

## Index To Exhibits

	<u>Page</u>
Exhibit 1: Experimental Design .....	68
Exhibit 2: ANOVA -- Hypotheses Design Layout .....	69
Exhibit 3: Participant Solicitation Materials & Professor's Instructions .....	70
Exhibit 4: Counterbalancing of Experimental Tasks .....	73
Exhibit 5: Participant Experimental Instructions* .....	74
Exhibit 6: Virginia Tech IRB Approval .....	77
Exhibit 7: Participant Consent Form .....	81
Exhibit 8: Participant Special Overhead Instructions* .....	82
Exhibit 9: Sample Game Results* .....	83
Exhibit 10: Participant Exit Memo.....	89
Exhibit 11: Results Notification to Student's Professors.....	90
Exhibit 12: Participant Result Notifications .....	92
Exhibit 13: Sample of Cost Functions* .....	95
Exhibit 14: Framing Operationalization* .....	101
Exhibit 15: Demographic Data Collection Screen* .....	103
Exhibit 16: Random Assignment to Conditions .....	104
Exhibit 17: Detail Results Compilation File -- Individual Players*.....	105
Exhibit 18: Results Summary File* .....	107
Exhibit 19: Sample Results in Factorial Matrix & Minitab Input.....	109
Exhibit 20: Minitab ANOVA Results Tables .....	110
Exhibit 21: Minitab Interaction t-tests.....	116

\* Indicated items are copies of computer screens.

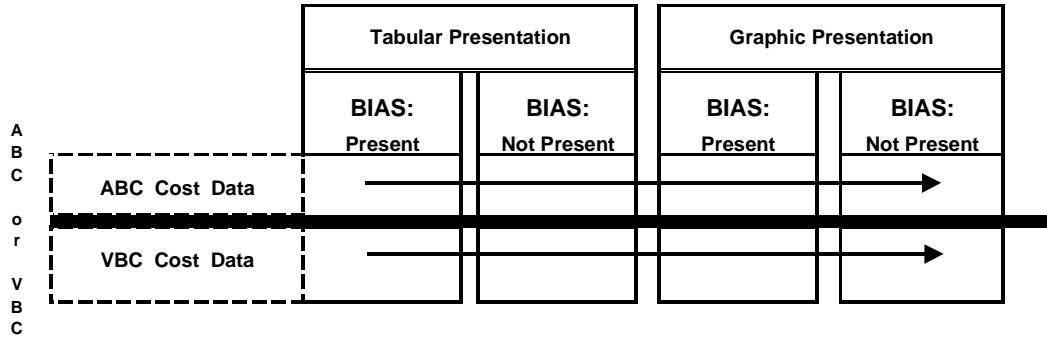
# Exhibit 1: Experimental Design

## Experimental Conditions ~ Cell Combinations

48 Subjects: 8 Cell Combinations ~ Each Subject Repeats 4 of the Combinations. (n=24 per cell)

Between Subject design for Cost (ABC/VBC) factor; Within Subject design for Cost Presentation and Bias factors

~ Factor Ordering is Completely Counterbalanced (4! = 24 orderings) ~



Note: Arrows represent the 'path' of a participant:

- > Participants play only one Cost Type (ABC or VBC).
- > Participants play each of the two Presentation Modes and Bias Conditions
- > Sequencing of the four games each participant plays is completely counterbalanced.

## Exhibit 2: ANOVA -- Hypotheses Design Layout

### ANOVA Table -- By Effects

(Number of Subjects: n = 24 // 48 subjects: Each repeats 4 of the 12 experimental conditions)

Main Effects		df	Sum Sqs	M.S.	F-Ratio	"P"
Cost Data (ABC/VBC)	Hypothesis #1	1				
Presentation	Hypothesis #2	1				
Framing Bias	Hypothesis #3	1				
<b>Two-Way Interactions:</b>						
Cost X Presentation	Hypothesis #4	1				
Cost X Framing	Hypothesis #5	1				
Presentation X Framing	Hypothesis #6	1				
<b>Three-Way Interaction:</b>						
Cost X Pres X Frame:	Research Question	1				
Total Model, Explained		7				
Residual		184				
		<b>Total</b>	<b>191</b>			

### ANOVA Summary Table

Note: This is the actual ANOVA used to calculate effects; -- The above Table is a simpler representation.

Effects	SOURCE	df	Sum Sqs	M.S.	F-Ratio	"P"
<b>Between Subjects:</b>						
<b>Hyp #1</b>	Main Effect	Presentation	1			
		Subjects / Present	46			
<b>Within Subjects:</b>						
<b>Hyp #2</b>	Main Effect	Cost Data (ABC/VBC)	1			
<b>Hyp #4</b>	2 Way ABC	Cost Data X Presentation	1			
		Cost Data X Subjects/Present	46			
<b>Hyp #3</b>	Main Effect	Framing	1			
<b>Hyp #6</b>	2 Way NON-ABC	Framing X Presentation	1			
		Praming X Subject/Present	46			
<b>Hyp #5</b>	2 Way ABC	Cost Data X Framing	1			
	3 Way All Terms	Cost Data X Presentation X Fran	1			Research Question
		Cost Data X Framing X Subject/I	46			
		<b>Total</b>	<b>191</b>			

### Exhibit 3: Participant Solicitation Materials & Professor's Instructions

## Accounting Majors!

**Want To Play A Game?**

**Get Paid<sup>1</sup>?**

**Get Extra Course Credit?**

**Learn Something About ABC?**

*(Well, three out of 4 ain't bad!)*

The Game Is A Business Simulation That Is Run Entirely On Computers. You Challenge the Simulated Marketplace and See How Much Money You Can Earn. It's Not Hard To Learn, It's Essentially the "Accountant's" Version of A Video Game – It Should Be Fun.

Game participation should take less than two hours, plus we will ask you to complete a visualization questionnaire after you play the game. To be safe perhaps you should block out three hours in total to participate. Anyway, it's a game; others that have played have truly enjoyed the game – the time was up before they knew it and then they wanted to stick around to play some more! Even if it ends up not being so great, the money and credit aren't so bad.

If you are interested, purely voluntary, please use the sign-up sheet that Dr. Killough and Dr. Leininger will pass around your class. You must be accounting majors, have satisfactorily completed Principles 2115, 2116 and Personal Computers 2504 to participate. If the best times for you are already taken, sign-up as an alternate.

*One small word of caution. It is important that once you commit to your time, you be there. Otherwise the computers are idle and we all waste a lot of time. If something comes up that cannot be avoided, of course that is fine, don't worry about it, just call Dr. Killough or Dr. Leininger so they will know. If you don't come and don't call, they might be a unhappy that you wasted their and other's time.*

So, sign up, play the game, have some fun, win some money (maybe \$100+)!

Signing up now is not a final commitment on your or our part. It is your request to play. We will contact you later with final times and commitments. The simulation is part of an academic research project, which you will be helping to advance. Your results will be kept strictly confidential. The teachers in this course will not have any access to the your individual results.

---

<sup>1</sup> **Expected Value = \$25.** *Twenty five percent of all players will be paid at least \$50. Payment for participation ranges from \$5 to \$100. Players will be assigned to groups of eight. Within each group of eight payments will be: \$100, \$50, \$20, \$10, and four \$5 payments. Plus a \$25 bonus will be available to one player in alternate groups.*

### **Exhibit 3 -- continued: Professor's Instructions**

To: Larry Killough  
Wayne Leininger

Date: October 6, 1997

From: Dave Harrison

Subject: Student Participants From Your Cost Classes

---

First, thank you for your support in my experiment. I think I have a good one, but being away from Blacksburg, and being dependent on the intricacies of sometimes unforgiving computer imperatives, well, let's just say I'm a bit nervous about the whole thing!

You will be helping me a lot by getting students to sign up to participate. I have included with this mailing everything you need to sign them up. This includes:

1. Student Handout: Information for students about the experiment and to encourage them to participate. There are 65 for each of you – one per class.
2. Student sign-up sheet: One sign-up sheet only. You both will share this one sheet. After one of you has signed-up interested students from your class, please give the sign-up sheet to the other for his class.
3. This Memo: Your instructions / and my thanks! Once you have signed up your students, please make a copy (in case of loss of original) and send the original to me:

**David Harrison**

School of Business - - Office 227  
University of South Carolina Aiken  
171 University Parkway  
Aiken, SC 29801

4. Comment on Incentives: Monetary & Extra Credit

As you know this experiment will only be successful in finding treatment differences if the student players are truly motivated to succeed (maximize simulation profits). My answer to this is to simply provide very high monetary incentives. The average payment to participants will be somewhat over \$25.

The monetary incentives work like this: I need 48 subjects. The 48 will be randomly divided into 8 groups for compensation purposes. Within each group of eight, the top finisher will get \$100. Second place gets \$50. **This means that 25% of all players will get at least \$50!** That is a lot. But it will serve me well if it really does work to inspire them to work at the game solution. The remaining 6 players will be rewarded with \$20 for third place, \$10 for fourth place, and the final 4 in each group of 8 get \$5. In addition, alternative groups will get at \$25 bonus opportunity.

Extra Credit For Your Course: Call me paranoid; with these monetary incentives further incentive should be unnecessary. But I simply have too much riding on this to not go the extra mile. I am asking you if you would offer students an extra credit opportunity in your course for participating. Again, warm bodies do me no good; I need motivated warm bodies! I am suggesting that you tell them they will receive:

Two Extra Credit Points toward their final grade in your course if their results are in the top half of all participant scores. Thus half the participants will get two points extra credit.

The extra credit opportunity has a pedagogical basis as they will learn about: (1) overhead allocation methods, (2) the effects of overhead allocation on decision making, and (3) half of the participants will see activity based costing methods demonstrated. In addition, they will be able to work with a computerized business simulation model, see how it can be used for sensitivity analyses and perhaps they may be inspired to pursue such automated simulations on their own.

Time permitting I would be happy to come back to Blacksburg and explain the model and results to the class. I would emphasize sensitivity analysis in decision making and activity based costing in that session if I get the opportunity to do it.

### **SUMMARY:**

1. Thank You.
2. In your next class:
  - Explain the simulation, pass out the information sheet and get students to sign-up for open time slots or as alternates.
  - Remember, the simulation really is a game. They should actually enjoy it. It's something like an applied version of video games they may actually pay to play.
  - Participants will learn something, be paid something and have a very good chance of being paid excessively well and received two extra course credit points.
3. Please send me the completed sign-up sheet. (Keep a copy yourself, in case of loss.)

Best Regards and see you the week of November 3<sup>rd</sup>,

# Exhibit 4: Counterbalancing of Experimental Task

## Experimental Conditions & Ordering ~ ~ Two Within / One Between

48 Subjects: 8 Cell Combinations ~ ~ Each Subject Repeats 4 of the Combinations. (n=24 per cell)

Between Subject design for ABC/VBC Information factor; Within Subject design for Presentation and Bias factors

**THIS TABLE SHOWS THE COMPLETE COUNTERBALANCING USED FOR TREATMENT SEQUENCING**

Cost Functions Were Performed in Order (1,2,3,4) by Each Participant

Each Subject Performs 4 Experiments: Subjects Randomly Assigned To Subj. #'s with following treatment sequencing.

Cost Function	Activity Based Costing (ABC)				Cost Function
	Bias=Present		Bias=Not Present		
	Graph	Table	Graph	Table	
	1	2	3	4	
Subject #1	1	2	3	4	Subject #25
Subject #2	1	2	4	3	Subject #26
Subject #3	1	3	2	4	Subject #27
Subject #4	1	3	4	2	Subject #28
Subject #5	1	4	2	3	Subject #29
Subject #6	1	4	3	2	Subject #30
Subject #7	2	1	3	4	Subject #31
Subject #8	2	1	4	3	Subject #32
Subject #9	2	3	1	4	Subject #33
Subject #10	2	3	4	1	Subject #34
Subject #11	2	4	1	3	Subject #35
Subject #12	2	4	3	1	Subject #36
Subject #13	3	1	2	4	Subject #37
Subject #14	3	1	4	2	Subject #38
Subject #15	3	2	1	4	Subject #39
Subject #16	3	2	4	1	Subject #40
Subject #17	3	4	1	2	Subject #41
Subject #18	3	4	2	1	Subject #42
Subject #19	4	1	2	3	Subject #43
Subject #20	4	1	3	2	Subject #44
Subject #21	4	2	1	3	Subject #45
Subject #22	4	2	3	1	Subject #46
Subject #23	4	3	1	2	Subject #47
Subject #24	4	3	2	1	Subject #48

Subject experimental conditions are randomly assigned.

Experimental conditions are COMPLETELY COUNTERBALANCED.

Counterbalancing of the four conditions yields 24 unique orderings (4!).

One for each subject in the within-subjects groupings

## Exhibit 5: Participant Instructions

### Part One = Initial Welcome, Practice Instructions and Demographics

~~Hello, and thank you again for agreeing to play in our game.~~

First we would like you to complete some questions [below] that tell us a little about yourself.  
Please use the mouse and keyboard to respond below.

For those of you with some experience with computer applications you may notice that this screen appears different than most you may have worked with. We have cleared the screen of the usual toolbars, scroll bars, menus, tabs and other items that normally help you edit and move around screens.

This game is fully automated so you will not need any of those features. All you need to do is follow our, hopefully clear, directions that appear on the screen, hit the "buttons" on the screen as we indicate, and enter information using the keyboard. Use the mouse to move around to the indicated response areas.

We have controlled the screen so that the computer will accept entries from you only in the correct, designated areas. If you make an entry elsewhere, that's OK, you will get a message that says the screen is "protected."

*Like I said, that's OK. In fact it will probably be a minor miracle if you do not get this message a couple of times during your play. To move on all you need to do is hit the ~~enter~~ key on the keyboard. Then go to the correct response area (with the mouse) and re-enter your desired response.*

For those of you that are "experienced hackers" and cannot resist the temptation to somehow break the protection and computer controls, that's OK too. ~~JUST PLEASE DO NOT DO IT NOW.~~ I will be happy to sit with you later, discuss the programming and built in controls. In fact I welcome your comments. But, let's do that after the game -- OK?

If you're ready, it's time for you to "hit" your first button.



**Exhibit Note: The "button" referred to is on the computer screen, but does not visibly print.  
After players hit this button they completed the demographic information (Exhibit 16)  
and then went on to the game instructions on the following sheet.**



## Exhibit 5: Participant Instructions (cont)

### Part Two = Actual Game Instructions

~~Now, what you do have to worry about is cost.~~ You have already learned or will learn that accountants put costs into one of three categories. There are material costs, like the cost of leather and padding that goes into baseball gloves. Next we have labor costs. This is simply the cost a business pays for a worker to put the glove together.

Maybe it takes half an hour, the worker gets paid \$10 per hour, so the cost would be \$5- per glove for labor.

The costs of material and labor is fixed [constant per unit] in this game. So, no matter how many gloves you make, the material and labor cost for each glove will always be the same. Make one or one million gloves, it doesn't matter, the cost PER GLOVE (each one) never changes. This is true for the cost of materials and labor for all four products. The game will provide you with cost information that will verify this for you and give you the exact costs for material and labor for each of the four products.

There is, however, a third type of manufacturing cost. We call this overhead. You may recall from your accounting courses (or will later recall) that overhead is the cost item that makes life difficult for accountants (and students!).

Overhead costing in this game is, like in real business, going to be difficult. The player that understands overhead is the player that is going to walk away with the \$100- In fact, the overhead costing is tricky enough that probably nobody will really understand exactly what's happening with it. So the player that at least gets a basic idea about how overhead is working will probably get the \$100- AND, of course, since half of all players will get at least some monetary reward, PLUS the full two extra credit points, figure out the overhead and you'll be part of the "Happy Half."

OK, lets review:

- 1) You win by having higher profits than others in your league (8 players, 4 get bonus prizes).
- 2) You play by deciding how many products (balls, gloves, bats & pitching machines) to make.  
–the price of the balls, gloves, bats & pitching machines is given, and always the same  
–you can always sell ALL the balls etc. that you produce.
- 3) There are three types of costs for the products: material, labor and overhead.  
Material and labor are, like pricing, the same for each unit you produce. So material and labor costs for each ball you produce is always the same (each). Same for gloves, bats and the pitching machine.
- 4) Overhead **IS NOT THE SAME** for each unit of production. It changes and is hard to predict.

~~Your job in the game is to choose volumes for each of the four products to produce in a year.~~ You will then see how much profit you have earned for your business that year with these levels of production. Then you get to play again for the next year, change the volumes, and see if this earns you more or less money. Hopefully, with each year's production you learn something about how [overhead] costs change so you can adjust your strategy and improve.

I say overhead costs because, remember, price, material cost and labor cost are always the same on a per unit basis. So overhead is the only factor you really have to deal with if you want to maximize profits, beat the other players in you league and pick up \$50 or \$100. (Or \$10 or \$20) *Plus the two extra credit points.*

This is a tuff game. Don't get frustrated because you can't figure out the overhead cost exactly. Of course, you should try to figure out exactly what's happening with overhead, but probably no one will really be able to do this. The winners will probably be those that don't give up even though they don't really understand the overhead cost behavior. The winners will be those that get a "gut" feeling for what's happening with overhead as volumes change. So, in addition to some concentrated analytical thought, gut feelings and intuition will be helpful. Like in Star Wars "~~Trust your feelings~~ [Luke], ~~go with the force~~". Luke would probably do pretty well in this game!

**TRY FOR A TRY?** The first game you play is PRACTICE. After that you will play FOUR separate complete games.

Each game has twelve years in it. You make product production decisions for each product for each year.

After each game is over, please call me to tally your score and set you up for the next game.

One thing, since everyone goofs up now and then, we will disregard your lowest score for one year in each game.

If you happen to mistakenly (or on purpose) put in a crazy volume that loses you a ton of money, that's OK (once).

Since everyone else is probably making the same mistakes. Keep your cool and keep trying, that's how you WIN!

**REVIEW TIME:** In the following game you have sixteen years to make product volume choices.

You can only enter information [your desired production volume] in the year you are playing in. You may change your choices all you want for that year, UNTIL you choose the volume for the fourth product. You also may make choices in any product order, BUT once all four product volumes have been selected, the computer will automatically lock your choices and print your results. You then take a minute to review the printed results of your selection.

*See what you can learn from the results, then make your selections for the next year.*

PLEASE CALL THE EXPERIMENTER (ME) IF YOU HAVE QUESTIONS OR THE COMPUTER ISN'T OPERATING CORRECTLY. DO NOT TRY TO FIX COMPUTER PROBLEMS YOURSELF -- THIS WILL DISQUALIFY YOUR PLAY.

Once you make the 4 product volume selections, the screen will lock again, and the results will be printed for you. You analyze your results -- gain some insights into improving your profits -- and move on to the next year's choices.

**READY?** IF YOU ARE THEN TYPE "ready" in this box



*--use mouse to go to box, then type ready" and hit Enter.*

**Please:** Do not try to get around this program. You are to enter yearly volume selections only.

If you have computer problems or questions, just ask the experimenter. [We're here to help.](#)

## **Exhibit 6: Virginia Tech IRB Approval**

### **Protocol for IRB Request** **Killough and Harrison Proposal**

#### **Justification of Project**

The purpose of accounting is to communicate financial information. The uses to which that information is employed depends on user objectives. Financial institutions and investors use financial information to make credit and investment decisions. Business management uses vary from important strategic decisions to simple functional purposes, such as paying employees. The effectiveness of the communication process is vital to financial information usage regardless of its purpose.

This research is designed to examine the effectiveness of communication of financial information in a decision-making environment. A recently popularized accounting methodology, Activity Based Costing (ABC), is observed to find its decision usefulness under two common decision-making conditions, presentation format and incentive bias. ABC is itself tested for efficacy compared with traditional methods. The comparison of ABC and non-ABC decision results, as influenced by presentation and bias, are the focus of the research.

Each of these three decision-making factors, ABC, presentation and bias have been examined in other research. Methodologies have varied; rarely have computerized business simulations been used to the extent that we propose. More importantly, none have studied these common decision making factors as interacting factors.

ABC research is most often performed using case study methodologies of actual ABC implementations in real businesses. The realism in such studies is unsurpassed, but the control conditions necessary for objective research conclusions are lacking. Presentation issues have been studied often, and often in a controlled and computerized environment. This research has primarily been conducted in the computer systems and decision science areas. It formed the foundation for much of our proposed study. It has not been specifically tied to ABC nor to bias. Bias is most often researched as a psychological phenomenon. Research in bias is generally more theoretical and less applied [to specific, common business decisions] than we propose.

The objective of our project is to determine how these commonplace factors influence profit motivated decision-making. Our experimental design observes common production level decisions. Our decision-making environment is computerized, as is common in the workplace today.

## Procedures

Students will be recruited from courses at Virginia Tech. Any student registered for Dr. Killough's or Dr. Leininger's Cost Accounting classes is eligible to participate. Recruitment consists of a short class announcement that describes the nature of the research and solicits student for participation in the accounting experiment. Interested students will be asked to sign-up as potential participants on a sign-up sheet that is circularized in the classes. They are told: (1) the experiment may take up to three hours, (2) that cash and extra credit incentives will be available to participants as a function of their performance. Their performance will be compared with other participants and they will be paid promptly after all results are tallied.

As participants arrive at the experiment site (computer laboratory in Pamplin) they will be asked to sign in and give their social security number. Following this they will be given a copy of the consent form and asked to read it and sign it if they still wish to participate.

The experiment is entirely on the computer. The instructions, practice set and the research experiment are fully automated. The participant will interact with the computer through a series of written computer instructions and prompts. A researcher will be nearby at all times, and available for limited questions or to fix computer problems that may arise.

After brief, introductory verbal instructions by the researchers, the participants will be escorted to a small room to begin the experiment using the computer in that room. The door to the room will remain open. Up to three students may be participating in separate experiments in adjacent rooms simultaneously. Participants will be expected to follow the automated instructions and prompts without any outside direction. If they have questions, a researcher will be nearby to help.

Instructions include a "practice set" that is identical to the actual experiment the participant will perform. After the practice set the computer will query the participant whether they wish to continue and begin the actual experimental simulation. If they wish to continue they will type "ready" on the computer and the experimental session begins.

Following the exact same format as the practice set, the participant will be shown certain accounting information and based on this information will be asked to make production level decisions. The production decisions will be recorded by the computer program and used to evaluate the participants, relative to other participants, at the conclusion of the research.

Participants will complete 4 sessions. Each session includes repeated trials of decisions that are directed at maximizing profits in a business simulation. The specific decision task is to choose a level of production for each of four products. The simulation calculates revenues, costs and profits based on the participant production

level decisions. Subjects will see the results of their decision after each trial. They will then make decisions for the next trial. All cost and revenue functions as well as experimental factors will remain constant throughout each session. Presumably the results of prior decisions and the decision conditions (accounting information, presentation format and bias) will influence the quality of their decisions. There are 16 trials (decision points) per session. Each session represents a different combination of experimental conditions. The experimental conditions are as follows:

1. ABC vs. Non-ABC: All information presented to participants regarding prices and cost will be exactly the same except for overhead costs. ABC subjects will get overhead cost as calculated using ABC methodology. Non-ABC participants will get overhead cost information using the traditional VBC methodology.
2. Presentation: Participants will have their information presented either in graphic form or in tabular form (report containing numbers).
3. Bias: At the middle of each session, participants will be asked to stop. They will be instructed to verbalize the strategy they are following by writing it down using the computer keyboard. Bias subjects will be informed that if their written strategy most closely approaches the optimal, as defined by the best results within their participant group of eight, they will be awarded a \$25 bonus in addition to the incentive award normally earned. Non-Bias participants will follow the same verbalization procedure but will not be told of, nor eligible for the \$25 bonus.

At the conclusion of the computerized research, participants will be asked to complete a non-computerized spatial ability test. This is a standardized test. The purpose of this is to look for possible covariates for presentation format and spatial ability.

### Risks and Benefits

There are no foreseeable risks to the subjects. Subjects will be compensated based on the decisions they make in the experiment. This is the only claimed benefit.

### Confidentiality/Anonymity

A record of each subject's participation in this research will be maintained. The record will be kept strictly confidential, indexed by an assigned participant number only. Participants will be asked to give limited demographic information such as sex, age, college major, courses taken, SAT scores and grades. This information will be used to examine for possible covariate effects as well. We will keep this information strictly confidential as well. Only the assigned participant number will be used in the statistical analysis.

## **CONSENT FORM -- See Following Exhibit (# 7)**

### **Participation Acknowledgement Receipt (See Exhibit #11)**

1. Reminds them of their pledge not to discuss results
2. Explains how I compile results, determine awards and payment timing and method.
3. Includes their student number and league assigned

They get this after Lynne gives them spatial ability test and they leave.

### **Biographical Sketch:**

Larry Killough is the KPMG Peat Marwick Professor of Accounting at the Pamplin School of Business, Virginia Tech. Dr. Killough has taught at Virginia Tech since 1969. He received a Ph.D. in Accounting from the University of Missouri. Dr. Killough worked in industry for several years prior to teaching and is a CPA. He has numerous publications, many of which are in the top accounting journals in his field. His research specializes in managerial and behavioral topics. He has extensive experience in running controlled experimental research such as the proposed project. In addition he teaches the doctoral seminars that cover behavioral research and experimental methods in accounting.

David Harrison is Assistant Professor of Accounting at the University of South Carolina Aiken. He is a Ph.D. candidate at Virginia Tech in the final stages of his work. He has had one academic publication since entering the Virginia Tech doctoral program four years ago. Mr. Harrison has over twenty years of industry experience and is a CPA. He worked with a Big Eight Accounting firm for six years, was division controller of a fortune 100 company, the director of internal audit for the US operations a major Japanese electronics company and has been corporate controller of two international firms. He has had extensive training in behavioral research methodologies during the past few years at Virginia Tech.

Lynne Harrison is the wife of David Harrison. She has been extremely supportive of David's efforts as a doctoral candidate, and plans to finish up this effort by handling some of the administrative parts of the proposed research. This will include proctoring the spatial ability test. She will hand the self-contained tests to participants, tell them to complete them and collect them when they are finished. If the participants have any questions they will be directed to Dr. Killough or Mr. Harrison. Her teaching experience includes teaching at the Virginia Tech Wellness Programs.

## **Exhibit 7: Participant Consent Form**

### **CONSENT FORM**

You are asked to participate in an experiment on decision-making. You will be paid and receive extra credit according to the decisions you make. The experiment consists of four separate sessions, each containing 12 decision points, plus a practice session. You may take an average of thirty minutes per session if you choose. This should be more than enough time.

The information you provide during the experiment, and the decisions you make will be recorded using the participant number that we will assign to you. All data will be kept strictly confidential by the researchers. Your identity will be maintained to tabulate compensation results only. The statistical analysis of the research will utilize the participant number that will be assigned to you shortly.

Participation is voluntary, and although we ask that you complete the experiment, you may discontinue participation at any time if you wish at no penalty.

**Virginia Tech Honor Code:** On my honor as a Virginia Tech student I promise that I will keep my participation in this experiment confidential until November 10<sup>th</sup>. I will not discuss my strategies, my choices, or my outcomes with anyone. While the games are different, the experiment will be seriously compromised if other participants are aware of it prior to their participation. After November 10<sup>th</sup> you may freely discuss any and all aspects of your participation with anyone. You will be in violation of the Virginia Tech honor code, and forfeit your cash and course extra credit incentives if you violate this pledge. Thank you.

If you have any questions regarding this experiment after your participation is completed, please contact Professor Larry Killough, 540-231-6542.

Please sign the following statement.

I consent to participate in this experiment under the conditions described herein, including my pledge, on my honor as a Virginia Tech student, not to discuss the experiment until November 10, 1997.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Date

## Exhibit 8: Participant Special Overhead Instructions\*

### ***Participants Instructions for Games One and Three (after year three):***

You've now played the first three years this of game. I am going to interrupt you very briefly. I will show you this "reminder message" twice, once during your first game and then again during game three. The purpose is simply to help keep you on track. You are probably feeling a bit frustrated by now. That's natural, the instructions were long, maybe a little complicated. This is a tuff game.

**Here's reminder number one:** The price you get for each product, and the cost for material and labor always stay the same, for all years (and all games). What changes is the way we allocate overhead.

**Overhead is tricky** -- like I said in the instructions, depending on your nature, as an accountant you will either consider overhead costing to be a challenge or just a big pain. Either way, it's difficult. In this game overhead is just like for real: it's challenging and it's a pain.

But just like in real life, deal with it we must. So, the point I am trying to get across to you is that overhead holds the key to this game. Not an easy key, certainly, but since this is the only variable that is seemingly unpredictable. . . perhaps the key is to try to figure it out.

I mentioned in the original instructions that the players that best understand overhead will probably be the players that do best in the game. That Still Holds True!

OK -- Enough Already With My Hints. Good Luck, Good Fortunes and Back To Year 4 - -

### ***Participants Instructions for Games Two and Four (after year three):***

Yep -- It's me again. You'll be getting this message during games two and four.

I'm back with my "helpful hints."

Once again, I know this can be a frustrating game!

Don't start feeling like you should have everything all figured out by now.

Think about it, would I be designing a game that was that easy?

*Keep up your effort level, that will certainly put you ahead of those that slack off.*

Now first off I want to tell you that although the cost functions are the same for all years within each game, they **DO CHANGE BETWEEN GAMES**. So if you try to put in the same volumes in game two that you liked in game one, you will get different results.

Cost functions are the same for years 1 - 12 within each game. But they do change from game 1 to game 2 to game 3 to game 4.

OK, maybe you figured this out anyway. My REAL "hint" brings us back to OVERHEAD again.

~~One last time (promise!):~~ OVERHEAD IS THE KEY TO THIS GAME.

It is the only variable that is somewhat unpredictable.

**Case in Point:** Change the volume on one product, but keep the volume for the other three products the same. Can you guess what happens? The unit cost for OVERHEAD for ALL four products changes. That doesn't happen for material or labor. they're our predictable little friends - - they stay the same (on a per unit basis). Not overhead!

So, ~~concentrate on overhead~~, figure out its behaviors and you're on your way to fame and fortune!



## Exhibit 9A: Sample Game Results @ Year 10 -- ABC/Table

### Detail Analysis Of PER UNIT COSTS For Year Number Ten

<b>PER UNIT ANALYSIS:</b>	<b>Ball</b>	<b>Glove</b>	<b>Bat</b>	<b>Pitch Mach.</b>
<b>Price</b>	<b>\$10.00</b>	<b>\$30.00</b>	<b>\$20.00</b>	<b>\$3,500</b>
Direct Material	\$0.60	\$5.00	\$0.75	\$500
Direct Labor	\$0.50	\$10.00	\$0.50	\$2,000
<b>Overhead:</b>				
Material Handling & Warehousing	\$0.40	\$0.80	\$0.10	\$25
Design Engineering	\$0.15	\$7.69	\$0.77	\$1,537
Production Set-up: Indirect Labor	\$0.11	\$2.72	\$2.72	\$33
Leased Machinery Rental	\$0.50	\$2.25	\$1.00	\$750
Administrative Overhead	\$2.38	\$7.14	\$7.14	\$238
Shipping Department	\$0.60	\$0.60	\$0.75	\$75
<b>Overhead Allocations -- PER UNIT</b>	<b>\$4.14</b>	<b>\$21.20</b>	<b>\$12.48</b>	<b>\$2,658</b>
<b>Total Cost Per Unit</b>	<b>\$5.24</b>	<b>\$36.20</b>	<b>\$13.73</b>	<b>\$5,158</b>
<b>PROFIT / (LOSS) PER UNIT</b>	<b>\$4.76</b>	<b>(\$6.20)</b>	<b>\$6.27</b>	<b>(\$1,658)</b>

<b>At Chosen Sales &amp; Production of:</b>	<b>4,234</b>	<b>8</b>	<b>1,987</b>	<b>10</b>
	<b>Balls</b>	<b>Gloves</b>	<b>Bats</b>	<b>Pitching Machines</b>

### Summary And Prior Years Results:

	<u>Sales Volumes Chosen</u>				<u>Sales</u>	<u>Direct Costs</u>	<u>Overhead</u>	<u>Profit/(Loss)</u>
	<u>Ball</u>	<u>Glove</u>	<u>Bat</u>	<u>Pitch</u>		<u>Mat'l &amp; Labor</u>		
Year #1	5,432	21	3,456	9	155,570	33,110	115,930	6,529
Year #2	1,345	13	3,234	5	96,020	18,217	72,732	5,071
Year #3	3,543	23	3,456	3	115,740	16,062	90,934	8,743
Year #4	5,342	31	4,231	5	156,470	24,130	134,502	(2,162)
Year #5	3,423	15	2,645	9	119,080	29,797	78,094	11,189
Year #6	3,546	14	3,546	14	155,800	43,543	113,128	(872)
Year #7	1,345	25	2,768	7	94,060	22,815	64,457	6,788
Year #8	2,678	21	2,897	12	127,350	36,882	84,818	5,650
Year #9	3,786	14	2,456	9	118,900	29,945	75,735	13,220
Year #10	4,234	8	1,987	10	117,320	32,261	69,085	15,974
Year #11								
Year #12								

**Cummulative Profit      \$70,131**

**Notes:** (1) The Worst Year is Ignored. (2) Any values that appear as '#### etc.' represent very large numbers. [Their profit is always negative.]

## Exhibit 9B: Sample Game Results @ Year 10 -- ABC/Graph

Page 1

***Please See Next Page For UNIT COST Analysis Of This Year's Results***

---

---

### Summary And Prior Years Results:

	Sales Volumes Chosen				Sales	Direct Costs		Profit/(Loss)
	Ball	Glove	Bat	Pitch		Mat'l & Labor	Overhead	
Year #1	5,432	21	3,456	9	155,570	33,110	115,930	6,529
Year #2	1,345	13	3,234	5	96,020	18,217	72,732	5,071
Year #3	3,543	23	3,456	3	115,740	16,062	90,934	8,743
Year #4	5,342	31	4,231	5	156,470	24,130	134,502	(2,162)
Year #5	3,423	15	2,645	9	119,080	29,797	78,094	11,189
Year #6	3,546	14	3,546	14	155,800	43,543	113,128	(872)
Year #7	1,345	25	2,768	7	94,060	22,815	64,457	6,788
Year #8	2,678	21	2,897	12	127,350	36,882	84,818	5,650
Year #9	3,786	14	2,456	9	118,900	29,945	75,735	13,220
Year #10	4,234	8	1,987	10	117,320	32,261	69,085	15,974
Year #11								
Year #12								

---

---

**Cummulative Profit      \$70,131**

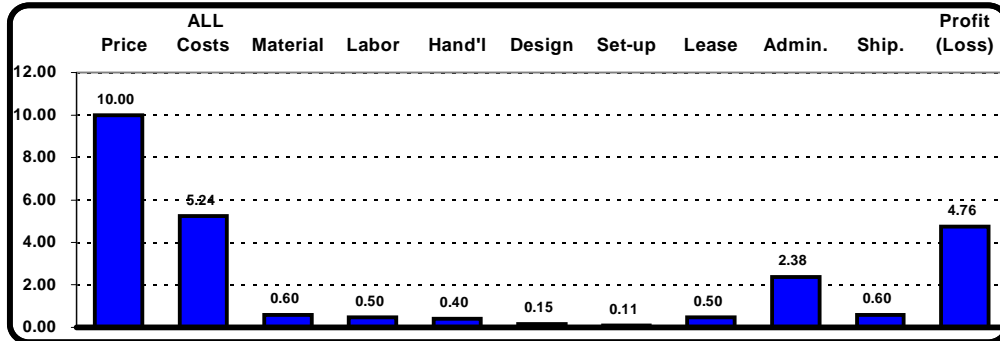
**Notes:** (1) The Worst Year is Ignored. (2) Any values that appear as '##### etc.' represent very large numbers. [Their profit is always negative.]

# Exhibit 9B (cont.): Sample Game Results @ Year 10 -- ABC/Grap

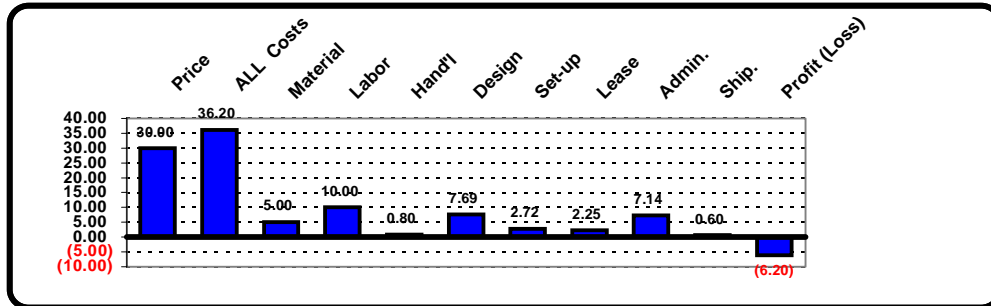
Year Number 10

Page # 2

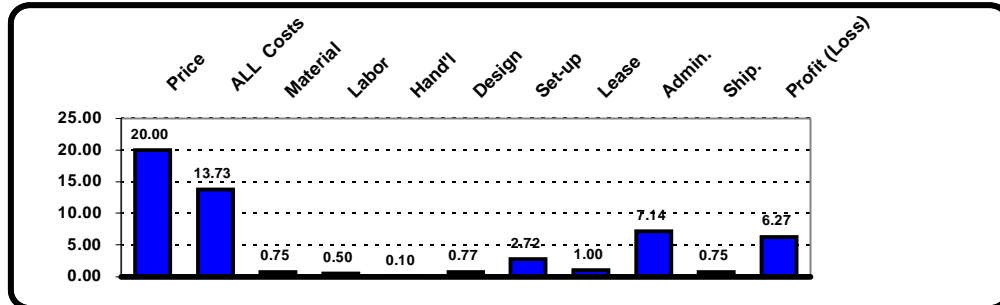
Cost PER BALL (unit costs) When 4,234 Balls Are Made



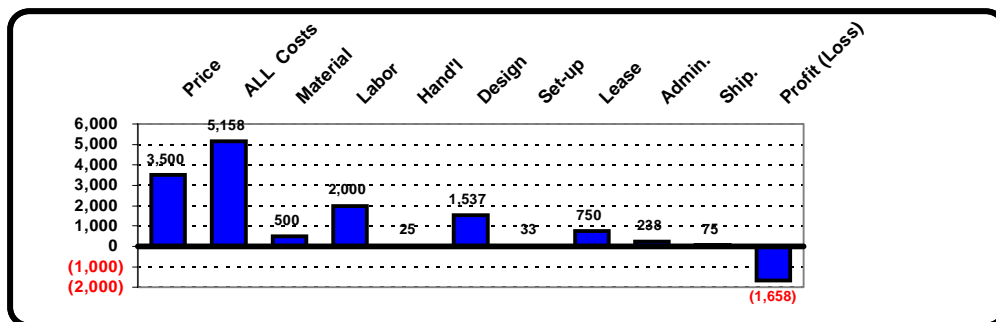
Cost PER GLOVE (unit costs) When 8 Gloves Are Made



Cost PER BAT (unit costs) When 1987 Bats Are Made



Cost PER Machine (unit costs) When 10 Machines Are Made



## Exhibit 9C: Sample Game Results @ Year 10 -- VBC/Table

### Detail Analysis Of PER UNIT COSTS For Year Number Ten

PER UNIT ANALYSIS:	Ball	Glove	Bat	Pitch Mach.	
Price.....	\$10	\$30	\$20	\$3,500	<i>not meaningful</i>
Direct Material	0.60	5.00	0.75	500	" "
Direct Labor	0.50	10.00	0.50	2,000	" "
Overhead Allocation	1.49	29.79	1.49	5,958	" "
<b>Total Cost Per Unit</b>	<b>2.59</b>	<b>44.79</b>	<b>2.74</b>	<b>8,458</b>	" "
<b>PROFIT / (LOSS) PER UNIT</b>	<b>\$7.41</b>	<b>(\$14.79)</b>	<b>\$17.26</b>	<b>(4,958)</b>	" "

At Chosen Sales & Production of:	4,234	8	1,987	10
	Balls	Gloves	Bats	Pitching Machines

### Summary And Prior Years' Results

	Sales Volumes Chosen				Sales	Direct Costs		Profit/(Loss)
	Ball	Glove	Bat	Pitch		Mat'l & Labor	Overhead	
Year #1	5,432	21	3,456	9	155,570	33,110	115,930	6,529
Year #2	1,345	13	3,234	5	96,020	18,217	72,732	5,071
Year #3	3,543	23	3,456	3	115,740	16,062	90,934	8,743
Year #4	5,342	31	4,231	5	156,470	24,130	134,502	(2,162)
Year #5	3,423	15	2,645	9	119,080	29,797	78,094	11,189
Year #6	3,546	14	3,546	14	155,800	43,543	113,128	(872)
Year #7	1,345	25	2,768	7	94,060	22,815	64,457	6,788
Year #8	2,678	21	2,897	12	127,350	36,882	84,818	5,650
Year #9	3,786	14	2,456	9	118,900	29,945	75,735	13,220
Year #10	4,234	8	1,987	10	117,320	32,261	69,085	15,974
Year #11								
Year #12								
<b>Cummulative Profit</b>							<b>\$70,131</b>	

Notes: (1) The Worst Year is Ignored. (2) Any values that appear as '#### etc.' represent very large numbers. [Their profit is always negative.]

## Exhibit 9D: Sample Game Results @ Year 10 -- VBC/Graph

### Summary And Prior Years' Results

E

	<u>Sales Volumes Chosen</u>				<u>Sales</u>	<u>Direct Costs</u>		<u>Profit/(Loss)</u>
	<u>Ball</u>	<u>Glove</u>	<u>Bat</u>	<u>Pitch</u>		<u>Mat'l &amp; Labor</u>	<u>Overhead</u>	
Year #1	5,432	21	3,456	9	155,570	33,110	115,930	6,529
Year #2	1,345	13	3,234	5	96,020	18,217	72,732	5,071
Year #3	3,543	23	3,456	3	115,740	16,062	90,934	8,743
Year #4	5,342	31	4,231	5	156,470	24,130	134,502	(2,162)
Year #5	3,423	15	2,645	9	119,080	29,797	78,094	11,189
Year #6	3,546	14	3,546	14	155,800	43,543	113,128	(872)
Year #7	1,345	25	2,768	7	94,060	22,815	64,457	6,788
Year #8	2,678	21	2,897	12	127,350	36,882	84,818	5,650
Year #9	3,786	14	2,456	9	118,900	29,945	75,735	13,220
Year #10	4,234	8	1,987	10	117,320	32,261	69,085	15,974
Year #11								
Year #12								

---

**Cummulative Profit      \$70,131**

---

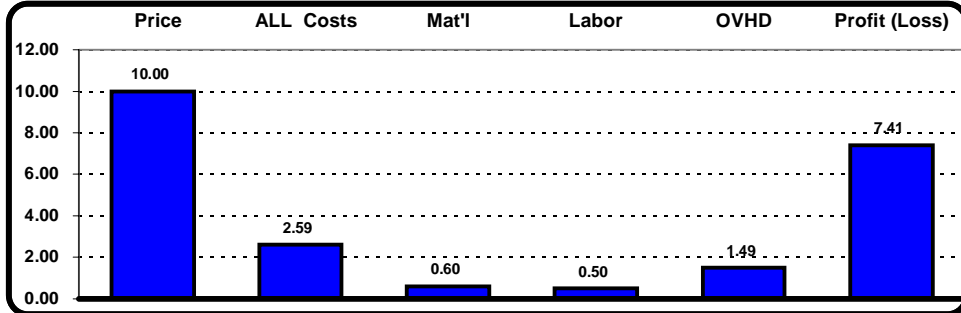
**Notes:** (1) The Worst Year is Ignored. (2) Any values that appear as '#### etc.' represent very large numbers. [Their profit is always negative.]

**Exhibit 9D (cont.): Sample Game Results @ Year 10 -- VBC/Gr:**

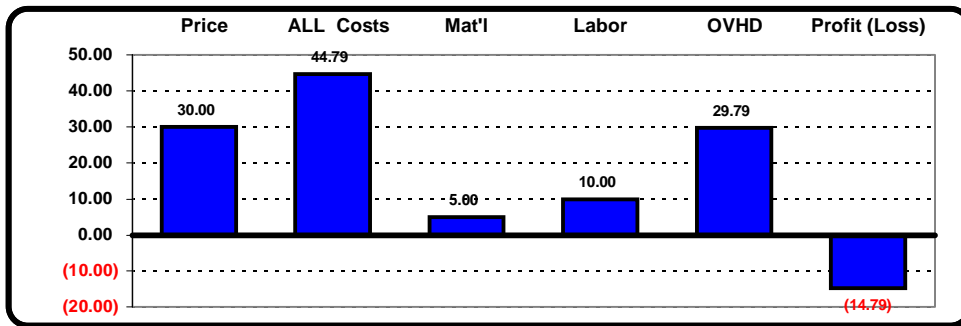
Year Number **10**

Page 2

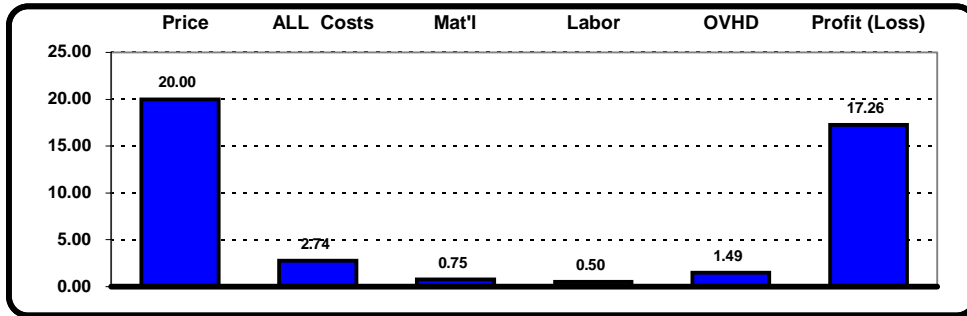
**Cost PER BALL (unit costs) When 4,234 Balls Are Made**



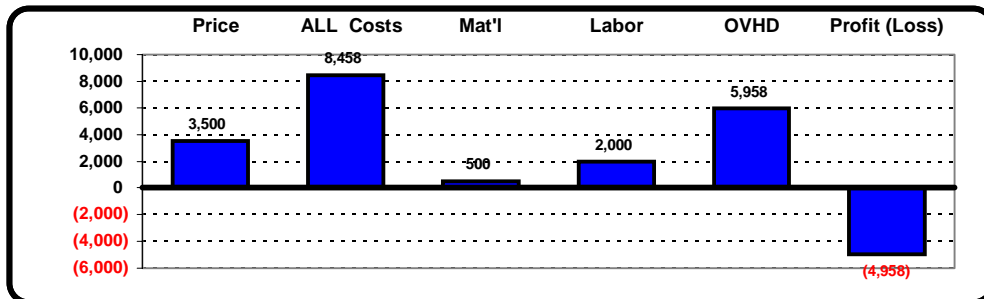
**Cost PER GLOVE (unit costs) When 8 Gloves Are Made**



**Cost PER BAT (unit costs) When 1,987 Bats Are Made**



**Cost PER Machine (unit costs) When 10 Machines Are Made**



## Exhibit 10: Participant Exit Memo

### Accounting Business Simulation Participants

Thank you very much by helping me out by participating in this simulation experiment. I do hope you have enjoyed it. I am sure it was somewhat complicated and frustrating to begin with, but once you got the hang of it I hope it became at least a little entertaining.

I am sure you are interested in how you did in terms of your results compared to others in your league. Remember, although there are many participants, you will be compared only to seven other participants for your incentive awards.

The awards start at \$100 for the best results in your group. The second best participant gets \$50, then \$20, \$10 and the final four in the group get \$5. The top four finishers will get extra credit in their Cost class as well.

It will take me a week to tally the results. You will be notified of your place and reward, and receive payment within 30 days. Please remember the pledge you made on your consent form. Do not discuss the simulation, in any way, until November 10<sup>th</sup>.

You may contact me about anything regarding the simulation you wish. As of November 10<sup>th</sup> I can be reached in South Carolina at 803 641 - 3376. My email is davidh@aiken.sc.edu.

Thanks again, your participation is very helpful to me,

David Harrison

## **Exhibit 11: Results Notification to Student's Professors**

December 6, 1997

Dear Larry, Bob, and Wayne,

RE: Student Extra Credit

The purpose of this letter is to let you know that I have paid your student subjects (Ouch!). Enclosed is the information you need for your classes' extra credit awards.

First though, thank you all once again for your support in getting participants for my experiment. As I have mentioned to you in prior emails, I have done some preliminary analysis. It is safe to say that the results show that my model works and, in fact, works very well indeed. ABC and direct labor decision making effectiveness is persuasively differentiated by the model.

The ABC/Direct labor model was to be the "platform" from which I examined other aspects of decision making. I was especially interested in the graphs and table decisions. Based on my take on the numbers so far I think I won't be getting much graph and table action. Too bad!

I am getting some borderline significance on my bias conditions and interactions. This is interesting and I will work this further. I think I will end up with some findings here. Just need to dig into the numbers a bit more.

Also I haven't looked at my second dependent variable yet (time). My first cut looked at the profitability results only. There is the MANOVA to run as well. Plus I haven't done anything with the demographics or possible covariance on my spatial ability tests. So there is a lot of meat left to play around with.

For example, as I pointed out in my letter to the participants, the men had better ABC results than the women. But apparently when faced with the more difficult direct labor game the women outperformed the men. (I am comparing average results here, not sure if the differences were significant.) Perhaps there is some graphs and tables stuff in the men versus women or other demographics also. Like I said, I've got plenty of numbers and vantages from which to look at them – I guess I'll have to wait another semester to settle into that "cozy" professorial life style I've been looking forward to...

Anyway I really am quite happy with myself for putting together a pretty decent model. As my latest incompetency with the server showed I am not quite a computer expert, so getting the model to be fully automated and to precisely differentiate ABC/Direct labor is something that makes me feel good. I worked very hard at it. It is a good model; I hope to get some valuable mileage out of it for other projects. If you have any ideas let me know.



Attached is a list of students in your class that I feel should be eligible for some form of extra credit: (1) students that signed up and were available, but were not selected to play, (2) students that signed up, played the game and had results that were in the top half of their group, (3) students that signed up and played the game, but had results that were not in the top half of their group.

The game instructions indicated that students that were in the top half of their groups would receive two points of extra credit. The game implied that students finishing in the lower half would get no extra credit, but this, in fact, was never stated. The differential was considered necessary to stimulate participant incentive, which was considered vital. Thus the differential in extra credit and the large differences in payments (\$5 to \$100).

Of course, extra credit is your decision, not mine. Perhaps you would like to give everyone some extra credit. I think that might be a good thing to do. But I strongly suggest you give more credit to those in the top half.

Perhaps you might give one point to students that signed up or were in the lower half. And give two or three points to those that were in the top half. Your decision - - probably you three should be consistent whatever you do.

I have included a copy of a "sample" payment letter that I sent out to the students with their checks. Note that under "Extra Credit Status" I have written either "A" or "B." The "A" corresponds to #2 above (played and were in the top half of their group). The "B" corresponds to #3 above (played and were in the bottom half of their group). As I mentioned, for credibility at Tech I think you should maintain the incentive differential.

Well, Merry Christmas to all. I will be stopping in Blacksburg on December 29<sup>th</sup> and 30<sup>th</sup> on the way home from Christmas in New York. I'll stop by and hope to say hi to Y'all. Coincidentally I'll be there to watch my favorite women's basketball team compete in their home tournament – maybe I'll see you there.

Best Regards,

Cc: Sheryl Ball  
John Brozovosky  
Bob Williges

# Exhibit 12A: Student Payment Notification:

Dear: **Player #**

December 5, 1997

Thank you again for participating in our accounting research, the "Baseball Business Simulation Game." Enclosed with this letter is your check. I have also included some summary statistics that might interest you. One of the things I looked at was whether Activity Based Costing (ABC) information would lead to better decision making. The results from this game pretty clearly supported ABC. The ABC group made \$16,875,993. Direct labor allocations managed to \$166,413,253 for its players! A pretty big difference.

Certainly part of the results obtained by individual players was just simple luck. A lucky start or just luck could account for much in terms of individual results. So, maybe you're a good gamesperson or maybe you got unlucky - - either way: thanks for playing, have a terrific vacation AND now you know that at least one thing you learned in Cost this semester really works: - - **ABC Is A Winner!**

Your payment is based on your individual results, compared with seven other players in your league. The all conditions for you and the other players in your league were identical: All ABC or all direct labor. So who did better as a group, they were compared only with other ABC'ers for payment purposes. (And the direct labor participants were compared only with other DL's)

Sincerely,

David Harrison

P.S. Interestingly in the ABC game the men outdid the women (average score \$886,754 vs. \$611,372), but in the more frustrating direct labor game women did better (losses of \$5,121,450 vs. \$9,075,855).

Go Figure!

Your Player 2

Your Class: Dr. Brown

Your League: American East

Your Game: ABC

<b>Your Results<sup>1</sup>:</b>			
Your Profits:	\$1,808,007		
<u>Place in League:</u>	First		
<u>Cash Payment Earn:</u>	\$100	<u>Check #</u>	301
<u>Extra Credit Status</u>	A	<i>(See Your Cost Teacher)</i>	

<b>Your League's Statistics<sup>1</sup>:</b>			
<b>High:</b>	\$1,808,007	<b>Average:</b>	\$584,398
<b>Low:</b>	(\$688,324)	<b>Median:</b>	\$545,059
<b>Std Dev:</b>	\$873,536		

**Overall League Standings<sup>2</sup>:**  
**Top League / World Series Champs:**  
**American West** ~ ~ (in a very close match)  
 score: \$6,137,079 to \$6,063,733

**MVP Award** to Player #44 in the National League West  
 for her score of \$103,974 in year 11 of her second game.

**Statistics for ABC Game Overall<sup>2</sup>:**

High: \$2,299,815	Average: \$703,166
Low: (\$1,329,427)	Median: \$911,166
Std Dev: \$889,198	

**American League (ABC):**  
 First Place = Western  
 Second Place = Central  
 Third Place = Eastern

**Statistics for Direct Labor Game Overall<sup>2</sup>:**

High: \$1,629,497	Average: (\$6,933,886)
Low: (\$57,725,811)	Median: (\$1,094,676)
Std Dev: \$13,506,367	

**National League (DL\$):**  
 First Place = Eastern  
 Second Place = Western  
 Third Place = Central

<sup>1</sup> Profits for all four games, less the worst year in each game.

<sup>2</sup> These and all other statistics that are outside of your league have nothing to do with your payment calculation.

## Exhibit 12B: Summary of Player Results:

### Player Results Payment Schedule

s Again before releasing					Profits	TIME
Place	Payment	Ck #	Teacher #	League	Less Worst	less Worst
1	\$100		B 2	Amer. East	\$1,808,007	1:19:42
2	\$50		A 3	Amer. East	\$1,775,072	1:10:45
3	\$20		B 6	Amer. East	\$984,393	1:13:45
4	\$10		A 7	Amer. East	\$900,913	1:06:57
n/a	\$5		B 1	Amer. East	\$189,205	1:05:20
n/a	\$5		B 4	Amer. East	\$57,182	1:09:05
n/a	\$5		A 8	Amer. East	(\$351,268)	1:10:13
n/a	\$5		A 5	Amer. East	(\$688,324)	1:26:21
<b>Average =</b>					<b>\$584,398</b>	

High =	\$1,808,007	Median =	\$545,059
Low =	(\$688,324)	Std. Dev. =	\$873,536

1	\$100		A 15	Amer. Cent.	\$2,299,815	0:48:50
2	\$50		B 16	Amer. Cent.	\$1,348,032	1:38:05
3	\$20		A 13	Amer. Cent.	\$1,134,528	1:04:10
4	\$10		A 12	Amer. Cent.	\$921,420	1:05:31
n/a	\$5		A 14	Amer. Cent.	\$463,106	0:48:40
n/a	\$5		A 9	Amer. Cent.	\$391,030	1:18:32
n/a	\$5		B 11	Amer. Cent.	\$113,083	1:14:29
n/a	\$5		C 10	Amer. Cent.	(\$607,280)	0:51:14
<b>Average =</b>					<b>\$757,967</b>	

High =	\$2,299,815	Median =	\$692,263
Low =	(\$607,280)	Std. Dev. =	\$821,230

1	\$100		B 22	Amer. West	\$1,620,300	0:50:22
2	\$50		B 17	Amer. West	\$1,476,534	1:17:29
3	\$20		A 19	Amer. West	\$1,375,050	1:26:08
4	\$10		A 20	Amer. West	\$1,211,756	0:52:55
n/a	\$5		A 23	Amer. West	\$1,176,147	1:36:21
n/a	\$5		B 24	Amer. West	\$810,932	0:55:16
n/a	\$5		A 18	Amer. West	(\$204,214)	1:40:42
n/a	\$5		B 21	Amer. West	(\$1,329,427)	1:19:06
<b>Average =</b>					<b>\$767,135</b>	

High =	\$1,620,300	Median =	\$1,193,952
Low =	(\$1,329,427)	Std. Dev. =	\$955,686

#### Summary for All ABC Players

<b>Total ABC</b>	<b>\$16,875,993</b>
------------------	---------------------

High =	\$2,299,815	Median =	\$911,166
Low =	(\$1,329,427)	Std. Dev. =	\$889,198

**Exhibit 12B: Summary of Player Results (cont):**

1	\$100	A	32	Natl. East	\$995,292	0:58:24
2	\$50	C	25	Natl. East	\$391,133	0:59:19
3	\$20	A	26	Natl. East	\$238,948	1:09:04
4	\$10	A	30	Natl. East	\$180,170	1:28:53
n/a	\$5	A	27	Natl. East	(\$2,240,227)	1:01:47
n/a	\$5	A	29	Natl. East	(\$2,973,260)	1:21:01
n/a	\$5	C	31	Natl. East	(\$3,508,742)	0:46:10
n/a	\$5	A	28	Natl. East	(\$15,422,072)	2:02:50
					<b>Average =</b>	<b>(\$2,792,345)</b>

High =	\$995,292	Median =	(\$1,030,028)
Low =	(\$15,422,072)	Std. Dev. =	\$5,035,699

1	\$100	A	35	Natl. Cent.	\$1,629,497	1:11:31
2	\$50	A	38	Natl. Cent.	\$298,923	1:08:36
3	\$20	A	36	Natl. Cent.	(\$720,691)	1:15:03
4	\$10	C	37	Natl. Cent.	(\$1,744,267)	0:58:06
n/a	\$5	H	33	Natl. East	(\$3,829,152)	1:20:34
n/a	\$5	B	34	Natl. Cent.	(\$20,783,563)	1:21:57
n/a	\$5	A	39	Natl. Cent.	(\$33,754,644)	1:25:10
n/a	\$5	B	40	Natl. Cent.	(\$57,725,811)	1:28:24
					<b>Average =</b>	<b>(\$14,578,714)</b>

High =	\$1,629,497	Median =	(\$2,786,709)
Low =	(\$57,725,811)	Std. Dev. =	\$20,075,668

1	\$100	A	46	Natl. West	\$28,954	1:02:11
2	\$50	C	43	Natl. West	(\$25,191)	1:12:06
3	\$20	A	47	Natl. West	(\$106,650)	0:51:41
4	\$10	C	48	Natl. West	(\$270,787)	1:13:47
n/a	\$5	B	41	Natl. West	(\$599,091)	0:59:42
n/a	\$5	A	44	Natl. West	(\$1,468,660)	0:56:13
n/a	\$5	C	45	Natl. West	(\$8,826,297)	1:28:03
n/a	\$5	A	42	Natl. West	(\$16,177,065)	1:16:18
					<b>Average =</b>	<b>(\$3,430,598)</b>

High =	\$28,954	Median =	(\$434,939)
Low =	(\$16,177,065)	Std. Dev. =	\$5,568,336

**Summary for All DL\$ Players**

**Total DL\$ (\$166,413,253)**

High =	\$1,629,497	Median =	(\$1,094,676)
Low =	(\$57,725,811)	Std. Dev. =	\$13,506,367

# Exhibit 13: Sample Cost Functions:

This is 'left' half of Cost functions for "Summary & Product A"

**YEAR TEN 10**

Summary of Cost Driving Calculations For Entire Operation:  
*(For Year One Volumes Selected)*

**Overheads:**

Material Handling	Linear	TC = a * (#Parts)
Production Planning Dept.	learning	TC = b * LN(#PO's)
Set-up Indirect Labor	Inc/Decr/Inc	TC=c*LN(#SU's) - (#SU's)^2&exp
Leased Machinery Cost	linear	TC = d * (#MachHrs)
Quality & Finishing	exponential	TC = (e)'*((e-DL\$)^1.3)
Shipping Department	linear	TC = f *(#Ships)

Year Ten Volumes Selected:

Ball	4,234
Glove	8
Bat	1,987
Pitch Machine	10

Product A -> Year Ten

Volume Selected → **4,234**

**COST CONVERSION INFORMATION**

		Cost Driver		COST FUNCTIONS	
<b>Direct Costs:</b>					
<b>Material Costs</b>		Units Produced	<b>\$ per unit</b> 0.60	Linear	TC = .45 * (#units)
<b>Labor Costs</b>	0.10	Units Produced	0.50	Linear	TC = .25 * (#units)
	DL hours / unit	DL Rate/Hr=	\$5.00		
<b>Overheads:</b>					
Material Handling		# of Parts per unit	<b># per unit</b> 4	Linear	TC = a * (#Parts)
Production Planning Dept.		# of Prod. Orders	0.01	learning	TC = b * LN(#PO's)
Set-up Indirect Labor		# of Set-ups	0.010	Inc/Decr/Inc	TC=c*LN(#SU's) - (#SU's)^2&exp
Leased Machinery Cost		Machine Hours	0.1	linear	TC = d * (#MachHrs)
Quality & Finishing		Q&F Dept. Minutes	2	exponential	TC = (e)'*((e-DL\$)^1.3)
Shipping Department		# of Shipments	0.4	linear	TC = f *(#Ships)

**Direct Labor Dollar Group Rate Used For OVHDCost Alloc**

**This is 'right' half of Cost functions for "Summary & Product A"**

COST DRIVING:			Overhead	Cost per Driver	Description of Cost Driver
"Coefficient"	Activity	Vol.	Total Cost		
a =	0.100	21,487	2,149	\$0.10	per pieces in product
b =	2,500.00	1,146	17,609	\$15.37	per purchase orders needed
c =	1,000.00	571	6,215	\$10.88	per set-ups needed
d =	5.00	2,324	11,622	\$5.00	per machine hour needed
e =	7,500.00	22,438	26,704	\$1.19	per direct labor dollars
e' =	0.100				
f =	1.50	3,190	4,785	\$1.50	per shipments needed
<b>Total Indirect Costs</b>			<b>\$69,085</b>	<b>n/m</b>	
<b>@ Year Ten Volumes</b>					
<b>Total Direct Material Costs</b>			<b>\$9,071</b>		
<b>Total Direct Labor Costs</b>			<b>\$23,191</b>		
<b>Indirect Costs Per Direct Labor Dollar</b>			<b>\$2.98</b>		

COST DRIVING:			FINAL COSTS		
"Coefficient"	Activity	Vol.	COST	Cost / Driver	Cost/unit
		4,234	2,540	0.60	\$0.60
		4,234	2,117	0.50	\$0.50
<b>Total Direct Costs</b>			<b>\$4,657</b>	<b>\$1.10</b>	<b>\$1.10</b>
<b>Actual (&amp;ABC) Overhead Costs (per group costs above):</b>					
			<b>TTL COST</b>	<b>Cost / Driver</b>	<b>Cost/unit</b>
a =	0.100	16,936	1,694	0.10	\$0.40
b =	2,500.00	42	651	15.37	\$0.15
c =	1,000.00	42	461	10.88	\$0.11
d =	5.00	423	2,117	5.00	\$0.50
e =	7,500.00	8,468	10,078	1.19	\$2.38
e' =	0.100				
f =	1.50	1,694	2,540	1.50	\$0.60
			<b>\$17,541</b>	= Actual OVHD Costs Per Group Cost Function	
<b>ation (per above)</b>			<b>\$2.98</b>	<b>\$4.14 Actual Cost / Unit</b>	
			<b>\$6,307</b>	<b>\$1.49 DL Based Cost / Unit</b>	
			<b>(\$11,234)</b>	<b>Difference Allocation OVER / (UNDER)</b>	
<b>Actual OVHD Costs</b>					

**This is 'left' half of Cost functions for "Products B & C"**

<u>Product B</u> -- <u>Year Ten</u>		<u>COST CONVERSION INFORMATION</u>			
<u>Volume Selected</u>		<u>Cost Driver</u>	<u>COST FUNCTIONS</u>		
8					
<b>Direct Costs:</b>					
<b>Material Costs</b>		Units Produced	\$ per-unit 5.00	Linear	TC = 5 * (#units)
<b>Labor Costs</b>	2.0	Units Produced	10.00	Linear	TC = 10 * (#units)
	DL hours / unit	DL Rate/Hr=	\$5.00		
<b>Overheads:</b>					
Material Handling		# of Parts per unit	# per-unit 8	Linear	TC = a * (#Parts)
Production Planning Dept.		# of Prod. Orders	0.50	learning	TC = b * LN(#PO's)
Set-up Indirect Labor		# of Set-ups	0.250	Inc/Decr/Inc	TC=c*LN(#SU's) - (#SU's)^2&exp
Leased Machinery Cost		Machine Hours	0.5	linear	TC = d * (#MachHrs)
Quality & Finishing		Q&F Dept. Minutes	6	exponential	TC = (e)'*((e-DL\$)^1.3)
Shipping Department		# of Shipments	0.4	linear	TC = f * (#Ships)
Direct Labor Dollar Group Rate Used For OVHDCost Alloc					

<u>Product C</u> -- <u>Year Ten</u>		<u>COST CONVERSION INFORMATION</u>			
<u>Volume Selected</u>		<u>Cost Driver</u>	<u>COST FUNCTIONS</u>		
1,987					
<b>Direct Costs:</b>					
<b>Material Costs</b>		Units Produced	\$ per-unit 0.75	Linear	TC = .75 * (#units)
<b>Labor Costs</b>	0.10	Units Produced	0.50	Linear	TC = .5 * (#units)
	DL hours / unit	DL Rate/Hr=	\$5.00		
<b>Overheads:</b>					
Material Handling		# of Parts per unit	# per-unit 1	Linear	TC = a * (#Parts)
Production Planning Dept.		# of Prod. Orders	0.05	learning	TC = b * LN(#PO's)
Set-up Indirect Labor		# of Set-ups	0.250	Inc/Decr/Inc	TC=c*LN(#SU's) - (#SU's)^2&exp
Leased Machinery Cost		Machine Hours	0.2	linear	TC = d * (#MachHrs)
Quality & Finishing		Q&F Dept. Minutes	6	exponential	TC = (e)'*((e-DL\$)^1.3)
Shipping Department		# of Shipments	0.5	linear	TC = f * (#Ships)
Direct Labor Dollar Group Rate Used For OVHDCost Alloc					

**This is 'right' half of Cost functions for "Products B & C"**

COST DRIVING:			FINAL COSTS		
"Coefficient"	Activity	Vol.	COST	Cost / Driver	Cost/unit
		8	40	5.00	\$5.00
		8	80	10.00	\$10.00
		<b>Total Direct Costs</b>	<b>\$120</b>	<b>\$15.00</b>	<b>\$15.00</b>
<b>Actual (&amp;ABC) Overhead Costs (per group costs above):</b>					
			TTL COST	Cost / Driver	Cost/unit
a =	0.100	64	6	0.10	\$0.80
b =	2,500.00	4	61	15.37	\$7.69
c =	1,000.00	2	22	10.88	\$2.72
d =	5.00	4	18	5.00	\$2.25
e =	7,500.00	48	57	1.19	\$7.14
e' =	0.100				
f =	1.50	3	5	1.50	\$0.60
			<b>\$170</b>	= Actual OVHD Costs Per Group Cost Function	
				\$21.20	Actual Cost / Unit
ation (per above)	<b>\$2.98</b>		<b>\$238</b>		<b>\$29.79 DL Based Cost / Unit</b>
			<b>\$69</b>	Difference Allocation OVER / (UNDER)	
				Actual OVHD Costs	

COST DRIVING:			FINAL COSTS		
"Coefficient"	Activity	Vol.	COST	Cost / Driver	Cost/unit
		1,987	1,490	0.75	\$0.75
		1,987	994	0.50	\$0.50
		<b>Total Direct Costs</b>	<b>\$2,484</b>	<b>\$1.25</b>	<b>\$1.25</b>
<b>Actual (&amp;ABC) Overhead Costs (per group costs above):</b>					
			TTL COST	Cost / Driver	Cost/unit
a =	0.100	1,987	199	0.10	\$0.10
b =	2,500.00	99	1,527	15.37	\$0.77
c =	1,000.00	497	5,406	10.88	\$2.72
d =	5.00	397	1,987	5.00	\$1.00
e =	7,500.00	11,922	14,189	1.19	\$7.14
e' =	0.100				
f =	1.50	994	1,490	1.50	\$0.75
			<b>\$24,798</b>	= Actual OVHD Costs Per Group Cost Function	
				\$12.48	Actual Cost / Unit
ation (per above)	<b>\$2.98</b>		<b>\$2,960</b>		<b>\$1.49 DL Based Cost / Unit</b>



**This is 'left' half of Cost functions for "Products D & Final Summary"**

<u>Product D -- Year Ten</u>		<u>COST CONVERSION INFORMATION</u>			
<u>Volume Selected</u>		<u>Cost Driver</u>	<u>COST FUNCTIONS</u>		
10					
<b>Direct Costs:</b>			<b>\$ per unit</b>		
<b>Material Costs</b>		Units Produced	500	Linear	TC = 500 * (#units)
<b>Labor Costs</b>	200.00	Units Produced	2,000	Linear	TC = 2000 * (#units)
	DL hours / unit	DL Rate/Hr=	\$10.00		
<b>Overheads:</b>			<b># per unit</b>		
Material Handling		# of Parts per unit	250	Linear	TC = a * (#Parts)
Production Planning Dept.		# of Prod. Orders	100.00	learning	TC = b * LN(#PO's)
Set-up Indirect Labor		# of Set-ups	3.00	Inc/Decr/Inc	TC=c*LN(#SU's) - (#SU's)^2&exp
Leased Machinery Cost		Machine Hours	150.00	linear	TC = d * (#MachHrs)
Quality & Finishing		Q&F Dept. Minutes	200.00	exponential	TC = (e)'*((e-DL\$)^1.3)
Shipping Department		# of Shipments	50.0	linear	TC = f * (#Ships)

**Direct Labor Dollar Group Rate Used For OVHDCost Alloc**

**Summary, Year Ten:**

<b>YEAR TEN:</b>	<b>-A-</b>	<b>-B-</b>	<b>-C-</b>	<b>-D-</b>	<b>Total</b>
Sales \$	42	0	40	35	117
Reported Profit	20	(0)	12	(17)	16
Actual Profit	9	0	(9)	16	16
Profit Over/(Under)	11.2	(0)	22	(33)	0
O/(U) as % of Sales	27%	-29%	55%	-94%	0%

**This is 'right' half of Cost functions for "Products D & Final Summary"**

<b>COST DRIVING:</b>			<b>FINAL COSTS</b>		
"Coefficient"	Activity Vol.		COST	Cost / Driver	Cost/unit
	10		5,000	500.00	\$500.00
	10		20,000	2,000.00	\$2,000.00
	<b>Total Direct Costs</b>		<b>\$25,000</b>	<b>\$2,500.00</b>	<b>\$2,500.00</b>
<b>Actual (&amp;ABC) Overhead Costs (per group costs above):</b>					
			<b>TTL COST</b>	<b>Cost / Driver</b>	<b>Cost/unit</b>
a =	0.100	2,500	250	0.10	\$25.00
b =	2,500.00	1,000	15,370	15.37	\$1,537.01
c =	1,000.00	30	327	10.88	\$32.65
d =	5.00	1,500	7,500	5.00	\$750.00
e =	7,500.00	2,000	2,380	1.19	\$238.03
e' =	0.100				
f =	1.50	500	750	1.50	\$75.00
			<b>\$26,577</b>	= Actual OVHD Costs Per Group Cost Function	
				\$2,657.69	Actual Cost / Unit
ation (per above)	<b>\$2.98</b>		<b>\$59,581</b>	<b>\$5,958.06 DL Based Cost / Unit</b>	
			<b>\$33,004</b>	Difference Allocation OVER / (UNDER)	
				Actual OVHD Costs	

<b>DIRECT LABOR ALLOCATIONS, Year Ten:</b>					
	Total	Prod.A	Prod.B	Prod.C	Prod.D
Materials	9,071	2,540	40	1,490	5,000
Labor	23,191	2,117	80	994	20,000
DL\$ Alloc OVHD	69,085	6,307	238	2,960	59,581
<b>Total Product</b>	<b>101,346</b>	<b>10,964</b>	<b>358</b>	<b>5,443</b>	<b>84,581</b>
<b>Actual (ABC) Overhead Totals</b>	<b>69,085</b>	<b>17,541</b>	<b>170</b>	<b>24,798</b>	<b>26,577</b>
<b>OVHD Diff's</b>	<b>0</b>	<b>(11,234)</b>	<b>69</b>	<b>(21,838)</b>	<b>33,004</b>

## Exhibit 14: Framing Operationalization:

### Framing Operationalization #1 -- Implementation of Framing Bias.

**Guess What? YOU GOT LUCKY! -- FROM HERE ON THIS GAME IS NOW A \$25 BONUS GAME**

Hi -- here we go again, time to think about winning strategies once more.

The game is almost half over. You have completed 5 out of the 12 years -- still 7 years to go.

Please take a few minutes to think about the profit maximizing strategy you have been using so far. What seem's to be working -- What's no help. Think about a strategy that you might try using right after this break.

Once you're comfortable with your strategy, please write it down in the **WHITE** area below. Think for a moment before you start writing.

**IF YOU STICK WITH THIS STRATEGY THAT YOU DESCRIBE AND IT IS A WINNER YOU WILL GET A \$25 BONUS! PLUS YOU'LL PROBABLY WIN THE \$100 TOP PRIZE IN YOUR LEAGUE. YOU HAVE TO DO TWO THINGS TO WIN THE \$25 BONUS.**

First you have to stick with it through the rest of the 7 remaining years in this session. Next it has to be the winning strategy in This Game (this set of 12 years).

Whatever your strategy is you are always free to change it, whatever and whenever.

OK -- please write your strategy below. Take about three to eight minutes for this whole process That includes thinking about the strategy and writing it down. Ten minutes maximum.

Use the mouse or cursor to move from line to line.

We are giving you more room than you need.

**Writing your strategy will be helpful -- but there is NO Bonus This Time!**

Call Me If You Are Having Trouble Typing, Entering Or Moving Around On This Page - - DON'T TYPE PAST HERE

**Another Reminder-- We disregard results from your worst year. So don't get frustrated just because**

***Framing Operationalization #2 -- "CONTROL" No Framing.***

Hello! Sorry to stop you, NO the game is not over. It's 'contemplation' time, that's all.

The game is almost half over. You have completed 5 out of the 12 years -- still 7 years to go.

Please take a few minutes to think about the profit maximizing strategy you have been using so far. What seem's to be working -- What's no help. Think about a strategy that you might try using right after this break.

Once you're comfortable with your strategy, please write it down in the **WHITE** area below. Think for a moment before you start writing.

THERE IS NO BONUS OR INCENTIVE OR ANYTHING FOR WRITING DOWN A WINNING STRATEGY. BUT THIS WHOLE WRITING DOWN THING WILL PROBABLY HELP WITH YOUR GAME FROM HERE ON -- SO GIVE IT A TRY AND WRITE OUT YOUR PLANS.

Remember This Session Has No Bonus or Incentive for Correct or Even Good Strategies But Using This Time Productively Get's You That Much Closer to the \$100 and Extra Credit.

Whatever your strategy is you are always free to change it, whatever and whenever.

OK -- please write your strategy below. Take about three to eight minutes for this whole process That includes thinking about the strategy and writing it down. Ten minutes maximum.

Use the mouse or cursor to move from line to line.

We are giving you more room than you need.

**Writing your strategy will be helpful -- but there is NO Bonus This Time!**

Call Me If You Are Having Trouble Typing, Entering Or Moving Around On This Page - - DON'T TYPE PAST HERE



**Another Reminder--** We disregard results from your worst year. So don't get frustrated just because you may have goofed up on one year -- And others probably did the same anyway. **Hang In There!**

# Exhibit 15: Demographic Data Collection Screen:

{Note: Demographic Input Boxes Lined up Perfectly on Actual Screens}

Please enter your name below in the yellow box:  
-- then hit enter --

**YOUR NAME**

Please Select the Button Below That Most Closely Describes You--- [one per box only]:

Player #  
 League BAD PLAYER NUMBER !!!!!!!  
 Your player # and leagues are assigned by us. We will tell you them again at the game's end.

- Your Major**
  - Accounting Management
  - Acct/Systems Mgt. Sci.
  - Finance Other-Business
  - Marketing Non-Business
- Your Year in School**
  - Sophmo
  - Junior
  - Senior
  - MS-Acct
  - MBA
  - Other
- Your Career Intentions**
  - Accounting: Auditing(CPA)
  - Controllershship/Industry(CMA)
  - Tax
  - Banking
  - Management
  - Marketing/Sales
  - Engineering
  - Accounting Systems
  - Consulting
  - Small Business
  - Other
- Your Computer Experience**
  - None (help!)
  - Tech Course Work Only (1504 & 2504)
  - Moderately Good
  - Experienced User

**NOTE: On The Computer Screen The Entry Boxes Lined Up Exaclty**

- Accounting Courses Completed** {Check As Many As Apply}
 

<input type="checkbox"/> Principles 2115	<input type="checkbox"/> Principles 2116	<input type="checkbox"/> Intermediate 3115	<input type="checkbox"/> Intermediate 3116	<input type="checkbox"/>
<input type="checkbox"/> Computers 1504	<input type="checkbox"/> Computers 2504	<input type="checkbox"/> Systems 3513	<input type="checkbox"/> Applications 3534	<input type="checkbox"/>
<input type="checkbox"/> Auditing 4415	<input type="checkbox"/> Tax 4314	<input type="checkbox"/> Number Of Other Accounting Courses Completed		3 4

Use Arrows  
Then Highlight #
- Economics Courses Taken** {Check As Many As Apply}
  - Principles 2115
  - Principles 2116
  - Others
- Grade Point Average, Cummulative**

Cum. Grade Point

Use Arrows to Move Up & Down Then Highlight Your QCA Range
- SAT--Verbal**  ← enter your score
- SAT--Math**  ← enter your score
- Age**  ← enter your age
- Sex**  ← enter M or F

Please hit enter after your last entry  
Then go to the "Begin" button if you're ready

If you have completed all items, please push below:

# Exhibit 16: Random Assignment of Conditions:

## Student Sign Up AND Random Assignment

Students Used This Sheet To Sign-up For Participation. Once Time Slots Were Filled, the 48 different Factorial Conditions Were Randomly Assigned. Random Assignment Was Made Using Excel's Random Number Generator for Numbers 1-48.

Note: Some ReScheduling Was Done -- Random Assignment Maintained Throughout -- Times Were Rescheduled Not Factorial Assignment.

MONDAY: Nov. 3rd	TUESDAY: Nov. 4th	WEDNESDAY: Nov. 5th	THURSDAY: Nov. 6th
8:00 AM Name: _____ #10 Phone: _____	8:00 AM Name: _____ #29 Phone: _____	8:00 AM Name: _____ #13 Phone: _____	8:00 AM Name: _____ #20 Phone: _____
8:50 AM Name: _____ #4 Actual Date Was Friday @ 9am Phone: _____	8:50 AM Name: _____ #23 Actual Date Was Friday @ 9am Phone: _____	8:50 AM Name: _____ #25 Phone: _____	8:50 AM Name: _____ #40 Phone: _____
9:40 AM Name: _____ #27 Phone: _____	9:40 AM Name: _____ #37 Phone: _____	9:40 AM Name: _____ #16 Phone: _____	9:40 AM Name: _____ #9 Phone: _____
10:30 AM Name: _____ #28 Phone: _____	10:30 AM Name: _____ #18 Actual Date Was Friday @ noon Phone: _____	10:30 AM Name: _____ #19 Phone: _____	10:30 AM Name: _____ #45 Phone: _____
11:20 AM Name: _____ #15 Phone: _____	11:20 AM Name: _____ #43 Phone: _____	11:20 AM Name: _____ #18 Phone: _____	11:20 AM Name: _____ #48 Phone: _____
12:10 PM Name: _____ #46 Phone: _____	12:10 PM Name: _____ #30 Actual Date Was _____ Phone: _____	12:10 PM Name: _____ #35 Phone: _____	12:10 PM Name: _____ #33 Phone: _____
1:00 PM Name: _____ #39 Phone: _____	1:00 PM Name: _____ #42 Phone: _____	1:00 PM Name: _____ #26 Phone: _____	1:00 PM Name: _____ #36 Phone: _____
1:50 PM Name: _____ #1 Actual Date Was Friday @ 9:30 am Phone: _____	1:50 PM Name: _____ #47 Phone: _____	1:50 PM Name: _____ #32 Phone: _____	1:50 PM Name: _____ #24 Phone: _____
2:40 PM Name: _____ #14 Phone: _____	2:40 PM Name: _____ #38 Actual Date Was Friday @ 1:50 pm Phone: _____	2:40 PM Name: _____ #3 Phone: _____	2:40 PM Name: _____ #41 Phone: _____
3:30 PM Name: _____ #21 Phone: _____	3:30 PM Name: _____ #8 Phone: _____	3:30 PM Name: _____ #12 Phone: _____	3:30 PM Name: _____ #17 Phone: _____
4:20 PM Name: _____ #34 Phone: _____	4:20 PM Name: _____ #31 Phone: _____	4:20 PM Name: _____ #7 Phone: _____	4:20 PM Name: _____ #22 Phone: _____
5:10 PM Name: _____ #5 Phone: _____	5:10 PM Name: _____ #2 Phone: _____	5:10 PM Name: _____ #11 Phone: _____	5:10 PM Name: _____ #44 Phone: _____

**Exhibit 17: Detail Results Compilation File (Sample for Player #2):**

>This is 'hard copy;' results also kept on computer disks.

	<u>W/S Source</u>	<u>Linked</u>	<u>Paste Special</u>
<b>NAME</b>	New ---	Sample Player	Sample Player
<b>PLAYER NUMBER</b>	New ---	24	24
<b>LEAGUE NUMBER</b>	New ---	Amer. East	Amer. East
<b>PLAYER/GAME LOG#</b>	New ---	sample#24-abc-t-n#3	sample#24-abc-t-n#3
<b>COST FUNCTION</b>	New ---	3	3
		0	0
<b><u>Conditions Assigned:</u></b>			
<b>ABC or DL</b>	ABC	ABC	ABC
<b>Graph or Table</b>	New ---	table	table
<b>Bias or None</b>	New ---	none	none
<b><u>Demogrphics:</u></b>			
	"" ""		
Major		1	1
Year in College		2	2
Career Intentions		5	5
Computer Experience		3	3
<b><u>Acct Courses:</u></b>			
Acct 2115		TRUE	TRUE
Acct 2116		TRUE	TRUE
Inter 3115		0	0
Inter 3116		0	0
Computers 1504		TRUE	TRUE
Computers 2504		TRUE	TRUE
Systems 3513		0	0
Applications 3534		0	0
Auditing 4415		0	0
Tax 4314		0	0
Other		0	0
<b><u>Econ Courses:</u></b>			
Econ Principles I		TRUE	TRUE
Econ Principles II		TRUE	TRUE
Other		0	0
Grade Point		3	3
SAT -- Verbal		610	610
SAT -- Math		590	590
Age		20	20
Sex		F	F
<b><u>TOTAL -- YEARS 1 TO 12 ONLY</u></b>			
<b>Elapsed Time</b>		<b>05:32.0</b>	<b>05:32.0</b>
<b><u>Volumes Chosen:</u></b>			
Ball		44,155	44,155
Glove		201	201
Bat		36,338	36,338
Pitch Machine		90	90
<b><u>Results / Profit:</u></b>			
Ball		181,015	181,015
Glove		(2,339)	(2,339)
Bat		86,674	86,674
Pitch Machine		(166,737)	(166,737)
<b>Total</b>		<b>98,612</b>	<b>98,612</b>

<u>Year 1:</u>		ABC-Yr#1		
<u>Elapsed Time</u>			3.94E-04	00:34.0
<u>Volumes Chosen:</u>				
Ball		5,432		5,432
Glove		21		21
Bat		3,456		3,456
Pitch Machine		9		9
<u>Results / Profit:</u>				
Ball		20,341		20,341
Glove		(247)		(247)
Bat		2,553		2,553
Pitch Machine		(16,118)		(16,118)
<u>Total</u>		6,529		6,529
<u>Year 2:</u>				
<u>Elapsed Time</u>			00:22.0	00:22.0
<u>Volumes Chosen:</u>				
Ball		1,345		1,345
Glove		13		13
Bat		3,234		3,234
Pitch Machine		5		5
<u>Results / Profit:</u>				
Ball		6,080		6,080
Glove		(164)		(164)
Bat		11,877		11,877
Pitch Machine		(12,721)		(12,721)
<u>Total</u>		5,071		5,071
<u>Year 3:</u>				
<u>Elapsed Time</u>			00:22.0	00:22.0
<u>Volumes Chosen:</u>				
Ball		3,543		3,543
Glove		23		23
Bat		3,456		3,456
Pitch Machine		3		3
<u>Results / Profit:</u>				
Ball		14,053		14,053
Glove		(407)		(407)
Bat		4,738		4,738
Pitch Machine		(9,640)		(9,640)
<u>Total</u>		8,743		8,743

**Note to Exhibit 18: This file contained all years, 1 - 12. Only years 1 -3 and the summary are shown above.**

***In addition at the end of this file the Framing Operationalization results from the players was included here. See Exhibit 15.***



# Exhibit 18: Results Summary File (Sample of 2 Player Results)

Game Results -- Summary		Player #1 / Professor B				Player #2 / Professor B			
		Game 1	Game 2	Game 3	Game 4	Game 1	Game 2	Game 3	Game 4
	file name	chen#1abc-g-b#1	chen#1abc-t-b#2	chen#1abc-g-n#3	chen#1abc-t-n#4	ervall#2-abc-g-b#1	ervall#2-abc-tb#2	rvall#2-abc-t-n#3	rvall#2-abc-g-n#4
12	Name (& 1st Link Ref.)	Player #1	Player #1	Player #1	Player #1	Player #2	Player #2	Player #2	Player #2
13	Player Number	1	1	1	1	2	2	2	2
14	Group/League	Amer. East	Amer. East	Amer. East	Amer. East	Amer. East	Amer. East	Amer. East	Amer. East
Conditions:									
19	ABC / DL\$	ABC	ABC	ABC	ABC	ABC	ABC	ABC	ABC
20	Table / Graph	graph	table	graph	table	graph	table	table	graph
21	Bias / None	bias	bias	none	none	bias	bias	none	none
16	Cost Function	1	2	3	4	1	2	3	4
	Profits:	<b>\$\$ All Years</b>	<b>\$\$ Less Worst</b>	<b>\$\$ Less 2nd W</b>	<b>\$\$ less 3rd W</b>	<b>\$\$ All Years</b>	<b>\$\$ Less Worst</b>	<b>\$\$ Less 2nd W</b>	<b>\$\$ less 3rd W</b>
80	Total Profits, Excl. Yr.1	85,989	110,478	43,856	(308,663)	246,187	661,595	90,335	809,885
	Total less the worst of 2-12	82,535	118,429	183,266	(163,728)	226,503	613,482	88,641	759,707
	Total less 2 worst of 2-12	77,754	117,175	199,816	(96,240)	206,809	553,162	85,286	694,963
	Total less 3 worst of 2-12	70,692	113,234	195,195	(50,507)	187,030	492,056	80,970	630,084
	time -- All Years	1:15:41	1:02:58	0:54:01	0:46:27	1:33:42	1:17:05	1:05:42	0:55:40
	time -- Less Worst	0:23:37	0:17:47	0:17:34	0:16:43	0:32:36	0:22:18	0:19:14	0:19:34
	time -- Less 2nd W	0:18:32	0:14:35	0:15:31	0:14:20	0:25:35	0:18:14	0:16:06	0:17:10
	time -- less 3rd W	0:15:53	0:12:27	0:13:40	0:12:01	0:22:03	0:15:12	0:13:38	0:14:49
	time -- All Years	0:13:35	0:10:38	0:11:50	0:10:24	0:18:31	0:12:45	0:11:34	0:12:50
	time -- Less Worst	75.68	62.97	54.02	46.45	93.70	77.08	65.70	55.67
	time -- Less 2nd W	23.62	17.78	17.57	16.72	32.60	22.30	19.23	19.57
	time -- less 3rd W	18.53	14.58	15.52	14.33	25.58	18.23	16.10	17.17
	decimals for calculation	15.88	12.45	13.67	12.02	22.05	15.20	13.63	14.82
	Total time, Excl. Yr.1	13.58	10.63	11.83	10.40	18.52	12.75	11.57	12.83
	Total less the worst of 2-12								
	Total less 2 worst of 2-12								
	Total less 3 worst of 2-12								
Profits (In Order -- unsorted):									
96	Year 1	3,187	(14,813)	(20,391)	(6,408)	19,688	47,612	(340,382)	49,671
111	Year 2	3,453	(7,952)	(139,410)	(16,935)	19,685	48,113	3,355	50,178
127	Year 3	7,061	1,254	(16,550)	(24,842)	19,694	60,320	4,746	64,878
142	Year 4	8,294	3,941	4,621	(45,733)	19,778	61,556	1,695	68,355
157	Year 5	9,146	5,296	12,604	(144,935)	19,883	61,106	4,315	64,745
172	Year 6	10,303	7,690	15,716	(67,488)	22,458	61,167	4,727	69,338
188	Year 7	7,652	11,956	18,338	(26,759)	22,882	61,554	4,495	82,081
203	Year 8	9,563	12,711	22,428	(26,171)	23,301	61,503	7,191	81,945
218	Year 9	8,245	14,476	22,093	(30,179)	23,714	61,483	9,225	81,914
233	Year 10	7,187	17,109	28,908	(10,794)	25,481	61,591	15,355	82,116
249	Year 11	4,782	20,990	34,809	36,769	27,361	61,563	16,393	82,151
264	Year 12	10,303	23,006	40,299	48,402	21,952	61,638	18,837	82,185
Elapsed Time: (In order -- unsorted):									
84	Year 1	0:00:47	0:00:27	0:00:35	0:00:33	0:00:40	0:01:00	0:00:21	0:00:36
99	Year 2	0:02:04	0:01:49	0:01:30	0:01:10	0:02:50	0:01:51	0:02:00	0:02:24
115	Year 3	0:02:39	0:01:16	0:01:50	0:01:22	0:03:32	0:03:02	0:01:30	0:01:50
130	Year 4	0:02:18	0:01:32	0:01:51	0:01:13	0:03:32	0:01:51	0:02:28	0:01:43
145	Year 5	0:01:37	0:01:22	0:01:16	0:01:37	0:01:59	0:01:52	0:02:04	0:01:35
160	Year 6	0:05:05	0:03:12	0:02:03	0:02:19	0:07:01	0:04:04	0:03:08	0:01:59
176	Year 7	0:01:38	0:01:24	0:01:34	0:02:23	0:01:57	0:01:29	0:01:36	0:01:37
191	Year 8	0:01:52	0:01:18	0:01:40	0:01:22	0:02:21	0:02:27	0:01:08	0:01:21
206	Year 9	0:01:37	0:02:08	0:01:21	0:01:15	0:01:50	0:01:50	0:01:20	0:01:33
221	Year 10	0:01:43	0:01:17	0:01:17	0:01:21	0:01:50	0:01:17	0:01:16	0:02:21
237	Year 11	0:01:36	0:01:02	0:01:50	0:01:12	0:02:56	0:01:26	0:01:24	0:01:20
252	Year 12	0:01:28	0:01:27	0:01:22	0:01:29	0:02:48	0:01:09	0:01:20	0:01:51
	sum of above	0:24:24	0:18:14	0:18:09	0:17:16	0:33:16	0:23:18	0:19:35	0:20:10
	total per W/S above	0:23:37	0:17:47	0:17:34	0:16:43	0:32:36	0:22:18	0:19:14	0:19:34
SORTED RESULTS									
	Profits: First use = to get years, then Paste special of Values, Then sort.								
ELIMINATE	Year 1	3,187	(14,813)	(20,391)	(6,408)	19,688	47,612	(340,382)	49,671
sort years	Year 2	3,453	(7,952)	(139,410)	(144,935)	19,685	48,113	1,695	50,178

<b>Demographics:</b>		<b>Player #1</b>	<b>Player #2</b>	
Name		hp4	hp3	
Printer		ABC	ABC	
Game		1	1	
Major		2	2	
Year in College		9	0	
Career Intentions		2	3	
Computer Experience				
<b>Acct Courses:</b>				
Acct 2115	TRUE	TRUE	TRUE	
Acct 2116	TRUE	TRUE	TRUE	
Inter 3115	0	0	0	
Inter 3116	0	0	0	
Computers 1504	TRUE	TRUE	TRUE	
Computers 2504	TRUE	TRUE	TRUE	
Systems 3513	0	0	0	
Applications 3534	0	0	0	
Auditing 4415	0	0	0	
Tax 4314	0	0	0	
Other	5	0	0	
<b>Econ Courses:</b>				
Econ Principles I	TRUE	TRUE	TRUE	
Econ Principles II	TRUE	TRUE	TRUE	
Other	0	0	0	
Grade Point	3	2	2	
SAT -- Verbal	525	400	400	
SAT -- Math	600	580	580	
Age	21	20	20	
Sex	f	m	m	
<b>Spatial Ability:</b>				
RIGHT	11	10	10	
WRONG	10	4	4	
SCORE	6.0	8.0	8.0	
RIGHT	11	12	12	
WRONG	10	4	4	
SCORE	6.0	10.0	10.0	
<b>Average Score</b>	<b>6.00</b>	<b>9.00</b>	<b>9.00</b>	
<b>Control Totals ##### (74,759,835) (41,135,512) (18,465,235)</b>				
<b>PROFITS:</b> Total Profits tal Less Worst al Less 2nd W al Less 3rd W				
<b>Totals:</b>				
ABC	9,388,899	20,451,681	21,811,110	20,936,345
DL\$	#####	(95,211,516)	(62,946,621)	(39,401,580)
<b>totals</b>	<b>#####</b>	<b>(74,759,835)</b>	<b>(41,135,512)</b>	<b>(18,465,235)</b>
Graph	#####	(42,968,095)	(24,416,099)	(12,837,437)
Tables	#####	(31,791,740)	(16,719,413)	(5,627,797)
<b>totals</b>	<b>#####</b>	<b>(74,759,835)</b>	<b>(41,135,512)</b>	<b>(18,465,235)</b>
errors	0	0	0	0
Bias	(80,590,019)	(6,467,044)	3,438,657	9,474,368
None	#####	(68,292,791)	(44,574,169)	(27,939,603)
<b>totals</b>	<b>#####</b>	<b>(74,759,835)</b>	<b>(41,135,512)</b>	<b>(18,465,235)</b>
errors	0	0	0	0
Game 1	#####	(85,792,458)	(59,774,602)	(40,387,813)
Game 2	5,891,623	8,783,837	9,218,688	8,944,673
Game 3	#####	(7,944,428)	(1,655,063)	2,335,495
Game 4	#####	10,193,214	11,075,465	10,642,410
<b>totals</b>	<b>#####</b>	<b>(74,759,835)</b>	<b>(41,135,512)</b>	<b>(18,465,235)</b>
errors	0	0	0	0
<b>PROFITS:</b> Avg. Profits g Less Worst g Less 2nd W g Less 3rd W				
ABC	195,602	435,142	474,155	465,252

## Exhibit 19: Sample Results in Factorial Matrix (For Minitab Input)

### Results PROFITS: IGNORE 1ST Year & Less Worst Year

48 Subjects: 8 Cell Combinations -- Each Subject Repeats 4 of the Combinations. (n=24 per cell)

Between Subject design for ABC/VBC Information factor; Within Subject design for Presentation and Bias factors

Random Assignment Of Conditions (used 'randbetween' function); But sequence of Cost Functions Always 1,2,3,4

Each Subject Performs FOUR Experiments; Subjects are Randomly Assigned Order Based on Subject Number Assignment

	Activity Based Costing (ABC)					Traditional Based Costing (VBC)				
	BIAS: Present		NONE			BIAS: Present		NONE		
	Graph	Table	Graph	Table		Graph	Table	Graph	Table	
Subject #1	82,535	118,429	183,266	(163,728)		(63,975)	36,473	152,545	308,550	Subject #25
Subject #2	226,503	613,482	759,707	88,641		(202,243)	343,705	414,525	(293,325)	Subject #26
Subject #3	200,459	380,290	657,492	815,073		173,263	(196,885)	(781,347)	(1,220,552)	Subject #27
Subject #4	(25,434)	(90,703)	(35,881)	251,651		(11,251,750)	(9,867)	(445,831)	(115,275)	Subject #28
Subject #5	(653,572)	575,530	209,144	(348,239)		(1,724,414)	(317,885)	10,060	(513,150)	Subject #29
Subject #6	(11,161)	533,844	58,393	417,457		(122,663)	474,164	(222,396)	74,465	Subject #30
Subject #7	345,856	105,294	2,696	446,091		(133,949)	(3,323,051)	81,461	(88,863)	Subject #31
Subject #8	433,468	(522,216)	516,338	(368,976)		64,413	238,514	328,793	327,079	Subject #32
Subject #9	196,951	93,590	103,304	56,832		61,566	101,553	(4,351,152)	437,294	Subject #33
Subject #10	143,146	(57,787)	121,698	(208,082)		(1,475,404)	(643,651)	(382,661)	(12,198,869)	Subject #34
Subject #11	562,635	414,370	(104,771)	(587,077)		612,813	326,019	611,731	565,571	Subject #35
Subject #12	346,785	385,394	62,751	85,392		168,795	(218,181)	(199,171)	44,149	Subject #36
Subject #13	54,768	259,562	83,580	703,456		(330,882)	(970,729)	114,567	(158,876)	Subject #37
Subject #14	41,844	(81,646)	448,370	259,472		(209,844)	250,771	(13,519)	285,247	Subject #38
Subject #15	627,117	547,184	430,244	513,540		(434,042)	169,482	(30,266,320)	280,057	Subject #39
Subject #16	563,209	361,889	654,306	109,938		261,908	139,081	104,416	(7,391,094)	Subject #40
Subject #17	318,580	711,454	(146,850)	577,251		(30,683)	(416,012)	(7,036)	28,162	Subject #41
Subject #18	(517,844)	699,141	112,643	(120,021)		(199,749)	94,560	(414,356)	(12,701,758)	Subject #42
Subject #19	639,043	(71,084)	606,549	232,831		62,968	145,390	(44,505)	(111,762)	Subject #43
Subject #20	317,173	98,813	307,235	446,238		(30,158)	(48,477)	(1,657,829)	284,702	Subject #44
Subject #21	116,401	51,571	(696,444)	58,441		76,697	666,984	(1,548,861)	(6,399,097)	Subject #45
Subject #22	679,648	333,362	635,463	(27,940)		107,654	198,762	(42,556)	(210,042)	Subject #46
Subject #23	539,692	301,369	(67,707)	580,571		(24,170)	81,719	(113,262)	(19,740)	Subject #47
Subject #24	99,097	250,380	194,980	197,949		(52,366)	(231,681)	(22,582)	76,356	Subject #48
<b>Totals</b>	5,326,899	6,011,512	5,096,506	4,016,761		(14,696,215)	(3,109,242)	(38,695,286)	(38,710,771)	<b>Totals</b>

Total for GRAPHS	(42,968,096)
Total for TABLES	(31,791,740)
<b>Total ABC</b>	<b>20,451,682</b>

(6,467,046) Total for BIAS
(68,292,790) Total for NONE
(95,211,517) Total DL\$

## Exhibit 20: Minitab ANOVA Results Tables

These pages were copied onto Word. Minor formatting changes made for Word. Minitab Commands and other output left intact.

### Below are the results supporting:

1. Hypothesis #1 (ABC vs. VBC for profitability Response)
2. Hypothesis #2 (Presentation for Time response)

Ignore 1st Year and Less 1 Worst Year For Profits Only (ABC factor)  
 Retrieving worksheet from file: C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\MINI=IGNORE YR1 & 1W.MTW  
 MTB > Save 'C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\MINI=IGNORE YR1 & 1W.MTW';  
 SUBC> Replace.  
 Saving worksheet in file: C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\MINI=IGNORE YR1 & 1W.MTW  
 \* NOTE \* Existing file replaced.  
 MTB > ANOVA 'Profits-1' 'Time=G-4sec' = c1|c2(c1)|c3|c4-c3\*c4\*c2(c1);  
 SUBC> Random Subject;  
 SUBC> Restrict;  
 SUBC> EMS;  
 SUBC> Means 'ABC/VBC' 'Bias/None' 'Graph/Table'.

### Analysis of Variance (Balanced Designs)

<u>Factor</u>	<u>Type</u>	<u>Levels</u>	<u>Values</u>
ABC/VBC	fixed	2	1 2
Subject(ABC/VBC)	random	24	1 - 24
Bias/Non	fixed	2	1 2
Graph/Ta	fixed	2	1 2

### Analysis of Variance for Profits-

<u>Source</u>	<u>DF</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>P</u>
<b>ABC/VBC</b>	<b>1</b>	<b>6.9677E+13</b>	<b>6.9677E+13</b>	<b>10.45</b>	<b>0.002*Significant</b>
Subject(ABC/VBC)	46	3.0660E+14	6.6652E+12	0.84	0.724
Bias/Non	1	1.9908E+13	1.9908E+13	2.80	0.101
Graph/Ta	1	6.5058E+11	6.5058E+11	0.08	0.778
ABC/VBC*Bias/Non	1	1.7146E+13	1.7146E+13	2.41	0.127
ABC/VBC*Graph/Ta	1	7.4583E+11	7.4583E+11	0.09	0.763
Bias/Non*Subject(ABC/VBC)=46		3.2730E+14	7.1153E+12	0.89	0.646
Graph/Ta*Subject(ABC/VBC)=46		3.7347E+14	8.1189E+12	1.02	0.472
Bias/Non*Graph/Ta	1	9.3058E+11	9.3058E+11	0.12	0.734
ABC/VBC*Bias/Non*Graph/Ta=1		5.0410E+11	5.0410E+11	0.06	0.802
Error	46	3.6590E+14	7.9543E+12		
Total	191	1.4828E+15			

Source	Variance component	Error term	Expected Mean Square (using restricted model)
1 ABC/VBC	2	(11) + 4(2) + 96Q[1]	
2 Subject(ABC/VBC)	-3.2E+11	11 (11) + 4(2)	
3 Bias/Non	7	(11) + 2(7) + 96Q[3]	
4 Graph/Ta	8	(11) + 2(8) + 96Q[4]	
5 ABC/VBC*Bias/Non	7	(11) + 2(7) + 48Q[5]	
6 ABC/VBC*Graph/Ta	8	(11) + 2(8) + 48Q[6]	
7 Bias/Non*Subject(ABC/VBC)	-4.2E+11	11 (11) + 2(7)	
8 Graph/Ta*Subject(ABC/VBC)	8.23E+10	11 (11) + 2(8)	
9 Bias/Non*Graph/Ta	11	(11) + 48Q[9]	
10 ABC/VBC*Bias/Non*Graph/Ta	11	(11) + 24Q[10]	
11 Error	7.95E+12	(11)	

### Analysis of Variance for Time=G-4

Source	DF	SS	MS	F	P
ABC/VBC	1	1.75	1.75	0.03	0.866
Subject(ABC/VBC)	46	2794.29	60.75	1.88	0.017
Bias/Non	1	4.08	4.08	0.24	0.628
<b>Graph/Ta</b>	<b>1</b>	<b>127.01</b>	<b>127.01</b>	<b>5.06</b>	<b>0.029*Significant</b>
ABC/VBC*Bias/Non	1	4.47	4.47	0.26	0.613
ABC/VBC*Graph/Ta	1	1.86	1.86	0.07	0.787
Bias/Non*Subject(ABC/VBC)	46	791.41	17.20	0.53	0.982
Graph/Ta*Subject(ABC/VBC)	46	1153.69	25.08	0.78	0.802
Bias/Non*Graph/Ta	1	36.73	36.73	1.14	0.292
ABC/VBC*Bias/Non*Graph/Ta	1	12.95	12.95	0.40	0.530
Error	46	1484.29	32.27		
Total	191	6412.52			

Source	Variance component	Error term	Expected Mean Square (using restricted model)
1 ABC/VBC	2	(11) + 4(2) + 96Q[1]	
2 Subject(ABC/VBC)	7.120	11 (11) + 4(2)	
3 Bias/Non	7	(11) + 2(7) + 96Q[3]	
4 Graph/Ta	8	(11) + 2(8) + 96Q[4]	
5 ABC/VBC*Bias/Non	7	(11) + 2(7) + 48Q[5]	
6 ABC/VBC*Graph/Ta	8	(11) + 2(8) + 48Q[6]	
7 Bias/Non*Subject(ABC/VBC)	-7.531	11 (11) + 2(7)	
8 Graph/Ta*Subject(ABC/VBC)	-3.594	11 (11) + 2(8)	
9 Bias/Non*Graph/Ta	11	(11) + 48Q[9]	
10 ABC/VBC*Bias/Non*Graph/Ta	11	(11) + 24Q[10]	
11 Error	32.267	(11)	

**Means**

<b>ABC/VBC</b>	<b>N</b>	<b>Profits-</b>	<b>Time=G-4</b>
1	96	213038	16.966
2	96	-991787	17.157

<b>Bias/Non</b>	<b>N</b>	<b>Profits-</b>	<b>Time=G-4</b>
1	96	-67365	16.916
2	96	-711383	17.207

<b>Graph/Ta</b>	<b>N</b>	<b>Profits-</b>	<b>Time=G-4</b>
1	96	-447584	17.875
2	96	-331164	16.248

MTB > Stop.

## Exhibit 20: ~continued~ Minitab ANOVA Results Tables

### Below are the results supporting:

3. Hypothesis #3 (Framing Bias vs. None for Profitability Response)
4. Hypothesis #5 (ABC Info. & Framing Interaction on Profitability Response)

Years 6 - 12: All Results --

Profits: Years 6-12 in total	(no: Need to drop 1W)
Profits: Years 6-12 Less 1 Worst (from 6-12)	YES= Use for Bias Effect
Time: Years 6-12 (graphs - 4 seconds)	(no: Time for 1-12 for Graph Effect)
Time: Years 6-12 (graphs - 4 seconds)	(no: Time for 1-12 for Graph Effect)

Retrieving worksheet from file: C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\MINI=YEARS 6-12.MTW

Worksheet was saved on 3/11/1998

```
MTB > Save 'C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB
ANALYSIS\MINI=INPUT\MINI=YEARS 6-12.MTW';
SUBC> Replace.
```

```
MTB > ANOVA 'Ttl Profit'-'Time6-12Less1W;G-4s.' = &
CONT> c1|c2(c1)|c3|c4-c3*c4*c2(c1);
SUBC> Random Subject;
SUBC> Restrict;
SUBC> EMS;
SUBC> Means 'ABC/VBC' 'Bias/None' 'Graph/Table' c1*c3.
```

### Analysis of Variance (Balanced Designs)

<u>Factor</u>	Type	Levels	Values
ABC/VBC	fixed	2	1 2
Subject(ABC/VBC)	random	24	1 - 24
Bias/Non	fixed	2	1 2
Graph/Ta	fixed	2	1 2

**ANALYSIS OF VARIANCE FOR PROFITS-**

<b>Source</b>	<b>DF</b>	<b>SS</b>	<b>MS</b>	<b>F</b>	<b>P</b>
<b>ABC/VBC</b>	<b>1</b>	<b>1.2769E+13</b>	<b>1.2769E+13</b>	<b>9.96</b>	<b>0.003*Significant</b>
Subject(ABC/VBC)	46	5.8993E+13	1.2825E+12	0.85	0.704
<b>Bias/Non</b>	<b>1</b>	<b>6.7110E+12</b>	<b>6.7110E+12</b>	<b>6.15</b>	<b>0.017*Significant</b>
Graph/Ta	1	2.0498E+11	2.0498E+11	0.14	0.706
<b>ABC/VBC*Bias/Non</b>	<b>1</b>	<b>5.6523E+12</b>	<b>5.6523E+12</b>	<b>5.18</b>	<b>0.028*Significant</b>
ABC/VBC*Graph/Ta	1	2.2148E+11	2.2148E+11	0.16	0.695
Bias/Non*Subject(ABC/VBC)=46	46	5.0176E+13	1.0908E+12	0.73	0.860
Graph/Ta*Subject(ABC/VBC)=46	46	6.5597E+13	1.4260E+12	0.95	0.571
Bias/Non*Graph/Ta	1	7.3035E+11	7.3035E+11	0.49	0.489
ABC/VBC*Bias/Non*Graph/Ta=1	1	4.5556E+11	4.5556E+11	0.30	0.585
Error	46	6.9167E+13	1.5036E+12		
Total	191	2.7068E+14			

Source	Variance component	Error term	Expected (using restricted model)	Mean Square
1 ABC/VBC	2	(11) + 4(2)	+ 96Q[1]	
2 Subject(ABC/VBC)	-5.5E+10	11	(11) + 4(2)	
3 Bias/Non	7	(11) + 2(7)	+ 96Q[3]	
4 Graph/Ta	8	(11) + 2(8)	+ 96Q[4]	
5 ABC/VBC*Bias/Non	7	(11) + 2(7)	+ 48Q[5]	
6 ABC/VBC*Graph/Ta	8	(11) + 2(8)	+ 48Q[6]	
7 Bias/Non*Subject(ABC/VBC)	-2.1E+11	11	(11) + 2(7)	
8 Graph/Ta*Subject(ABC/VBC)	-3.9E+10	11	(11) + 2(8)	
9 Bias/Non*Graph/Ta	11	(11) + 48Q[9]		
10 ABC/VBC*Bias/Non*Graph/Ta	11	(11) + 24Q[10]		
11 Error	1.50E+12	(11)		

**Analysis of Variance for Time6-12**

<b>Source</b>	<b>DF</b>	<b>SS</b>	<b>MS</b>	<b>F</b>	<b>P</b>
ABC/VBC	1	0.03	0.03	0.00	0.969
Subject(ABC/VBC)	46	882.89	19.19	1.84	0.021
Bias/Non	1	8.49	8.49	1.65	0.206
Graph/Ta	1	6.48	6.48	0.81	0.374
ABC/VBC*Bias/Non	1	3.68	3.68	0.71	0.403
ABC/VBC*Graph/Ta	1	1.21	1.21	0.15	0.700
Bias/Non*Subject(ABC/VBC)	46	237.30	5.16	0.49	0.991
Graph/Ta*Subject(ABC/VBC)	46	369.75	8.04	0.77	0.810
Bias/Non*Graph/Ta	1	4.50	4.50	0.43	0.514
ABC/VBC*Bias/Non*Graph/Ta	1	3.26	3.26	0.31	0.579
Error	46	479.64	10.43		
Total	191	1997.22			



Source	Variance component	Error term	Expected Mean Square (using restricted model)
1 ABC/VBC	2	(11) + 4(2) + 96Q[1]	
2 Subject(ABC/VBC)	2.192	11 (11) + 4(2)	
3 Bias/Non	7	(11) + 2(7) + 96Q[3]	
4 Graph/Ta	8	(11) + 2(8) + 96Q[4]	
5 ABC/VBC*Bias/Non	7	(11) + 2(7) + 48Q[5]	
6 ABC/VBC*Graph/Ta	8	(11) + 2(8) + 48Q[6]	
7 Bias/Non*Subject(ABC/VBC)	-2.634	11 (11) + 2(7)	
8 Graph/Ta*Subject(ABC/VBC)	-1.194	11 (11) + 2(8)	
9 Bias/Non*Graph/Ta	11	(11) + 48Q[9]	
10 ABC/VBC*Bias/Non*Graph/Ta	11	(11) + 24Q[10]	
11 Error	10.427	(11)	

### Means

ABC/VBC	N	Ttl Prof	Profits-	Time6-12	Time6-12
1	96	155026	173169	13.017	9.2781
2	96	-6359844	-342593	13.638	9.3028

Bias/Non	N	Ttl Prof	Profits-	Time6-12	Time6-12
1	96	52487	102246	13.287	9.0802
2	96	-6257305	-271670	13.368	9.5007

Graph/Ta	N	Ttl Prof	Profits-	Time6-12	Time6-12
1	96	-4480835	-52038	13.714	9.4742
2	96	-1723984	-117387	12.941	9.1068

ABC/VBC	Bias/Non	N	Ttl Prof	Profits-	Time6-12	Time6-12
1	1	48	188703	188548	12.856	8.9294
1	2	48	121348	157790	13.177	9.6269
2	1	48	-83730	15944	13.717	9.2310
2	2	48	-12635959	-701131	13.559	9.3746

MTB > Save 'C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\MINI=YEARS 6-12.MTW';

SUBC> Replace.

Saving worksheet in file: C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\MINI=YEARS 6-12.MTW

\* NOTE \* Existing file replaced.

MTB > Stop.

## **Exhibit 21: Minitab t-tests on Interactions for Content & Bias**

TEST of Significance of Interaction Components:

Interaction: Content & Bias -- Using file for years 6-12 less worst year.

Retrieving worksheet from file: C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\T-TESTS=INTERACT 6-12.MTW

Worksheet was saved on 4/12/1998

Two Sample T-Test and Confidence Interval

Two sample T for 'P@Abc+Bias' vs 'P@Abc+Nobias'

	N	Mean	StDev	SE Mean
P@Abc+Bi	48	188548	161535	23316
P@Abc+NO	48	157790	182919	26402

95% CI for mu P@Abc+Bi - mu P@Abc+NO: ( -39198, 100715)

**T-Test mu P@Abc+Bi = mu P@Abc+NO (vs not =): T= 0.87 P=0.38 DF= 92**

**NOT SIGNIFICANT FOR THE ABC COMPONENT OF THE INTERACTION**

Two Sample T-Test and Confidence Interval

Two sample T for 'P@Vbc+Bias' vs 'P@Vbc+Nobias'

	N	Mean	StDev	SE Mean
P@Vbc+Bi	48	15944	203580	29384
P@Vbc+NO	48	-701131	2263486	326706

95% CI for mu P@Vbc+Bi - mu P@Vbc+NO: ( 57173, 1376975)

**T-Test mu P@Vbc+Bi = mu P@Vbc+NO (vs not =): T= 2.19 P=0.034 DF= 47**

**SIGNIFICANT FOR THE VBC COMPONENT OF THE INTERACTION**

Saving worksheet in file: C:\DAVEY\ABC=THESIS\DATA ANALYSIS\CURRENT MINITAB ANALYSIS\MINI=INPUT\T-TESTS=INTERACT 6-12.MTW

\* NOTE \* Existing file replaced.

## **DAVID SHELBY HARRISON**

*Assistant Professor of Accounting  
University of South Carolina Aiken*

### **Education:**

- Ph.D.:** Virginia Polytechnic Institute and State University,  
Blacksburg, VA 1998 -- Major in Accounting
- MBA:** New York University, New York, NY 1972  
Concentration in Finance
- B.S.:** University of Colorado, Boulder, CO 1970  
Concentration in Marketing

### **Research & Teaching Interests:**

Managerial Accounting, Computer Simulations in Business Applications, Decision Making, Presentation, and Behavioral Accounting Areas

### **Teaching Experience:**

- University of South Carolina Aiken, 1997-present  
Virginia Polytechnic Institute, 1994-1997  
Touche Ross & Co., National Training Programs, 1976-78

### **Business Experience:**

- Consulting -- Primary client: Lindab Inc., Stamford, CT 1993 - present  
Financial consulting for Swedish manufacturer entering U.S. market.
- Park Electrochemical, Inc., Lake Success, NY 1990 - 1993  
Corporate Controller, NYSE electronics manufacturer.
- Heraeus, Inc., South Plainfield, NJ 1987 - 1990  
Corporate Controller and Treasurer; U.S. subsidiaries of \$2.5 billion German chemical and manufacturing company.
- SONY Corp. of America, Park Ridge, NJ 1986 - 1987  
Director of the U.S. Internal Audit Department.
- International Paper Company, New York, NY 1978 - 1986  
Last position: Division Controller of Liquid Packaging Group.
- Touche Ross & Company, New York, NY, 1972 - 1978  
Audit and consulting divisions.

### **Memberships and Certifications:**

- Certified Public Accountant  
AICPA  
American Accounting Association  
Institute of Management Accountants

### **Publications:**

- Harrison, David and William Sullivan, Spring 1996. "Activity-Based Costing for Improved Product Costing." Journal of Engineering Valuation and Costing