Research Proposal:
Simulation Use in the Introductory International Relations Classroom

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Abstract: The use of simulation exercises in undergraduate international relations courses is not new. Yet, many instructors faced with large classes full of students with little experience in the subject matter avoid this tool in favor of more traditional classroom techniques. This research proposal will introduce a simple simulation exercise into a large, introductory undergraduate course in international relations in order to explore the validity of views that simulations are inappropriate tools for large undergraduate courses.

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Research Question

The use of simulation exercises in undergraduate international relations courses is nothing new. Yet, many instructors restrict the use of simulations techniques to advanced sections, smaller classes, or classes that have a narrow topical or geographic focus. Although simulations may be suitable for introductory level courses, that fact that these courses usually consist of large classes full of students with little prior experience in the subject matter turn many away from simulations in favor of more traditional classroom techniques. Smith and Boyer (1996, 690) argue that the "...simulation has been perceived in some teaching environments as diverting faculty and student attention away from the main goal: absorbing the lessons." Yet, given the potential benefits of simulation use in the classroom, the question that remains is whether negative perceptions about simulation use in large undergraduate classes are justified. This research project will consider whether it is both practical and worthwhile to introduce a relatively easy simulation into a large, introductory undergraduate international relations course.

Literature Review

It is uncontroversial to argue that students process information differently. Yet, many introductory undergraduate courses retain the use of fixed teaching techniques. This creates a problem. On one hand, the combination of large class size and having students unfamiliar with the topic mandates the use of teaching techniques that allow for the rapid transfer of large quantities of basic material. On the other hand, the students in these introductory courses are often the ones who will experience the most difficulty adapting to the use of fixed teaching techniques. This dichotomy mandates the need for incorporating multiple approaches into undergraduate classroom instruction. While many view such concerns as the province of high school, the students in introductory classes often have many of the same characteristics as high school students. Expecting them to immediately adapt to a university environment may be entirely unrealistic, and undergraduate instructors should seek out opportunities to vary their teaching methods. "...[L]ecturing should never constitute the sole teaching technique in a course, or even perhaps the dominant one...the most effective teachers are those who use multiple approaches: lecturing, group discussion, problem-solving sessions, small-group work, and more" (Lang 2006).

The argument that undergraduate students benefit from the use of multiple teaching methods in the classroom is consistent with research into how students learn. Kolb (1976, 1984, 1988) proposes a learning model that argues that students learn best when they have access to concrete experiences, time for reflexive observation, and time for abstract conceptualization. These are all components of active learning. In addition, a number of researchers have argued that there are different stages of student development. Perry (1970) argues that how students approach knowledge, how students view their role in learning, and how students view the role of the instructor changes over time. Some students may be at different stages than others, but the role of the instructor is to design classroom instruction that appeals to all. Grow (1996) also outlines stages of student development, in this case focusing on how much direction the student provides relative to the instructor in their own learning. Both research on student learning and student development tends to emphasize the importance of using multiple methods in the undergraduate classroom.

Along these lines, it is a common practice for large introductory biology and chemistry courses to require students to complete laboratory exercises under the supervision of a teaching assistant. The use of teaching assistants is one way to provide students in large introductory classes with exposure to multiple teaching methods. Yet, while many introductory international relations courses also utilize teaching assistants, these classes tend not to incorporate similar laboratory type events. Brock and Cameron (1999) argue that simulations can be considered the equivalent of the laboratory experiments found in the physical sciences (Shellman 2001, 827). The use of simulations can provide concrete experiences to students that study of the social sciences often lacks.

Marchese (1998) explores the concepts of surface and deep learning. Unsurprisingly, he argues that the goal of classroom instruction should be the promotion of deep learning. The use of simulations represents an attempt to promote deep learning by incorporating non-traditional approaches into the undergraduate classroom. This can both address the need to accommodate multiple learning styles and challenging students while avoiding the anxiety often inherent in traditional approaches. Cruickshank and Telfer (1980, 77-78) argue that academic games provide a number of positive learning elements including approximating a real-world experience, providing opportunities to solve problems, providing responsive environments, and promoting psychological engagement.[1] "Basically, research indicates that the use of simulations and games complements, not replaces, other methods of teaching and learning" (Cruickshank and Telfer 1980, 78). Research indicates that academic games can increase student learning, especially among students with "low academic ability." These activities have a positive effect on student attitudes, interests, and satisfaction (Cruickshank and Telfer 1980, 78-79).

Research on learning also focuses attention on the importance of student motivation. Davis (1993) identifies a number of ways that simulation exercises can have a positive effect on motivation. First, simulations provide a way to provide students with immediate feedback about the success of strategies based on international relations traditions and theories discussed in class. Second, simulations can create a positive classroom atmosphere that promotes active participation and provides opportunities for student success. Third, simulations foster competition among students, but avoid the intense competition that can create stress harmful to learning. Lucas et al (1975, 261-262) compares student cognitive achievement and retention using simulation-gaming techniques and the lecture-discussion format. They review a number of examinations with contradictory results before concluding that students exposed to simulation-gaming techniques achieve similar levels of cognitive achievement and higher levels of cognitive retention than students exposed solely to discussion-lecture techniques (Lucas et al 1975, 266).

Smith and Boyer (1996, 690) argue that simulations enhance active learning by encouraging student participation, providing deeper levels of insight, assisting in information retention, promoting the development of critical thinking skills through collaboration, and development of speaking and presentation skills (Smith and Boyer 1996, 690-691). Although the use of simulations mandates that some course material cannot be covered, students understand what is covered better (Smith and Boyer 1996, 691). In addition, they argue that there is anecdotal evidence that simulations results in greater depths of understanding, higher levels retention, stronger critical thinking and analytical skills, and greater enthusiasm for learning (Smith and Boyer 1996, 693-694). “Simulations are tools for understanding complex interactions. They can provide insights into why political actors make choices that seem unreasonable or irrational. Simulations uncover the real motivational forces intrinsic to players as they struggle with their choices” (Smith and Boyer 1996, 694).

Although some instructors structure entire classes around interactive exercises (Dougherty 2003) Smith and Boyer (1996, 690) point out that, “...even when teachers are sympathetic to an active learning approach, the use of simulation in the classroom is often hindered by a lack of available and applicable simulations on relevant topics. Simulation use is also impeded by a lack of good guidelines for developing effective simulations." The simulations that do exist for use in international relations tend to be specific to only one international situation and can be very labor intensive for the instructor (Newmann and Twigg 2000). Reviewing the paper presentations from the simulations and role playing tracks of the 2007 American Political Science Association Teaching and Learning Conference tend to illustrate this point.[2] Simulations exercises are well represented in international relations, but the exercises that exist tend not to be entirely appropriate for large, introductory classes.

Newmann and Twigg (2000, 835) do make use of a simulation exercise on Kashmir in their introductory international relations course. The goal of the simulation was to provide variation in teaching techniques in order to facilitate active learning. The simulation provided students with first-hand experience with theoretical materials being covered in class. Yet, there are a number of problems associated with using this model in other introductory classes. First, implementation of the simulation required students to have specific information about Kashmir that other introductory international relations courses may not provide. In addition, the simulation required one 50 minute class prep, the instructor had to provide labor intensive role descriptions for each student, and the simulations itself required three to four class sections to execute (Newmann and Twigg 2000, 836-838). While the simulation was effective, it effectively illustrates a number of reasons why instructors are discouraged from using simulations in large introductory classes.

Research Design

The proposed research study will evaluate the hypothesis that the introduction of a relatively simple simulation model into large introductory international relations courses is both logistically viable and beneficial for student learning. Following the research design used by

Lucas et al (1975, 262) in their study on simulations, the study will test the null hypothesis that there is no difference between the control group (no simulation) and the research group (simulation) in either cognitive achievement or cognitive retention.

The simulation will be introduced into SS307: International Relations at the United States Military Academy during the Fall 2007 semester. The course is a core course and is a mandatory graduation requirement for students at West Point. Students typically take the course during their third year at the university. The course is organized into 31 sections of approximately 16 students each. There are 10 instructors assigned to teach SS307.[3] Both students and instructors are randomly assigned to their sections. Although the number of instructors who will use the simulation remains to be determined, each instructor participating in the research study will have an equal number of control (no simulation) and research (simulation) groups. Sections will be randomly assigned to control and research groups. Prior to implementation of the simulation, each instructor participating in the project will complete instructor training in order to standardize the experimental application. Assessment of the impact of the simulation will be conducted through both qualitative and quantitative means.

Qualitative Assessment of Simulation Impact on Learning

The qualitative assessment of the impact of the simulation will consist of a combination of three elements. Each of these elements will address how effectively the simulation meets the specified teaching goals outlined in the next section**. The first measurement will consist of the results of the subjective evaluations of each instructor of the performance of their research groups relative to the performance of their control groups. The second measurement will consist of student feedback during an end of semester debriefing. The third measurement will consist of student feedback on the end of course survey.** The three measurements will provide subjective evaluation of the influence of the simulation on student mastery of the material, but will not be able to effectively measure student retention. In addition, the final results will consider common dynamics experienced during the implementation of the simulation and troubleshooting of any difficulties experienced.

Quantitative Assessment of Simulation Impact on Learning

The quantitative assessment will consist of comparison of student performance on major graded events during the semester. This method of assessment will enable evaluation of both student mastery of the material and student retention of the material. Assessment of student retention will consist of comparison of student performance on class tests to student performance on the same material on the final exam.

This research design meets criteria for randomized experimentation. First, there is random assignment of both instructors and students to sections. Second, there is random assignment of sections to control and research groups. Although there is some selection bias possible due to the need for instructors to volunteer to participate in study, the potential bias is managable. In addition, the limited time frame of the application of the independent variable (one semester) minimizes the influence of a number of threats to internal validity. Specifically, it is reasonable to expect little influence of either maturation effects or history effects during the course of the experimental treatment. In addition, the fact that the course is a mandatory graduation requirement minimizes the danger of student withdrawal (mortality effects).

The first quantitative model will involve comparison of the differences between the average scores of the control groups and the average scores of the research groups. The average scores will be computed using nine difference measures. If the probability associated with the t values obtained from this comparison are statistically significant ($p < .05$), there will be evidence to reject the null hypothesis that there is no difference between the two groups (i.e. that the simulation does make a difference) (Hoyle, Harris, and Judd 2002, 467-472). A sample report format for this model is found in the evidence section of this proposal. The second approach will involve a correlational comparison. Although use of the Pearson product moment correlation coefficient to measure the association between the two variables results in the same t-score as the use of the comparison of means approach, the correlational analysis will allow consideration of dummy variables to control for instructor and gender effects (Hoyle, Harris, and Judd 2002, 471). See the section on evidence for the reporting formats for the results of the quantitative assessment of simulation effects on student mastery and retention of the material.

Simulation Mechanics[4]

Teaching Goals[5]

The goal of the simulation is to provide students with the opportunity to apply the theoretical material covered in the class to a simplified model of state interactions in an anarchic international system. There are 13 theoretical concepts applicable to the simulation that will be covered in the course. The concepts are listed in the order they are addressed in the course.

- State interactions under anarchy from realist and liberal perspectives
- Economic implications of realism and liberalism
- Role of ideas, identity, norms, culture, strategic beliefs
- Role of morality in international relations
- Impact of balances of power
- Influence of the structure of the international system
- Role of international institutions
- Influence of the democratic peace phenomenon
- Causes of internal conflict
- Influences of internal conflict on state behavior
- Influence of decision making on state foreign policy
- Role of individuals in development of state foreign policy
- Influence of development on state behavior

Students will be required to utilize the class material in the simulation. As a result, most of these teaching goals will be accomplished with minimal instructor intervention. However, the option to interject specific scenarios into any given iteration of the simulation remains open.

Simulation Construction

The simulation begins by dividing each class into four groups of between 3-5 students. The simulation "game board" is a simplified model of an international system (See Annex A). The four groups correspond to four great powers on the game board. The names of these states can be modified to any configuration desired by the instructor. In addition to the four great powers, there are 24 additional states on the board. Each great power starts with 100 "units" of four different measures of state power: machine capital (MC), labor capital (LC), resource capital (RC), and military capital (MLC). See annex B for sample "rules of the game."

Within each group, each student is further assigned a role. Sample roles include: head of state, prime minister, finance minister, foreign minister, and trade representative. There is no specific purpose for each role beyond ensuring that each student participates in the simulation. However, the roles provide the instructor with additional flexibility in the event they desire to interject additional scenarios into the simulation.

Simulation Execution

The simulation is executed by providing 10 minutes at the end of one class each week for students to interact. The samples "rules of the game" in annex B structure that interaction. At the conclusion of each 10 minute iteration of the simulation, each group will be required to submit a decision matrix indicating their foreign policy. A sample decision matrix is provided in annex C. After each iteration of the simulation, the instructor is required to update the game board using the calculations found in annex D. For ease of execution, these calculations are entered into an Excel spreadsheet. The calculations are designed to be released to the groups to assist them in making decisions. However, the instructor should not feel confined by the calculations. While it is useful to use them to guide execution of the simulation, having the instructor modify them on an ad hoc basis may be necessary in order to ensure that the simulation achieves the desired class goals. An example game board for a fictional week 1 of the simulation is provided at annex E. An example student handout for the same week is provided at annex F.

Evidence

Report format for results of first quantitative model (comparison of means)

Exam 1				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Exam 2				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Exam 3				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Paper				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Final Exam				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Comparison of Improvement from Exam 1 to Final Exam				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Comparison of Improvement from Exam 2 to Final Exam				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

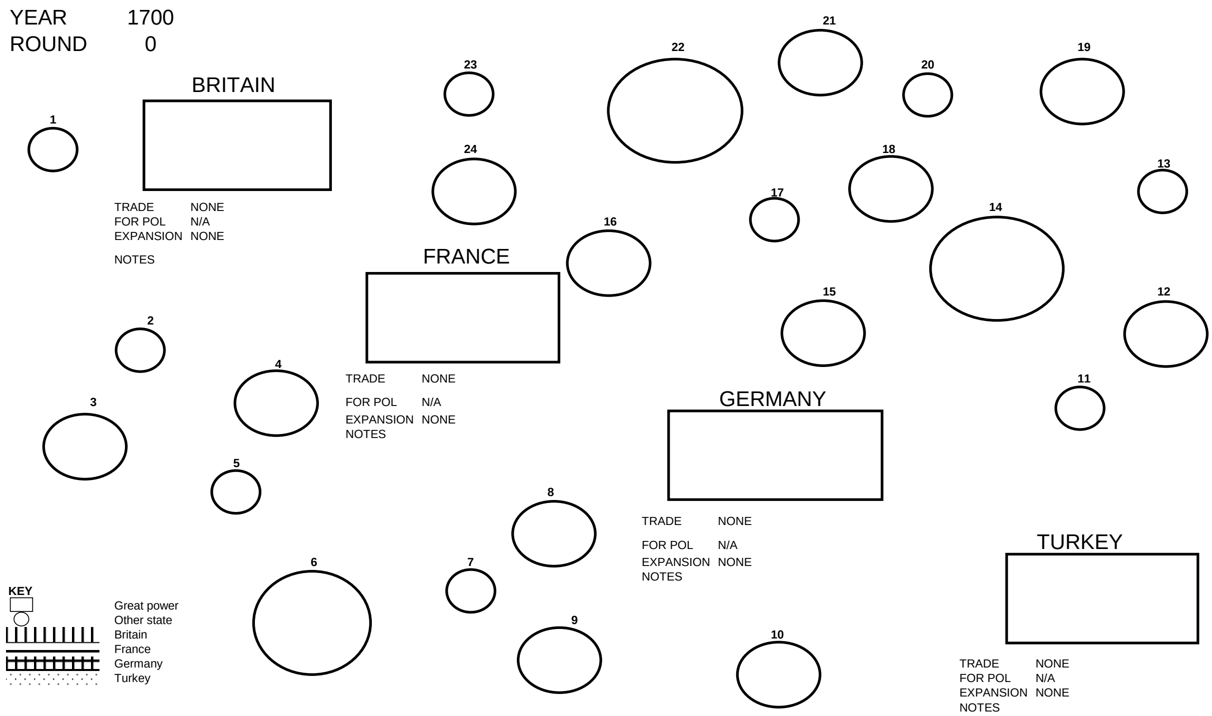
Comparison of Improvement from Exam 3 to Final Exam				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Comparison of Final Grades				
Group	n	Mean	Variance	P>|t|
Simulation				
No simulation				

Report format for results of second quantitative model (correlational approach)

Model 2			
Variable	Coefficient	Standard Error	P>|t|
Exam One			
Exam Two			
Exam Three			
Paper			
Final Exam			
Exam One v. Final Exam			
Exam Two v. Final Exam			
Exam Three v. Final Exam			
Final Grade			
Instructor			
Gender			
Constant			
N			
F			
Prob > F			
R^2			

Annex A (Sample Game Board)



Annex B (Sample Rules of the Game)

The goal of the game is to maximize your state's security (its expected probability of survival). The best way to accomplish this goal is entirely at your discretion. Your success will be measured by comparing your state's power to the power of the other great powers participating in the simulation. Each state will start with 100 units of machine-capital (MC), labor capital (LC), resource capital (RC), and military capital (MLC). The combination of these four measures constitutes each state's power or national product (GNP).

During each iteration of the simulation, each group will submit a decision matrix outlining their state's foreign policy. The decision matrix will require you to make five key decisions:

1. The percentage of your GNP that you will spend on consumption, investment, and military spending.

2. The ratio of your investment that will go to agriculture versus industry.

3. The specific details of your trade policy.

4. The specific details of your foreign policy.

5. The specific details of any territorial expansion your state will conduct.

Each group is encouraged to discuss strategy outside of class (within groups and across groups). Student will be given the last 10 minutes of class time to interact on a schedule to be determined by each instructor. Each instructor's evaluation of the impact of each key decision will be shaped by the course material. The results of each round are final -- for that round -- but may be appealed by email. If the appeal conforms to the logic of the readings it may be taken into account by the instructor during the next round.

While the logic for your decisions should be shaped by the course material, there a few additional guidelines:

1. Your ability to fight and win a particular territory, especially if opposed by another great power, is inherently probabilistic in terms of benefits, costs, and risks. Generally speaking, your odds are greater the greater your relative military power.

2. Remember that your population has to be well fed and happy in order to support you in your foreign policy. While spending a high percept of GNP on investment and military may build your capital, neglecting consumption may lead to civil unrest at home.

3. It takes two to make an agreement. If the other country you seek to trade or make an alliance with rejects your offer, then there will be no deal. Be sure you use diplomatic discussions to reach agreements before you submit your policy decisions each round.

Annex C (Sample Decision Matrix)

STATE: ______________________

DATE: ________________________

HEAD OF STATE: ____________________________

FOREIGN MINISTER: _________________________

FINANCE MINISTER: _________________________

TRADE REPRESENTATIVE: ___________________

KEY DECISIONS

% GNP	
CONSUMPTION	
INVESTMENT	
MILITARY SPENDING	
TOTAL	100
INVESTMENT RATIO	
AGRICULTURE	
INDUSTRY	
TOTAL	100
MILITARY	
% AT HOME	
% ABROAD	
TOTAL	100
TRADE POLICY	
STATE A	
STATE B	
STATE C	
FOREIGN POLICY	
STATE A	
STATE B	
STATE C	
TERRITORIAL EXPANSION	

Annex D (Sample Calculations)

1. Military Capital (MLC) is a proxy for a state's military power. Change in MLC is determined by the equation:

> [(fraction of GNP spent on military x current GNP) - (10% depreciation x current MLC)] minus expenditure on colonial policy.

2. Resource Capital (RC) is a proxy for a state's resource base (territory, raw materials, etc). Change in RC is determined by the equation:

> f (net result of colonial policy)

When you decide to attack a territory, the instructor will roll the dice to determine whether you were successful. If territory is undefended, any number but "1" would mean success, provided your nation has an adequate military base for operations. If the territory is defended by another great power, the odds will be determined by each state's relative military power. The same holds for direct attacks on another great power's homeland.

3. Labor Capital (LC) is a proxy for a state's human resources. Change in LC is determined by the equation:

> change in RC x (1 + fraction of GNP devoted to investment)

4. Machine Capital (MC) is a proxy for a state's level of industrialization. Change in MC is determined by the equation

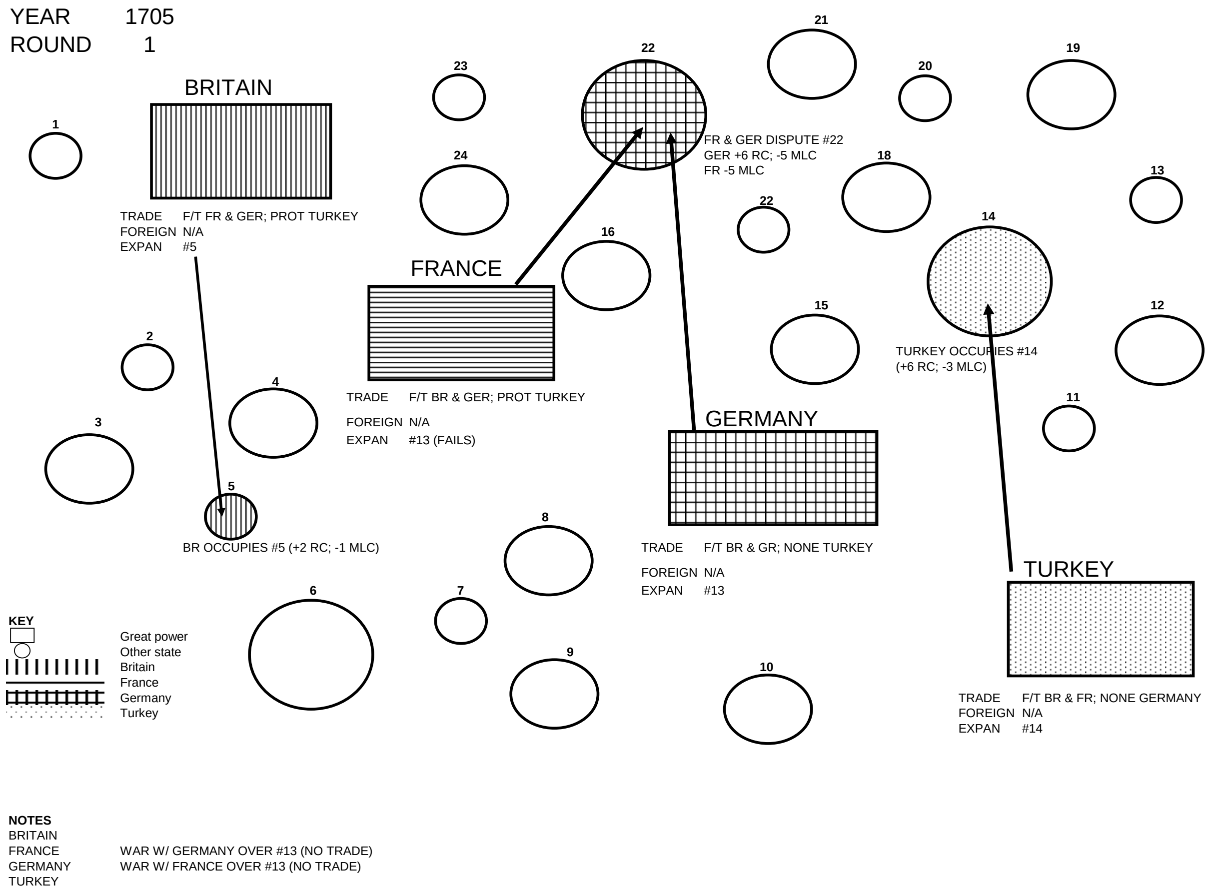
> (fraction of GNP spend on investment x current GNP) - (20% depreciation of current MC)

5. The change in a states total power / national product is determined by the equation:

> GNP = f (machine capital and labor capital)

Provided there is adequate resource base, the equation is factored up by the level of trade. With all states trading freely, GNP is calculated by the formula .67 MC + .33 LC, with some allowance for a nation's resource base (a large resource base may bump up total GNP).

Annex E (Example Game Board for Simulation Week 1)



Annex F (Example Student Handout for Simulation Week 1)

BRITAIN

POWER		ROUND 1
MC	Economic Power (Machine Capital)	110
LC	Potential Power (Labor Capital)	102
	Population Size	
	Human-capital	
RC	Potential Power (Resource Capital)	102
	Land	
	Raw Materials	
	Fertile Territory	
MLC	Military Power (Military Capital)	129
GNP	Total Power	110
REP	Relative Economic Power	0.2619048
RMP	Relative Military Power	0.2476008
EPS	Estimated Probability Survival	0.2547528

KEY DECISIONS	
% GNP	ROUND 1
CONSUMPTION	30
INVESTMENT	30
MILITARY SPENDING	40
TOTAL	100
INVESTMENT RATIO	
AGRICULTURE	50
INDUSTRY	50
TOTAL	100
MILITARY	
% HOME	25
% COLONIES	25
% EXPANSION	50
TOTAL	100

CHANGE	ROUND 1
MC	10
LC	2
RC	2
MLC	29
GNP	10
SOCIAL STAB	0
MIL EXP	1
COLONIES	2
TRADE MULT	0.05
COLONY #S	5

FRANCE

POWER		ROUND 1
MC	Economic Power (Machine Capital)	120
LC	Potential Power (Labor Capital)	100
	Population Size	
	Human-capital	
RC	Potential Power (Resource Capital)	100
	Land	
	Raw Materials	
	Fertile Territory	
MLC	Military Power (Military Capital)	115
GNP	Total Power	108
REP	Relative Economic Power	0.2571429
RMP	Relative Military Power	0.2207294
EPS	Estimated Probability Survival	0.2389361

KEY DECISIONS	
% GNP	ROUND 1
CONSUMPTION	30
INVESTMENT	40
MILITARY SPENDING	30
TOTAL	100
INVESTMENT RATIO	
AGRICULTURE	40
INDUSTRY	60
TOTAL	100
MILITARY	
% HOME	20
% COLONIES	30
% EXPANSION	50
TOTAL	100

CHANGE	ROUND 1
MC	20
LC	0
RC	0
MLC	15
GNP	8
SOCIAL STAB	0
MIL EXP	5
COLONIES	0
TRADE MULT	0.04
COLONY #S	

GERMANY

POWER		ROUND 1
MC	Economic Power (Machine Capital)	100
LC	Potential Power (Labor Capital)	106
	Population Size	
	Human-capital	
RC	Potential Power (Resource Capital)	106
	Land	
	Raw Materials	
	Fertile Territory	
MLC	Military Power (Military Capital)	145
GNP	Total Power	106
REP	Relative Economic Power	0.252381
RMP	Relative Military Power	0.2783109
EPS	Estimated Probability Survival	0.2653459

KEY DECISIONS	
% GNP	ROUND 1
CONSUMPTION	20
INVESTMENT	20
MILITARY SPENDING	60
TOTAL	100
INVESTMENT RATIO	
AGRICULTURE	30
INDUSTRY	70
TOTAL	100
MILITARY	
% HOME	0
% COLONIES	20
% EXPANSION	80
TOTAL	100

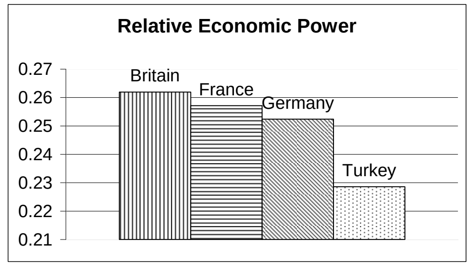
CHANGE	ROUND 1
MC	0
LC	6
RC	6
MLC	45
GNP	6
SOCIAL STAB	0
MIL EXP	5
COLONIES	6
TRADE MULT	0.03
COLONY #S	22

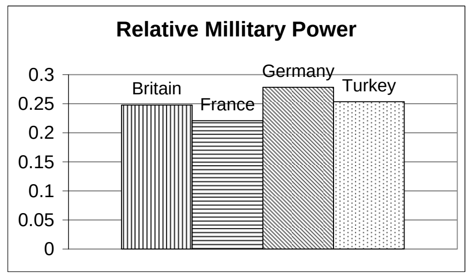
TURKEY

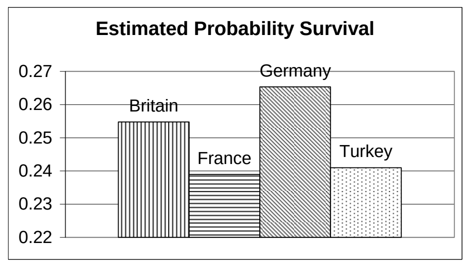
POWER		ROUND 1
MC	Economic Power (Machine Capital)	105
LC	Potential Power (Labor Capital)	106
	Population Size	
	Human-capital	
RC	Potential Power (Resource Capital)	106
	Land	
	Raw Materials	
	Fertile Territory	
MLC	Military Power (Military Capital)	132
GNP	Total Power	96
REP	Relative Economic Power	0.2285714
RMP	Relative Military Power	0.2533589
EPS	Estimated Probability Survival	0.2409652

KEY DECISIONS	
% GNP	ROUND 1
CONSUMPTION	30
INVESTMENT	25
MILITARY SPENDING	45
TOTAL	100
INVESTMENT RATIO	
AGRICULTURE	40
INDUSTRY	60
TOTAL	100
MILITARY	
% HOME	10
% COLONIES	10
% EXPANSION	80
TOTAL	100

CHANGE	ROUND 1
MC	5
LC	6
RC	6
MLC	32
GNP	-4
SOCIAL STAB	0
MIL EXP	3
COLONIES	6
TRADE MULT	-0.02
COLONY #S	14







Notes

[1] They also highlight some disadvantages including the hesitancy to use simulation exercises in the classroom, extensive time requirements for using simulations, the fact that simulations tend to focus on supplemental experiences and not basic skills, and the fact that simulations are less available, expensive, and potentially confusing. In addition, simulations can be noisy and poor simulation development can result in both failure and confusion in the classroom (Cruickshank and Telfer 1980, 77-78).

[2] Available online at http://www.apsanet.org/content_39496.cfm.

[3] These numbers are estimates based on the Spring 2006 semester.

[4] I am indebted to Professor Dale C. Copeland at the University of Virginia for the simulation model used in this research design. Dr. Copeland uses a version of this simulation in his classes. Permission to adapt the product for use in this research project will be obtained from Dr. Copeland prior to the start of research. The description of the simulation and the information in all of the annexes is all based on Dr. Copeland's work.

[5] The organization of this section (teaching goals, simulation construction, simulation execution) is based on Smith and Boyer's (1996, 692-693) steps for planning simulations.

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