Locating the History We Have Within the Distribution of Counterfactuals

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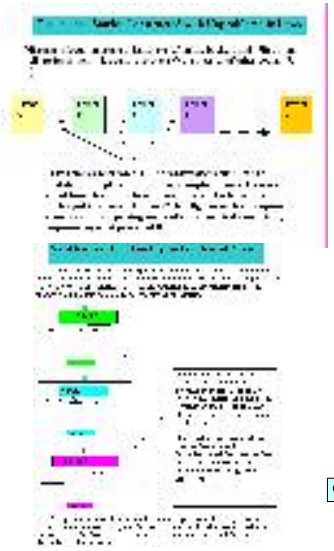
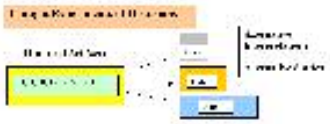
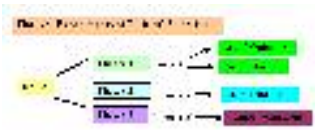
Thought Experiments and Counterfactuals for Historians and Political Scientists



Historians use Thought Experiments to generate counterfactuals inspired by alternative interpretations of historical artifacts. These are intended to evaluate the actuality of stories reported as having occurred. The normal problem for historians is that without explicit theoretical triage, the array of alternative interpretations produced is idiosyncratic and unreliable.



Political Scientists use Thought Experiments to generate counterfactuals inspired by alternative theories. These are intended to evaluate the explanatory power of a particular theory. The normal problem for political scientists is that many such counterfactuals may also be consistent with the particular theory at issue. Nor is it easy to distinguish which "counterfactuals" are actually "counter-nonfactuals"—outcomes that could not have occurred but that are entertained because of the incorrectness of the theories that produced them or errors of interpretation and extrapolation.



Social Scientists Use Counterfactual Thinking to Express and Test Their Theories

Hypothesis H holds that A → B, where "A" and "B" are stories treated as unitary events by the application of laws pertaining to classes of events to which those events belong.

Hypothesis H: A → B

Observation of B in the presence of A corroborates Hypothesis H only to the extent that, counterfactually, it is also believed, and implicitly claimed, that Not A would have led to Not B.

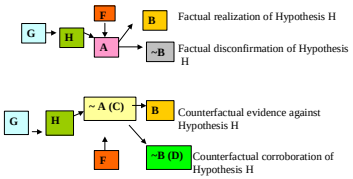
Hypothesis H actually entails:

A → B

AND

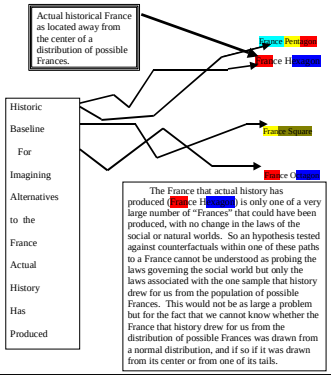
~A → ~B

Social scientists support such claims by generating thought experiments (longer stories) in which all other aspects of the world, or as many as possible, are imagined to remain the same, except that instead of A, "Not A" is present—for example "C."



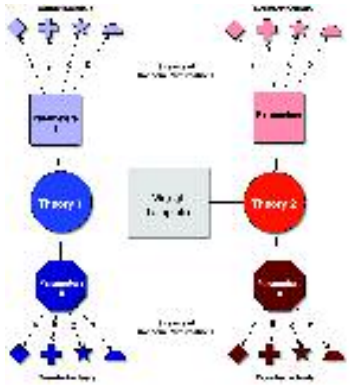
If the thought experiment with C taking the place of "A" leads to B as well, then the hypothesis is not corroborated. If the thought experiment with C taking the place of A leads to Not B, for example "D," then the hypothesis is corroborated.

Improving Counterfactual Analysis



Agent-Based Modeling: Counterfactuals as Data in Thought Experiments

Agent Based Modeling generates large numbers of Thought Experiments that portray counterfactuals. Since each counterfactual is automatically consistent with the particular theory operationalized by the rules of the simulation, and since changes in the rules can produce alternative arrays of counterfactuals consistent with such changes, patterns in the distributions of these Thought Experiments can have great analytic significance.



The diagram above indicates how agent-based modeling can make thought experiments more systematic and improve the evaluation of patterns in the distribution of counterfactuals produced by these thought experiments. The virtual template provides identical initial conditions. Moving to the left or right, into the bluish or reddish-brown sides of the display, represents choice of one set of theoretical propositions or another to guide the tracing and evaluation of independent variables and dependent measures. Within each set of experiments undertaken in the context of a single theoretical position (bluish or reddish-brown), two different experiments are represented (light and dark). For example, experiments were run to determine globalization's impact on the prevalence of the regime identity and to investigate the impact of reduced efficacy of the regime's bureaucracy.

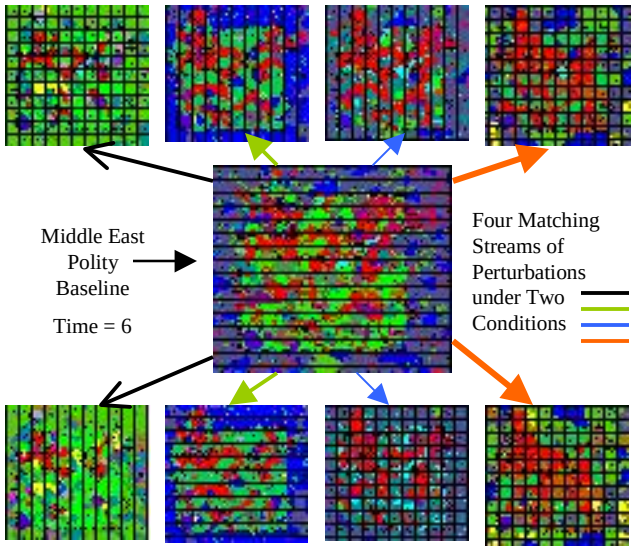
Experiments involve different weightings of key variables, i.e. different "parameter settings." For example, in the context of the experiments focused on the effects of globalization, it was hypothesized that both increasing the volatility of change in Middle East Polity's global environment and increasing the range within which fluctuations could occur would decrease the prevalence of regime identity.

The model's behavior in each experimental condition is examined dynamically multiple times, producing unique "runs" of the model, i.e. counterfactual "futures" for Middle East Polity. Differences across these futures are produced by the assignment to each run of a randomly but exactly specified stream of "accidental" signals (varying within a controlled range, with a controlled volatility, and a controlled predictability) that perturb the template. For example, such signals could reflect sequences of change in oil prices, in the implications of errors or effective diplomatic moves by various actors, by internal political shifts, or by changing cultural or economic trends. Results of experiments are evaluated as patterns across random perturbations. These patterns are made more comparable to patterns produced with alternative variable weightings or with the rival theory because exact streams of random perturbations are themselves held constant across conditions—hence the production of four distinct outcomes in each condition (albeit of different colors) represented in this display by a diamond, cross, star, and half moon. In standard experiments with PS-I the number of independent runs (computer-produced thought experiments) performed in each condition is 100.

Middle East Polity: Multiple Futures and Illustrative Results

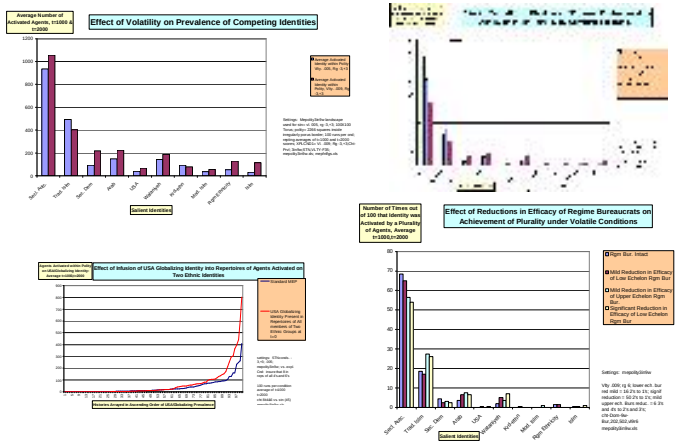
Four Histories: Medium Range of Environmental Variation

Bias range: -3,+3; time = 1000



Four Matching Histories: Wider Range of Environmental Variation: Bias range: -3,+4; time = 1000

Illustrative Results



Thanks to Ben Eidelson, Dan Miodownik, the National Science Foundation, and the Solomon Asch Center for Study of Ethnopolitical Conflict at the University of Pennsylvania. For more information about PS-I and for complete results go to: http://www.polisci.upenn.edu/abir/ or ilustick@sas.upenn.edu