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Strategic Corporate Management
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PROJECT

Summary

This project is worth 60 percent of your final grade. The motivation, game and report from the preliminary trials, Part A, are due tomorrow Friday January 11, and counts 20 percent. Part B, the experimental session, will be conducted in class tomorrow. The presentation of your project counts towards 10 percent, and your performance as a subject in experiments designed by your colleagues also counts 10 percent. The report on the experimental session, Part C, is due 11:55PM Sunday January 20, and counts 20 percent.

Please send my teaching assistant John Gardner at jrgarde@andrew.cmu.edu copies of the (preliminary and final) reports, and also attach the output file from your experiments.

You should form groups of up to four (where all students will be awarded the same grade), but no more than four in a group is permitted. You will be graded on the relevance and applicability of your problem to business (such as whether the questions you pose are interesting to business people, and why your experiments might shed light on them) as well as the analysis itself. If they are too easy or too hard nobody learns anything from them. The project has three parts.

Part A (20 percent): Motivation and Game

The first part of the project essentially consists of a short paper that is organized around the following points.

1. Provide a motivating introduction for the problem you wish to study. It should be a business issue in accounting, marketing, finance, industrial organization or labor relations, but not sports or politics. You should explain and justify: who are the main players, what they can do, how much do they know when their choices are made, what extraneous factors come into play, and what the important consequences of their choices and the extraneous factors.

2. Show how to represent the problem as an extensive form game. Clearly specify the players, the game tree (as dictated by the actions of the different players and nature), the payoffs at each of the terminal nodes, and the information sets. Your discussion of the payoffs in the terminal nodes of your game should be related back to the important consequences you described in the first part. They might include a short discussion of the discounted future costs and revenues, the probability of success, estimated market shares and so on. Once you have done the calculations you should transform the payoff to a number so that your colleagues will not spend too much time with calculations, and show the transformation.

3. Write down or define the strategy space for each player (the list of possible strategies for each player) in your game. If the game involves four players or less, write down a matrix representation of the normal form (up to two column and row players) for

those parts of the game that cannot be solved by the first rule (backwards induction). If this is a two or three player game there any dominant or dominated strategies in your matrix? Are there any strategies that can be removed using the principle of iterated dominance? What are the set of Nash equilibriums for the reduced game in this case? Are they mixed or pure strategy equilibrium?

4. Use the methods we have developed in classes for folding back the perfect information parts of the game (where each information set consists of just one node) and solving the strategic parts of the game (where information sets have two or more nodes in them) to solve the game. Explain using diagrams that illustrate how your game is reduced as you work back up the tree to reach the solution.

5. Play through several rounds of your game within your group and briefly answer Part C in a preliminary report to be included in Part A, to prove that your game works, makes sense, and that your group will learn something when trying it out on the whole class. Treat this exercise as a trial run that fully prepares you for the real thing.

Please send John Gardner a copy of Part A as well as the game file. You are permitted to revise this section without penalty, except for your predictions, when you turn in the final version of your consolidated report.

Part B (20 percent): Experimental Session
Each person/group should run both the strategic and extensive form of their games as experiments in class, the other students being their subjects. These session(s) will probably be very busy, so everyone should know exactly how to run their own experiments on both modules, and save their results before the sessions begin.

Your grade in this portion of the project will be a strictly monotone increasing function of how well you play the games designed and run by the other students (where you are one of their subjects), but students who do a poor job of running their own experiments will also be penalized up to 50 percent of this portion of the project because it may compromise their results.

During the session you may use a proxy name rather than your real one to hide your true identity. At the end of the session please email me a copy of your output as an attached file, and also tell me your proxy name used during the sessions if it was not your real one.

You have up to 10 minutes to conduct your project presentation and experiment which will be strictly enforced. Please make a brief oral presentation to the whole class that motivates the experiment. Please prepare Power Point presentation (2 or 3 slides only) motivating your project and describing your experiment. Your presentation will be given from the front of the lecture hall. After the experiment is finished you should present your solution to this game to your colleagues in one slide and very briefly compared with classroom performance (by focusing on the relative frequencies with which each terminal node is reached). The two presentations should be up to 4 minutes altogether (about 2 for the introduction to the experiment and 1 for the solution) leaving 6 minutes for subjects play. The presentation counts 5 points towards your final grade and will be graded by your colleagues. I will deduct points for groups that lose track of time.

Part C (20 percent): Consolidated Report
The full consolidated report on the experimental session should have two appendices, your slides and your preliminary findings of what happened when you ran the experiment amongst

yourselves, namely Item 5 of Part A. The main body of the report should include the description of the experiment, including Items 1 through 4 of Part A, a detailed discussion of the results, and your conclusion. Most of the tables should be incorporated into the body of the text. You may include supplementary appendices that contain other supporting documents (such as motivating material and tables showing how individual subjects performed). Your discussion of the results should have three sections, as elaborated below. You should use statistics and econometrics to help summarize the data from your experiment, including bar charts, pie diagrams and other relevant graphical devices to illustrate your points. When arguing how well your predictions worked out, you should adjust for sampling error with t statistics, confidence intervals and so on. By all means, estimate some parameters of interest to your research questions, provide some confidence intervals, and test some hypotheses of interest to your project. The three sections should be based on the following:

1. Reconstruct and show diagrammatically how your subject population played the extensive form game (and also strategic form if relevant) by diagramming the relative frequencies with the various moves were made, including nature. That is, deduce from the terminal nodes what happened throughout the game, revise and update the choice labels on your extensive form tree by adding the proportions of subjects who made the various choices, and then include a screenshot of the revised tree in your report with a description. Then calculate and explain the optimal strategy for each player type to the empirical distributions. If this strategy differs from the theoretical solution, explain how it differs, showing how the moves are affected, and how the resulting average payoffs are affected, by player type.

2. The optimal strategies to the empirical distribution can only differ from the theoretical solution because the moves of nature did not accurately reflect the probabilities, and/or some subjects did not follow the theory during the experiment. Which of those two things occurred (neither, one of them, or both)? In your experiment how much did subjects lose or gain on average by not following the theory (by player type)? Can the differences in subject performance be explained by demographic differences across the population (by how much subjects bet, their work experience, educational background, or gender say)? Are there systematic features of the game that could explain the differences between the theoretical solution versus and the empirical play? For example, were some player types more likely to deviate from others, were some subjects more error prone than others, and is there evidence that subjects learned over time?

3. Evaluate how the other students performed on your project for the purposes of grading Part B. Thus the report should include tables that show which role or roles each of the class subjects played in your experiment, and the number of points the person received in the games he or she played. It should also show the number of points the person would have received if they had played according to the solution.