CODEBOOK

"Coordination in Large Numbers:
An Agent-Based Model of International Negotiations"
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For relevant citations, please refer to the original article.

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I. INTRODUCTION

This codebook describes the modeling software, model file, datasets and .DO files presented in David C. Earnest, "Coordination in Large Numbers: An Agent-Based Model of International Negotiations," published by *International Studies Quarterly*.

The datasets present results from 3,200 simulations of the agent-based model described in the article. I gathered the data presented in tables 3 and 4 from simulations conducted on March 9, 2006. The summary data and the theoretical conclusions derived from them come from simulations conducted on March 22 and March 23, 2007. Please note that simulation data is not empirical data per se; rather it is analogous to Monte Carlo metadata.

II. NETLOGO SOFTWARE AND FILE

I developed the coordination model using NetLogo v. 3.1.4, available as freeware from the Center for Connected Learning at Northwestern University (http://ccl.northwestern.edu/netlogo/). The source code for the model is available as a separate .NLOGO file, which the interested researcher can read with the NetLogo software. Please note that the .NLOGO file also contains in-code comments as well as a summary of how the interested user may run the model.

The model file (with an .nlogo suffix) is also available from the ISA data archive at http://www.isanet.org/data_archive.html. You can view the source code by clicking on the "Procedures" tab in NetLogo. The "Information" tab explains how to use the model and suggests some exercises. The "Interface" tab allows you to set up and run the model, change variables, and observe the emergence of coordination or discord over time. Please read the "Information" tab for directions.

III. DATASETS

There are three datasets associated with the article. All three are formatted for Stata v. 8.2.

1. Summary Data (filename: summarydata.dta)

This dataset summarizes the model parameters for the 3,200 simulations on which the article bases its findings. The unit of observation is a single simulation. Variables in the dataset record parameter values at the end of the simulation. Figure 2 summarizes and tables 3 and 4 present portions of this data.

2. Example of Discord (filename: discord.dta)

   This dataset presents time-series data for one simulation in which the model's agents failed to coordinate their social choice. The unit of observation is a time step in the simulation, with variables recording parameter values at the end of each time step. Figure 3 in the article presents this data.

3. Example of Coordination (filename: coordination.dta)

   This dataset presents time-series data for one simulation in which the model's agents coordinated their social choice. The unit of observation is a time step in the simulation, with variables recording parameter values at the end of each time step. Figure 4 in the article presents this data.

IV. .DO FILES

There are also five .DO files associated with figures 2, 3 and 4 and tables 3 and 4. These are intuitively named "figure2.do," "figure3.do" "table3.do" and so on. The reader may use these .DO files with the datasets described here to reproduce these figures and tables. Please note that figure2.do, table3.do and table4.do work only with the summarydata.dta dataset. Likewise figure3.do requires the discord.dta dataset, while figure4.do requires the coordination.dta dataset.

V. DESCRIPTION OF THE VARIABLES

From the earnest_summarydata.dta dataset

id: a unique identifier for each simulation. This variable ranges from 1 to 3,200.

simdate: Date of the simulation, formatted as MM/DD/YY.

fitcriterion: The criterion Miller's active nonlinear test algorithm (see Miller 1998) used to anneal the model. The criterion of fitness in the tests took one of two values: "max" indicates the simulation sought to maximize the number of periods in which negotiators disagreed over the social choice, while "min" sought to minimize the number of periods in which negotiators disagreed. This variable records the fitness criterion as a string (i.e. word rather than number). See the text of the article for a discussion of the active nonlinear test.

fitness_criterion: This variable is the same as fitcriterion, but records the criterion as an integer rather than a string. It is coded so that 0 = minimize periods of disagreement, 1 = maximize periods of disagreement.

generation: The "generation" of the active nonlinear test in which the run occurred. Each test conducted 40 generations of 40 simulations each. Consequently this variable is uniformly distributed with a minimum of 1 and a maximum of 40.

run: The number of the simulation within that day's run of the active nonlinear test. Because each test conducted 40 generations of 40 simulations each, this variable ranges from 1 to 1,600. Please note this variable is unique to each value of **simdate**, but is not a unique identifier. For a unique identification variable, please refer to the "id" variable.

fitness: The value of the fitness criterion, as recorded at the end of that simulation. This variable counts the number of periods in which the "diplomat" agents failed to agree to a unanimous social choice. Because the model limited each simulation to 200 time steps, this variable ranges theoretically from 0 to 200.

number: the number of nation-states represented n the model. The model limited this variable to no fewer than 3 and no greater than 40 nation-states negotiating simultaneously.

range: This variable measures the radius within which a given constituency in the model polls its neighboring constituencies. Because the agent-based model arrays constituencies in a nominal 35 x 35 space, some constituencies by chance will be further away than the value of the range variable. A constituency thus accounts only for preferences of its neighbors within a radius of value *range*. The model limits this variable to a minimum of 10 and a maximum of 30.

swings: Weighted rate at which constituencies reorder their preferences; higher values indicate quicker reordering. By construction this variable ranges from 1 to 5, with 5 indicating reordering occurs five times as fast as a "swing" value of 1.

sensitivity_DC: the sensitivity of level I negotiators to their level II constituents. This variable measures the probability that a negotiator agent will reorder its preferences to accord with those of its constituents. As a probability, this variable by construction varies continuously from 0 to 1.

sensitivity_DD: the sensitivity of level I negotiators to other level I negotiator agents. This variable measures the probability that a given negotiator agent will reorder its preferences to accord with the preferences of another negotiator. As a probability, this variable by construction varies continuously from 0 to 1.

From the earnest_coordination.dta dataset

time: the step in time in the simulation. This variable is a unique identifier for each observation.

blue_votes: the number of negotiators at level I (i.e. diplomats) that prefer choice blue.

green_votes: the number of negotiators at level I (i.e. diplomats) that prefer choice green.

yellow_votes: the number of negotiators at level I (i.e. diplomats) that prefer choice yellow.

blue_sprefs: the average percentage of the global population that prefers social choice blue. That is to say, this variable (and subsequent variables with the _spref suffix) measures the average percentage of the population within each constituency that prefers choice blue.

green_sprefs: the average percentage of the global population that prefers social choice green.

yellow_sprefs: the average percentage of the global population that prefers social choice yellow.

From the earnest_discord.dta dataset

time: the step in time in the simulation. This variable is a unique identifier for each observation.

blue_votes: the number of negotiators at level I (i.e. diplomats) that prefer choice blue.

green_votes: the number of negotiators at level I (i.e. diplomats) that prefer choice green.

yellow_votes: the number of negotiators at level I (i.e. diplomats) that prefer choice yellow.

VI. CONTACT INFORMATION

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