G&A last fiscal year:

Labor	$ 33,523
Other	26,993
Total	$ 60,516

2. Projected G&A current fiscal year:

Salaries and Wages	$ 36,875	($33,523 + 10% inc.)
Other	$ 28,342	($26,993 + 10% inc.)
Total	$ 65,217	

3. Calculation of G&A rate:

Projected G&A expense	$ 65,217	
Projected cost of goods mfgd	$661,828	= 9.8%

h. Profit: 15% of total costs based on weighted guidelines.

Thus, with your negotiation position firmly in mind, you depart your office to negotiate with David Lamb, the Air Force's negotiator for this acquisition.

NOTE: Delivery schedule is not a factor in the negotiation.

EXHIBIT I

Following is a listing of the audited Material Costs (Schedule I), Manufacturing Overhead (Schedule II), Customer Service Expense (Schedule III), and General and Administrative Expense (Schedule IV):

SCHEDULE I - MATERIAL COSTS

Material Costs (Year Ending 7/31/XY)	$126,630

SCHEDULE II - MANUFACTURING OVERHEAD

Year Ending 7/31/XY	Adjusted Totals
Salaries and Wages:	
Supervision	$ 31,326
Clerical	24,239
Other Indirect	53,006
Manufacturing Engineers	14,471
Engineers	46,309
Others	3,785
Overtime Premium	4,606
Night Bonus	1,470
Holidays and Vacations	21,774
Factory Supplies	16,169
Engineering Supplies	3,181
Perishable Tools	5,153
Maintenance	12,572
Engineering Travel	2,547
Telephone & Telegraph	2,444
Power and Light	3,400
Group Insurance	7,057
Pension Provision	3,754
Payroll Taxes	5,459
General Insurance	2,484
Property Tax	12,685
Scrap	5,495
Depreciation	62,572
Engineering Building Occupancy	1,842
Professional Services	387
All other Factory and Engineering Expenses	3,242
Total	$351,429
Direct Labor	$165,270
Manufacturing Overhead Rate	212.6%

Indirect Expenses - The totals include provision for anticipated increases of: 5% indirect wage and salary rates; vacation pay; depreciation due to new plant and equipment; etc. It also includes anticipated decreases in property taxes, professional services, etc.

EXHIBIT I (Continued)

SCHEDULE III - CUSTOMER SERVICE EXPENSE

Year Ending 7/31/XY	Adjusted Totals
Salaries:	
Administrative	$ 7,083
Clerical	4,142
Traveling	2,738
Building Occupancy	
Other	1,994
TOTAL	$ 16,391
Cost of Goods Manufactured (Material + Labor + Mfg O.H.)	$643,329
Customer Service Rate	2.55%

NOTE: Customer Service Expenses - The instrument portion has been reduced approximately $65,000 by the auditor for items classified as not-allowable. These include commissions, advertising, salary and expenses of the salesmen, etc.

SCHEDULE IV - GENERAL AND ADMINISTRATIVE EXPENSE

Year Ending 7/31/XY	Adjusted Totals
Salaries:	
Administrative	$ 15,033
General Accounting	11,906
Cost Accounting	6,584
Supplies	1,840
Traveling	1,158
Postage	859
Professional Services	5,030
Building Occupancy	1,127
Payroll Taxes	1,429
General Insurance	1,771
Depreciation	1,368
Building Allocation	3,811
TOTAL	$ 51,916
Cost of Goods Manufactured	$643,329
G&A Rate	8.06%

NOTE: General and Administrative Expenses - Items eliminated from this classification of accounts totaled $8,600 for contributions, patent expenses, credit and collection expenses, and bad debts.

EXHIBIT II

SPARK'S PROPOSAL (COST PROJECTION)

SPARK'S PREVIOUS COSTS (FOR 200 EACH)

	SPARK'S COST PROJECTION		SPARK'S PREVIOUS UNIT COSTS	
Purchased Parts	$ 1.67		$ 1.529	
Other Raw Materials	3.11		2.834	
Direct Labor	24.45	(11.7 hrs. @ $2.09)	22.281	(11.7 hrs. @ 1.904)
Manufacturing Overhead	69.82	(285.6%)	47.369	(212.6%)
Packaging	.34		.310	
Subtotal	$ 99.39		$ 74.323	
Cust. Serv. Expenses	13.44	(13.4%)	1.895	(2.55%)
G&A Expense	9.75	(9.8%)	5.990	(8.06%)
Subtotal	$122.58		$ 82.208	
Profit	18.41	(15%)		
Price	$140 99			

SOURCE: This case was adapted principally and liberally from Procurement Associates, Inc., Government Prime Contracts and Subcontracts Service (Covina, CA: Procurement Associates, Inc., 1973), pp. F-6-6 - F-6-12.

APPENDIX A

THE GALVANOMETER CASE

ROLE

of

DAVID LAMB, NEGOTIATOR, USAF

Recently, you sent out an RFP for 1000 galvanometers identical to a new model, only 200 of which previously had been sold, at a unit price of $150, by Spark Electronics Co. to Short Electric Co., a major prime contractor. As a part of your RFP, you requested submittal of cost and pricing data (DD Form633).

In response to your proposal, only one company, Spark Electronics Co., submitted a bid at a price of $140.99 per unit. (See Exhibit I.) Spark is a company which, among other major products, manufactures galvanometers. They have sold galvanometers to prime contractors and upper-tier subcontractors and to commercial firms. Although other firms are capable of manufacturing the galvanometer desired, Spark is the only company that responded to the RFP and has produced it to date; and, accordingly, you have justified negotiating with Spark as a sole source. It is anticipated that a firm fixed-price contract will result from your negotiation.

As good fortune would have it, you know that Spark has just been through an audit relating to the establishment of a negotiated final overhead rate for the previous year for use on its cost-type contracts. (See Exhibit II.) you know, additionally, that Spark's "Customer Service Expense" audited rate was 2.55%, and that the auditor had disallowed approximately 75% of these expenses including advertising, salaries, commissions, and expenses in connection with the salesmen. Moreover, the "General and Administrative Expense" audited rate was 8.06% after the auditor had eliminated contributions, patent expenses, credit and collection expenses, and bad debts amounting to $15,600. Using these rates, the total unit cost on Spark's previous contract with Short was only $82.20. (See Exhibit I.)

After receipt of Spark's proposal, the auditor reviewed the contractor's cost records to manufacture the original 200 galvanometers. He found that the costs were as stated but disagreed with Spark's projections in their entirety. After reviewing the auditor's comments and Spark's proposal, you and the price analyst have arrived at a unit price objective of $51.00, supported as follows (See Exhibit I.):

a. Purchased parts. This 5% overall reduction is based on your assumption that an increase in quantity from 200 to 1000

should result in a substantial reduction (10% or more) on some of the purchased parts. Taking into account possible inflationary increases, this averages out at 5% overall.

b. Raw material. This is a 3% increase in recognition of possible material increases. Taking into account that Spark will be able to order the material immediately upon award of the contract, you consider this an adequate contingency.

c. Labor. The labor hours are based on the previous actual unit costs extended through 1000 units on an 80% improvement curve (learning curve). The $2 per hour rate is based on the historical rate factored by a 5% increase. This increase recognizes the possibility of a wage increase.

d. Manufacturing overhead rate. The manufacturing overhead rate is based on your assumption that Spark's volume will remain approximately the same. Indirect labor and certain other costs are factored for possible increases. Certain design engineering costs are deleted. No design engineering is required by the contract; therefore, you do not believe these costs are allocable. Your calculation of manufacturing overhead increases is as follows:

(1) Manufacturing overhead last year:

Salaries and wages	$173,136
Other overhead	178,293
Total manufacturing ovhd	$351,429

(2) Projected manufacturing overhead current fiscal year:

Salaries and wages	$173,136	
	- 46,309	(engineering costs)
	$126,827	
	6,341	(5% increase)
	$133,168	
Other overhead	183,641	($178,293 + 3%)
Total	$316,809	

This calculation provides for a 5% increase in allocable overhead salaries and a 3% increase in other costs.

(3) Labor base: $173,533. This is based on your assumption that the contractor's labor base for the current year will be essentially the same as the previous year's $165,270 plus 5% for expected wage increases.

(4) Projected overhead rate based on subparagraphs (1), (2), and (3), above:

Manufacturing overhead	$316,809
Labor	$173,533
Manufacturing ovhd rate	182.6%

e. Packaging. No comment.

f. Customer Service.

(1) Total customer service expense: $16,746. This is based on the amount of customer service expense accepted by the auditor for the previous year ($16,391) factored by a 5% increase for the labor portion (7083 x 5% = $354.15)

(2) Projected material base for the current fiscal year: $130,429. This is based on your assumption that Spark's material costs for the current fiscal year will be the same as the last fiscal year with the addition of a 3% factor to cover possible material increases.

(3) Projection of cost of goods manufactured for the current fiscal year:

Material costs	$130,429
Labor costs	173,533
Manufacturing overhead costs	316,809
Cost of goods manufactured	$620,771

(4) Calculation of projected customer service expense rate:

$$\frac{\text{Customer service expense } \$\ 16,746}{\text{Cost of goods manufactured } \$620,771} = 2.7\%$$

f. General and administrative Expense. This rate is based on the total G&A for Spark's previous fiscal year of $51,916 factored for expected increases. You do not include $8600 disallowed by the auditor for Spark's previous fiscal year on the basis that the items do not contribute to, and, therefore, should not be allocated to, this contract.

(1) Total G&A last fiscal year:

Labor	$ 33,523
Other	18,393
Total	$ 51,916

(2) Projected G&A current fiscal year:

Salaries and wages	$ 35,119	($33,523 + 5%)
Other	$ 18,945	($18,395 + 3%)
Total	$ 54,064	

This is based on your assumption that Spark's G&A costs are composed primarily of fixed costs which will remain the same regardless of output.

(3) Calculation of G&A rate:

$$\frac{\text{Projected G\&A expense } \$\ 54,064}{\text{Projected cost of goods mfgd. } \$620,771} = 8.7\%$$

h. Profit: 12% of total costs based on weighted guidelines.

Thus, with your negotiation position clearly in mind, you await the arrival of Larry Lyon, Director of Marketing, Spark Electronics Co.

NOTE: Delivery schedule is not a factor in the negotiation.

EXHIBIT I

SPARK'S PROPOSAL (COST PROJECTION)

SPARK'S PREVIOUS COSTS (FOR 200 EACH)

USAF'S INDEPENDENT COST ESTIMATE

	SPARK'S COST PROJECTION	SPARK'S PREVIOUS UNIT COSTS	USAF'S COST PROJECTIONS
Purchased Parts	$ 1.67	$ 1.529	$ 1.46
Other Raw Materials	3.11	2.834	2.92
Direct Labor	24.45 (11.7 hrs.@ $2.09)	22.281 (11.7 hrs.@ $1.904)	12.80 (6.4 hrs.@ $2.00)
Manufacturing Overhead	69.82 (285.6%)	47.369 (212.6%)	23.37 (182.6%)
Packaging	.34	.310	.34
Subtotal	$ 99.39	$74.323	$40.89
Cust. Serv. Expenses	13.44 (13.4%)	1.895 (2.55%)	1.10 (2.7%)
G&A Expense	9.75 (9.8%)	5.990 (8.06%)	3.55 (8.7%)
Subtotal	$122.58	$82.208	$45.54
Profit	18.41 (15%)		5.46 (12%)
Price	$140.99		$51.00

EXHIBIT II

Following is a listing of the audited Material Costs (Schedule I), Manufacturing Overhead (Schedule II), Customer Service Expense (Schedule III), and General And Administrative Expense (Schedule IV):

SCHEDULE I - MATERIAL COSTS

Material Costs (Year Ending 3/31/XY)	$126,630

SCHEDULE II - MANUFACTURING OVERHEAD

Year Ending 7/31/XY	Adjusted Totals
Salaries and Wages:	
Supervision	$ 31,326
Clerical	24,239
Other Indirect	53,006
Manufacturing Engineers	14,471
Engineers	46,309
Others	3,785
Overtime Premium	4,606
Night Bonus	1,470
Holidays and Vacations	21,774
Factory Supplies	16,169
Engineering Supplies	3,181
Perishable Tools	5,153
Maintenance	12,572
Engineering Travel	2,547
Telephone & Telegraph	2,444
Power and Light	3,400
Group Insurance	7,057
Pension Provision	3,754
Payroll Taxes	5,459
General Insurance	2,484
Property Tax	12,685
Scrap	5,495
Depreciation	62,572
Engineering Building Occupancy	1,842
Professional Services	387
All Other Factory and Engineering Expenses	3,242
Total	$351,429
Direct Labor	$165,270
Manufacturing Overhead Rate	212.6%

Indirect Expenses - The totals include provision for anticipated increases of: 5% indirect wage and salary rates; vacation pay; depreciation due to new plant and equipment; etc. It also includes anticipated decreases in property taxes, professional services, etc.

Exhibit II (Continued)

SCHEDULE III - CUSTOMER SERVICE EXPENSE

Year Ending 7/31/XY	Adjusted Totals
Salaries:	
Administrative	$ 7,083
Clerical	4,142
Traveling	2,738
Building Occupancy	
Other	1,994
Total	$ 16,391
Cost of Goods Manufactured (Material + Labor + Mfg. O.H.)	$643,329
Customer Service Rate	2.55%

NOTE: Customer Service Expenses - The instrument portion has been reduced approximately $65,000 by the auditor for items classified as not-allowable. These include commissions, advertising, salary and expenses of the salesmen, etc.

SCHEDULE IV - GENERAL AND ADMINISTRATIVE EXPENSE

Year Ending 7/31/XY	Adjusted Totals
Salaries:	
Administrative	$ 15,033
General Accounting	11,906
Cost Accounting	6,584
Supplies	1,840
Traveling	1,158
Postage	859
Professional Services	5,030
Building Occupancy	1,127
Payroll Taxes	1,429
General Insurance	1,771
Depreciation	1,368
Building Allocation	3,811
Total	$ 51,916
Cost of Goods Manufactured	$643,329
G&A Rate	8.06%

NOTE: General and Administrative Expenses - Items eliminated from this classification of accounts totaled $8,600 for contributions, patent expenses, credit and collection expenses, and bad debts.

SOURCE: This case was adapted principally and liberally from Procurement Associates, Inc., Government Prime Contracts and Subcontracts Service (Covina, CA: Procurement Associates, Inc., 1973) pp. F-6-6 - F-6-12.

APPENDIX B

APEX AVIATION

A ROLE PLAYING CASE DESIGNED TO DEVELOP NEGOTIATING SKILLS

by

DAVID N. BURT

TABLE OF CONTENTS

INTRODUCTION

There is a growing belief that the use of mock or simulated negotiations prior to entering actual negotiations may result in the negotiation of a more satisfactory agreement. Trial lawyers and labor unions have used this approach for many years. At least one leading government supplier is now using this technique while preparing to negotiate with representatives of government. In 1972 the author directed graduate research in an effort to determine the effect of conducting mock negotiations. One of the major problems encountered in this research was the absence of a well constructed, realistic scenario on which to base negotiations.

In preparation for participation as a faculty member at the 1974 Purchasing/Logistics Seminar cosponsored by Stanford University and the National Association of Purchasing Management, I prepared the following mock negotiation case, "Apex Aviation." All of the participants who played the role of the buyer from the Stanford Seminar and graduate students at the Air Force Institute of Technology who used the case in the summer of 1974 agreed that the mock negotiation experience was very helpful in preparing for the actual negotiations. Those individuals who played the role of the buyer's supervisor or of the seller indicated that they gained considerable insight into negotiating.

In addition to introducing the concept of mock negotiations, the Apex Aviation Company may be used as a teaching aid to help buyers or purchasing students gain experience in negotiation. Logically, the use of the case should be preceded by sessions dealing with (1) the relation between uncertainty and selection of the right type of contract pricing arrangement and (2) negotiation preparations and strategy.

INSTRUCTOR'S NOTES

The mechanics of presenting the Apex case follow. The class or group should be divided into three subgroups. One subgroup will be assigned the role of Richard Raymond, buyer. The second subgroup will be assigned the role of Ray Grant, Director of Commodities for Apex, and Raymond's boss. The third subgroup is assigned the role of Ralph Hawk, the prospective supplier. Each role player is given information relevant to his role, Raymond's (buyer) information being identified as 103 through 107, Grant's (Raymond's boss) 108 through 113, and Hawk's (prospective supplier) 114 through 116. Ideally, the role players should be assigned their roles and provided with the required material one or more days prior to conducting the negotiations. All role players should be directed not to discuss their roles with individuals with a different role. There is no objection to individuals with the same role (e.g., all Raymonds) working together to prepare for negotiations. In fact, such action is probably beneficial.

Although a time constraint may be viewed as somewhat artificial, the role players should be requested to complete the mock negotiations in forty-five minutes, with a similar amount of time allocated to the actual negotiations. Fifteen to thirty minutes should be available for the instructor or discussion leader to conduct the discussion following the actual negotiations.

Experience in the use of role-playing techniques indicates that there is a synergistic effect from having several discussions conducted simultaneously in the same area. Many role players will ask to be permitted to conduct their negotiations in a separate room. You are encouraged to insist that all discussions take place in the same room.

Due to the sequential nature of this process, those individuals who are playing the role of Hawk (seller) will be free during the mock negotiation between Raymond (buyer) and his boss, Grant. It is recommended that the Hawks meet together as a group during the mock and discuss details and strategies since most will be unfamiliar with the role of seller. Such a procedure serves two purposes: (1) it makes the individuals playing the role of Hawk more comfortable in the role of seller and (2) it avoids any dissonance which might occur if the Hawks were idle during the mock negotiations.

As soon as the mock negotiations have been completed, or forced due to time constraints to terminate, or at the next class or session, depending on the length of time available, the "actual" negotiation between Raymond and Hawk should take place. The instructor has the choice of dismissing the individuals playing Grant's role during the negotiation or of having Grant sit in on the actual negotiation as a non-participating observer. Experience with the observee approach has been highly favorable.

On completion of the "actual" negotiation, the instructor should lead a group discussion. The following questions are suggested:

1. What negotiating strategy did Raymond use?

2. How did Raymond gather information?

3. How did Raymond deal with uncertainty on the tooling? (If Hawk is unwilling to base his cost for the tooling on approximately 3100 hours, his estimate for the most likely number of hours, then a fixed price incentive or even cost plus incentive fee contract is usually appropriate for this portion of the work.)

4. Who retains title to the tooling? (Since Apex is to pay all costs, they should take title in order to avoid any sole source situation on follow-on purchases.)

5. Was a firm agreement reached on the delivery schedule?

6. What did Raymond learn during the mock? Did he change objectives and/or strategies? Did he become psychologically better prepared to enter actual negotiations?

One final thought is offered for your consideration: it is contended that the ability to think as one's opponent is a highly desirable attribute for a negotiator. What would happen if the buyer were to role-play the part of the seller during the mock negotiation before entering actual negotiations?

---

*The term "actual" is applied to the negotiation conducted by the individual role-playing the part of the buyer and another individual role-playing the part of the seller.

THE APEX AVIATION CASE

Background

The Apex Aviation Company is a leading supplier of mechanical subsystems to the aviation industry with annual sales of $300,000,000. The firm is in a highly competitive industry with four firms supplying approximately 80% of all mechanical subsystems to the aircraft manufacturers. Typically, Apex receives a functional or performance specification from an aircraft manufacturer for a subsystem or component and then engineers the design of the required item or subsystem. Due to the cyclical nature of the industry, Apex frequently subcontracts for the manufacture of items and then assembles the items in its own plants.

Recently Apex received a follow-on order for 100 landing gears. The initial order had been for 100 landing gears, delivery of which was completed 3 months ago. Due to heavy plant loading and following a review by the Apex make-or-buy committee, it has been decided to have the machining of the aluminum outer cylinder struts subcontracted with the aluminum ingots supplied by Apex.

The procurement has been assigned to Mr. Raymond of the Purchasing Department. Mr. Raymond has sent Requests for Proposals (RFP) to a number of qualified vendors. Copies of the design specification accompanied the RFP. The RFP called for a delivery schedule to commence six months after award of contract with 10 struts to be delivered per month over a 10 month period.

Role for Richard Raymond, Buyer

On receipt of a properly prepared purchase request together with specifications for 100 landing outer cylinder struts, you developed a Request for Proposal which was sent to 23 machining firms. Only three firms responded to the RFP and only one of these appeared to be able to meet the required delivery schedule. Calls to the two non-responsive proposers confirmed their inability to meet the required delivery schedule.

Apex has had a continuing relationship with the only responsive proposer, Hawk Manufacturing of San Mateo, California. Last week you visited Hawk and performed a mini-pre-award survey which convinced you that this source will be able to satisfy your requirements, if awarded a contract.* A copy of Hawk's proposal is attached.

In preparing for negotiations with Hawk, you requested Manufacturing Operations to estimate the number of manhours and cost required to machine the outer cylinder struts. Manufacturing Operations' response is included as attachment 107. In addition, you have checked on recently awarded contracts to the machining industry to aid in development of a position on direct hourly rates, overhead, G&A and profit. This information is contained in attachment 106.

You are scheduled to meet with Mr. Hawk, owner of Hawk Manufacturing Co., in your office tomorrow morning. This afternoon you are to enter into mock negotiations with Mr. Grant, Director of Commodities, the number two man in Apex's purchasing office.

*Since the machining industry is operating near capacity, you carefully reviewed Hawk's schedule. You are satisfied that Hawk will be able to meet your schedule. However, inclusion of your order will bring Hawk to full or near-full loading.

HAWK MANUFACTURING CO.
700 El Camino Road
San Mateo, California

10 January 19XY

Mr. Richard Raymond
Purchasing Department
Apex Aviation Co.
2777 Imperial Highway
Hawthorne, CA 90250

Dear Mr. Raymond:

Reference is made to your Request for Proposal #29-74. We are confident that we can meet all terms and conditions of your request for a total price of $480,800.

As we see the job, there are two components: (1) development of special tooling and (2) production of the outer cylinder struts.

Based on our past experience, we estimate that the special tooling will cost $191,000. If you would prefer, we will develop special tooling on a time and materials approach. The hourly rate, including overhead, G&A and profit will be $32.20 per hour. We estimate material costs to be $70,000 including a 10% handling charge.

The actual machining of the struts should take 100 hours per strut. Out cost for this portion of the contract is as follows:

100 hours per strut, 100 struts; 10,000 hours

direct labor cost, at $9 per hour	$ 90,000
overhead, 150%	135,000
total cost to manufacturer	225,000
G&A, 15%	33,750
Subtotal	$258,750
Profit, 12%	31,050
Total cost for struts	$289,800
Special tooling	191,000
Total	$480,800

If awarded the contract, we will be able to begin work on the special tooling immediately and on the production of the outer sylinder struts in six months. We will be able to meet your delivery schedule.

Thank you for the opportunity to do business.

Sincerely

/s/
Ralph Hawk
President
Hawk Manufacturing Co.

Extracts of Rates from Recent Machining Jobs

Name;	Jones Manufacturing Co.	Ryan & Sons	Southeast Tool & Die
Location:	San Francisco, CA	Springfield, OH	Atlanta, GA
Date Purchase Order Awarded:	June 19xx	October 19xx	December 19xx
For:	Machining Pistons	Outer Cylinders	Brake Cylinders
Hourly Rate:	$8.75	$8.00	$8.10
Overhead:	160%	150%	140%
G&A:	17%	16%	15%
Profit:	10%	10%	12%

APEX AVIATION

15 January 19xy

MEMO

From: D. Jones
Director of Manufacturing Operations

To: Richard Raymond,
Purchasing Department

Subj: Costs for Manufacturing Outer Cylinder Struts

During the past year, we machined 100 identical struts.* The first strut required 100 hours. The entire job required 5000 hours. As with most other work of this nature, we experienced an improvement curve of 90%.

The special tooling, which has since been converted to manufacture of another job, required 3000 manhours of tool and die makers' time. Their hourly rate is $10. Cost of materials for the special tooling was $65,000.

Our make-or-buy committee has estimated that the total current in-house cost of making the special tooling and machining the struts would be $425000. This figure takes into consideration the impact of incurring overtime, rescheduling other in-house work, and other costs incident to production overload.

/s/
David Jones

*This was done on a single production line.

THE APEX AVIATION CASE

Background

The Apex Aviation Company is a leading supplier of mechanical subsystems to the aviation industry with annual sales of $300,000,000. The firm is in a highly competitive industry with four firms supplying approximately 80% of all mechanical subsystems to the aircraft manufacturers. Typically, Apex receives a functional or performance specification from an aircraft manufacturer for a subsystem or component and then engineers the design of the required item or subsystem. Due to the cyclical nature of the industry, Apex frequently subcontracts for the manufacture of items and then assembles the items in its own plants.

Recently, Apex received a follow-on order for 100 landing gears. The initial order had been for 100 landing gears, delivery of which was completed 3 months ago. Due to heavy plant loading and following a review by the Apex make-or-buy committee, it has been decided to have the machining of the aluminum outer cylinder struts subcontracted with the aluminum ingots supplied by Apex.

The procurement has been assigned to Mr. Raymond of the Purchasing Department. Mr. Raymond has sent Requests for Proposals (RFP) to a number of qualified vendors. Copies of the design specification accompanied the RFP. The RFP called for a delivery schedule to commence 6 months after award of contract with 10 struts to be delivered per month over a 10 month period.

This case was prepared by Associate Professor David N. Burt.

Role for Ray Grant
Director of Commodities
Apex Purchasing Department

You are the Director of Commodity Purchases and the number two man in the purchasing department. Approximately one year ago you instituted the policy of requiring all commodity buyers to conduct a mock negotiation with you before entering into negotiations with the actual prospective supplier(s). This requirement is limited to all purchases in excess of $100,000. During this time you have discovered that your buyers frequently fail to establish realistic negotiation objectives prior to entering negotiations. Several of the buyers have been reluctant to use other than the firm-fixed price contract when a large degree of uncertainty is present. Further, not all buyers have used the experience or learning curve when appropriate.

Your approach has been to role play the part of the prospective supplier,* With this information in hand, you develop the best case you can in support of the contractor's proposal. You know from experience that most proposals are designed to be low enough to be within the competitive range so that the proposer will be included in negotiations. But you also know that most suppliers are risk averse and tend to offer prices which protect them from unforeseen events.

You are due to meet with Richard Raymond, one of your purchasing agents, this afternoon. Mr. Raymond is scheduled to meet with Mr. Hawk, owner of Hawk Manufacturing tomorrow. You have a copy of Mr. Hawk's proposals, information on three similar procurements, information from your production department on its recent experience with a similar production run and a memo from Mr. Raymond on the competitive environment and Hawk's ability to meet schedule to aid you in preparing to play his role as a potential supplier of outer cylinder struts to Apex.

*The information available to you includes a copy of the prospective supplier's proposal and any additional relevant facts which the buyer may possess.

APEX CO.

21 January 19XY

MEMO

FROM: R. Raymond

TO: Ray Grant

SUBJECT: Preparation for Negotiations with Hawk Manufacturing Co.

In response to a purchase request for 100 landing outer cylinder struts, a REquest for Proposal was sent to 23 machining firms. Only three firms responded to the RFP and only one of these appeared to be able to meet the required delivery schedule. Calls to the two nonresponsive proposers confirmed their inability to meet the required delivery schedule.

Apex has had a continuing relationship with the only responsive proposer, Hawk Manufacturing of San Mateo, California. Last week I visited Hawk and performed a mini-pre-award survey which convinced me that this sourcer will be able to satisfy our requirements, if a contract is awarded. Since the machining industry is operating near capacity, I carefully reviewed Hawk's schedule and am satisfied that he can meet our delivery requirements. Award of our requirement to Hawk will bring his facilities to full or near full loading.

/s/ Richard Raymond
Richard Raymond

HAWK MANUFACTURING CO.
7000 El Camino Road
San Mateo, California

10 January 19XY

Mr. Richard Raymond
Purchasing Department
Apex Aviation Co.
2777 Imperial Highway
Hawthorne, CA 90250

Dear Mr. Raymond,

Reference is made to your Request for Proposal #29-74. We are confident that we can meet all terms and conditions of your request for a total price of $480,800.

As we see the job, there are two components: (1) development of special tooling and (2) production of the outer cylinder struts.

Based on our past experience, we estimate that the special tooling will cost $191,000. If you would prefer, we will develop special tooling on a time and materials approach. The hourly rate, including overhead, G&A and profit will be $32.20 per hour. We estimate material costs to be $70,000 including a 10% handling charge.

The actual machining of the struts chould take 100 hours per strut. Our cost for this portion of the contract is as follows:

100 hours per strut, 100 struts; 10,000 hours

direct labor cost, at $9 per hour	$ 90,000
overhead, 150%	135,000
total cost to manufacturer	225,000
G&A, 15%	33,750
Subtotal	258,750
Profit, 12%	31,050
Total cost for struts	289,800
Special Tooling	191,000
Total	$480,800

If awarded the contract, we will be able to begin work on the special tooling immediately and on the production of the outer cylinder struts in six months.

Thank you for the opportunity to do business.

Sincerely

/s/ Ralph Hawk
Ralph Hawk
President
Hawk Manufacturing Co.

Extracts of Rates from Recent Machining Jobs

Name:	Jones Manufacturing Co.	Ryan & Sons	Southeast Tool & Die
Location:	San Francisco, CA	Springfield, OH	Atlanta, GA
Date Purchase Order Awarded:	June 19xx	October 19xx	December 19xx
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Profit:	10%	10%	12%

APEX AVIATION

15 January 19XY

MEMO

FROM: D. Jones
Director of Manufacturing Operations

TO: Richard Raymond,
Purchasing Department

SUBJ: Costs for Manufacturing Outer Cylinder Struts

During the past year, we machined 100 identical struts.* The first strut required 100 hours. The entire job required 5000 hours. As with most other work of this nature, we experienced an improvement curve of 90%.

The special tooling, which has since been converted to manufacture of another job, required 3000 manhours of tool and die makers' time. Their hourly rate is $10. Cost of materials for the special tooling was $65,000.

Our make-or-buy committee has estimated that the total current in-house cost of making the special tooling and machining the struts would be $425,000. This figure takes into consideration the impact of incurring overtime, rescheduling other in-house work, and other costs incident to production overload.

/s/
David Jones

*This was done on a single production line.

THE APEX AVIATION CASE

Background

The Apex Aviation Company is a leading supplier of mechanical subsystems to the aviation industry with annual sales of $300,000,000. The firm is in a highly competitive industry with four firms supplying approximately 80% of all mechanical subsystems to the aircraft manufacturers. Typically, Apex receives a functional or performance specification from an aircraft manufacturer for a subsystem or component and then engineers the design of the required item or subsystem. Due to the cyclical nature of the industry, Apex frequently subcontracts for the manufacture of items and then assembles the items in its own plants.

A few weeks ago, you received a Request for Proposal to machine the aluminum outer cylinder struts for 100 landing gears with the provision that the aluminum ingots would be supplied by Apex.

Several days ago, Mr. Raymond, from Apex's Purchasing Department, visited your plant to check on loading and capacity. You have had a continuing and satisfactory relationship with Apex.

This case was prepared by Associate Professor David N. Burt.

Role for Ralph Hawk
President
Hawk Manufacturing Co.

You recently submitted the attached proposal to the Apex Aviation Company for machining outer cylinder struts. Your proposal is composed of two elements: one for special tooling and one for manufacturing.

Your estimate of the most likely number of hours required to prepare the special tooling was 3100. You were fairly certain that no more than 4000 hours would be required. Accordingly, you used the value 3750 hours as a conservative, but realistic, estimate. Your hourly rate for tool and die personnel, overhead, G&A and profit rates are $10 per hour, 150%, 15% and 12%, respectively.

In order to estimate the amount of time required to manufacture an outer cylinder strut, you have one of your machinists use soft tooling and actually produce a strut. It required 200 hours to produce the test strut. Based on past experience on the relative efficiency of labor using hard tooling versus soft tooling, you divided the required hours by two, giving you 100 hours if the test item had been produced using hard tooling.* In other words, the most likely time required to produce the first item using the special tooling and production line techniques would be 100 hours. All of your rates are shown in the proposal.

You would like to get this job since it complements your present schedule. However, things are good in the machining business and you feel reasonably confident that if you don't get this job at a reasonably healthy porfit that something better will come along.

*You plan to use a single production line with no parallel stations if you receive this order.

HAWK MANUFACTURING CO.
7000 El Camino Road
San Mateo, California

10 January 19XY

Mr. Richard Raymond
Purchasing Department
Apex Aviation Co.
2777 Imperial Highway
Hawthorne, CA 90250

Dear Mr. Raymond,

Reference is made to your REquest for Proposal #29-74. We are confident that we can meet all terms and conditions of your request for a total price of $480,800.

As we see the job, there are two components: (1) development of special tooling and (2) production of the outer cylinder struts.

Based on our past experience, we estimate that the special tooling will cost $191,000. If you would prefer, we will develop special tooling on a time and materials approach. The hourly rate, including overhead, G&A and profit will be $32.20 per hour. We estimate material costs to be $70,000, including a 10% handling charge.

The actual machining of the struts should take 100 hours per strut. Our cost of this portion of the contract is as follows:

100 hours per strut, 100 struts; 10,000 hours

direct labor cost, at $9 per hour	$ 90,000
overhead, 150%	135,000
total cost to manufacturer	225,000
G&A, 15%	33,750
Subtotal	$258,750
Profit, 12%	31,050
Total cost for struts	289,800
Special Tooling	191,000
Total	$480,800

If awarded the contract, we will be able to begin work on the special tooling immediately and on the production of the outer cylinder struts in six months.

Thank you for the opportunity to do business.

Sincerely,

/s/ Ralph Hawk
Ralph Hawk
President
Hawk Manufacturing Co.

APPENDIX C

ORGANIZATIONAL PARTICIPANTS

Air Force Plant Representative Office
TRW Defense & Space Systems Group
1 Space Park
Redondo Beach, CA 90278

Defense Contract Administration Services Management Area
3452 E. Foothill Blvd.
Pasadena, CA 91107

Defense Contract Administration Services Management Area
1250 Bayhill Dr.
San Bruno, CA 94066

Defense Contract Administration Services Management Area
34 Civic Center Plaza
Santa Ana, CA 92712

General Dynamics, Pomona Division
P. O. Box 2506
Pomona, CA 91766

Lockheed Missiles & Space Co., Inc.
P. O. Box 504
Sunnyvale, CA 94088

Naval Plant Representative Office
General Dynamics, Pomona Division
P. O. Box 2507
Pomona, CA 91766

Naval Plant Representative Office
Lockheed Missiles & Space Co., Inc.
P. O. Box 504
Sunnyvale, CA 94088

Naval Supply Center
Bremerton, WA 98314

Naval Supply Center
Oakland, CA 94625

Naval Weapons Center
China Lake, CA 93555

Sacramento Air Logistics Center
McClelland AFB, CA 95652

Space and Missile Systems Organization
P. O. Box 92960
Los Angeles, CA 90009

TRW Defense and Space Systems Group
1 Space Park
Redondo Beach, CA 90278

FOOTNOTES

1. Ms Cynthia Springer, Program Analyst, Washington Headquarters Services of the Department of Defense, telephone interview conducted, November, 1978.

2. Loc. cit.

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