Extending Opinion Polls through the Combination of Analytical and Simulation Models
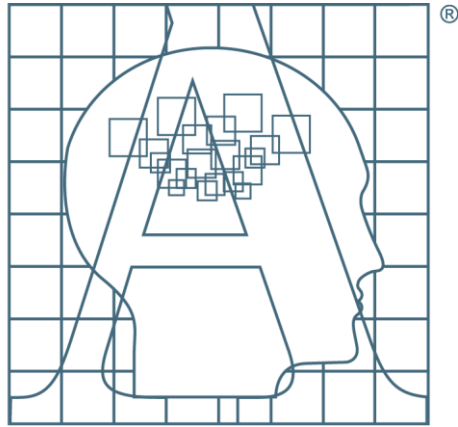
Presented By:
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The 31st International Conference of the System Dynamics Society

Monday July 22nd, 2013

Overview

- Purpose: Understanding changes in opinions
- Data and analytical models: Making the most of different sources
    - Polling data
    - Media
- Simulation model: Updating and forecasting opinions
- Preliminary results and future research

Purpose:
How are opinions changing?

Data exists at different **modalities**, **depths** and **frequencies**

Can models help comprehensive and timely estimate of **current** and **future** social dynamics?
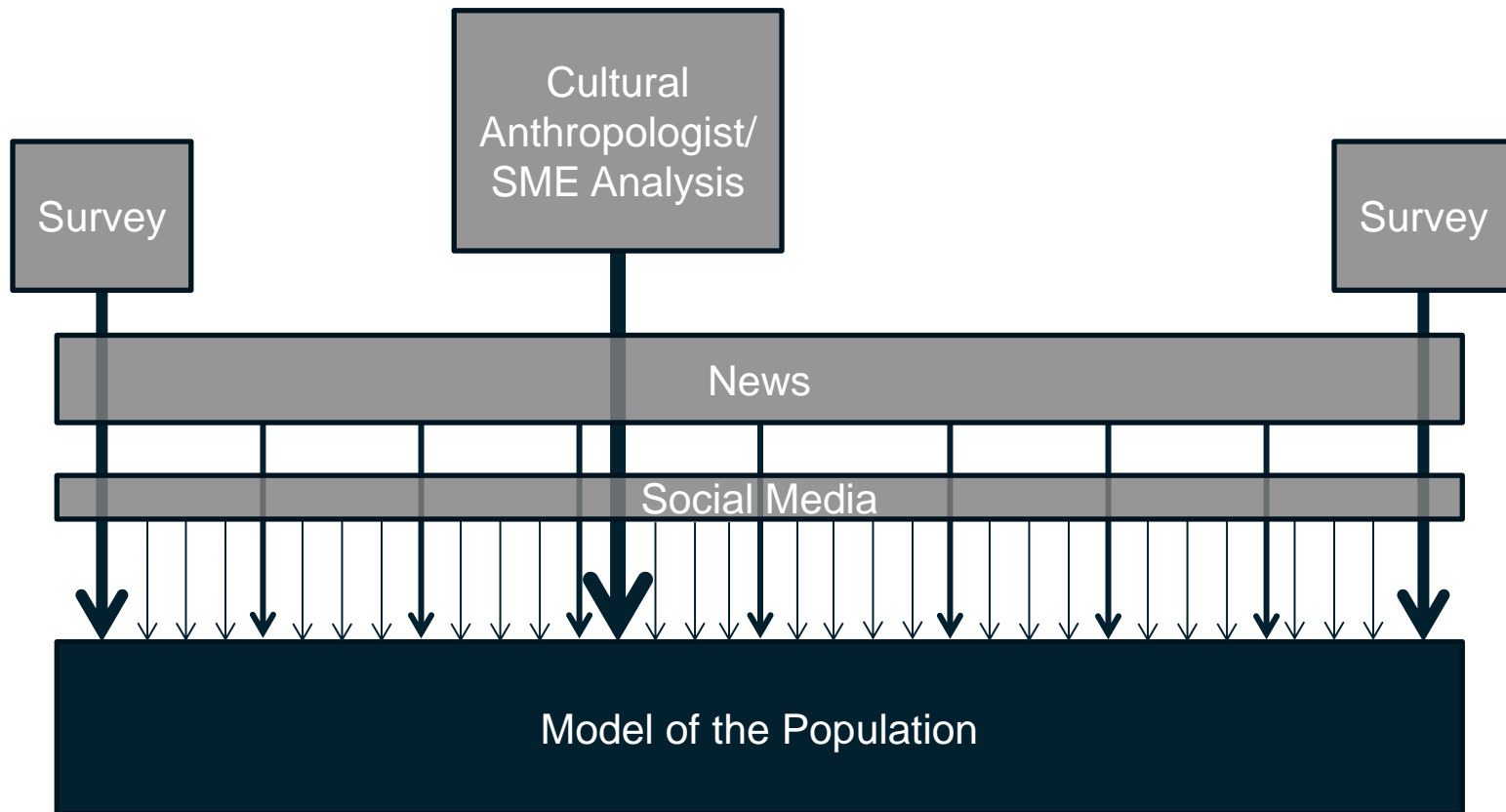
Data and analytical models:
Polling Identities & Initial Opinions

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Identity Type	Identity Item
Gender	Male/Female
Ethnicity	Which ethnic group do you belong to?
Education	What is the highest level of school you completed [6 point scale]

Opinion Type	Opinion Item
U.S.	How would you rate the work of the United States in Afghanistan – excellent, good, fair, or poor?
Afghan Government	How would you rate the work of the present government – excellent, good, fair, or poor?
Hamid Karzai	How would you rate the work of Hamid Karzai as president of Afghanistan – excellent, good, fair, or poor?
Taliban	Is your opinion of the Taliban very favorable, somewhat favorable, somewhat unfavorable, very unfavorable

Data and analytical models:
Deriving Reactions from Polling (1)
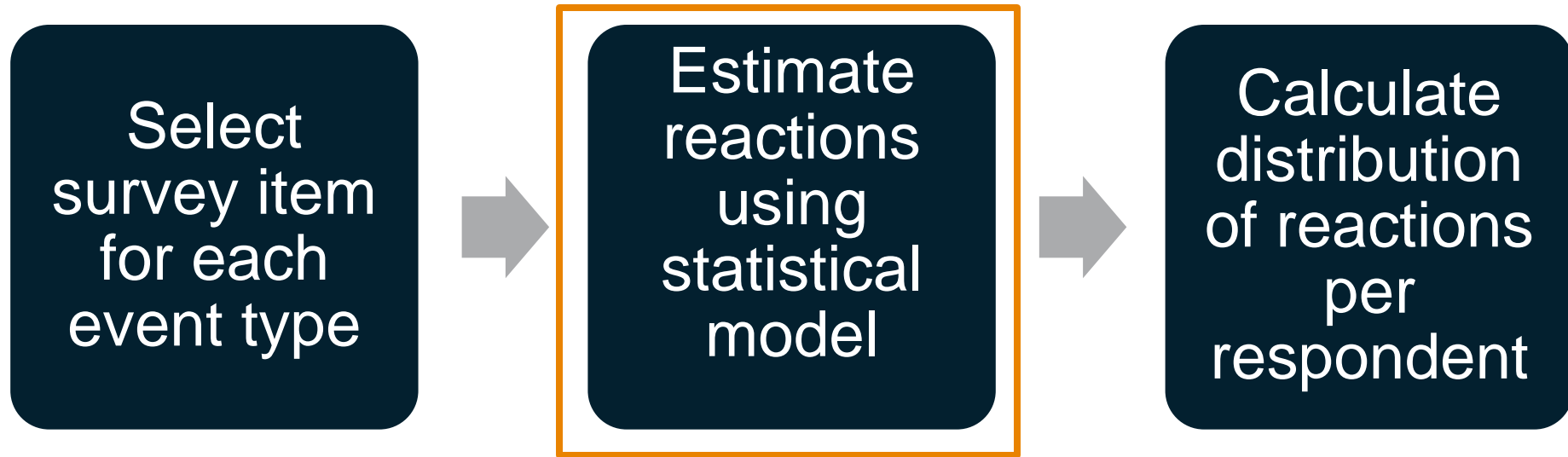
Select survey item for each event type → **Estimate reactions using statistical model** → **Calculate distribution of reactions per respondent**

Event Type	Reaction Item
Road reconstruction	I would like to ask you about today's conditions in the village/neighborhood where you live. How would you rate the following using very good, somewhat good, somewhat bad or very bad? [Roads, bridges, and other infrastructure]
Security	[Security from crime and violence]
Schools	[The local schools]

Data and analytical models:
Deriving Reactions from Polling (2)

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Human-Centered Engineering

Select survey item for each event type	→	Estimate reactions using statistical model	→	Calculate distribution of reactions per respondent

AfghanGovtOpinion= Intercept + Gender + Ethnicity + Education + Region + Road Item + Gender x Road Item + Ethnicity x Road Item + Education x Road Item + Region x Road Item

Setting value of road item allows for incorporating event thresholds (e.g., very bad to very good; somewhat bad to somewhat good)

Allows impact of road reconstruction event to vary by identity and region

Data and analytical models:
Deriving Reactions from Polling (3)

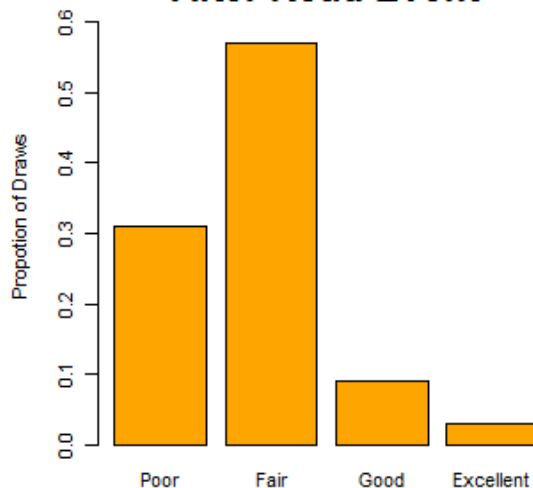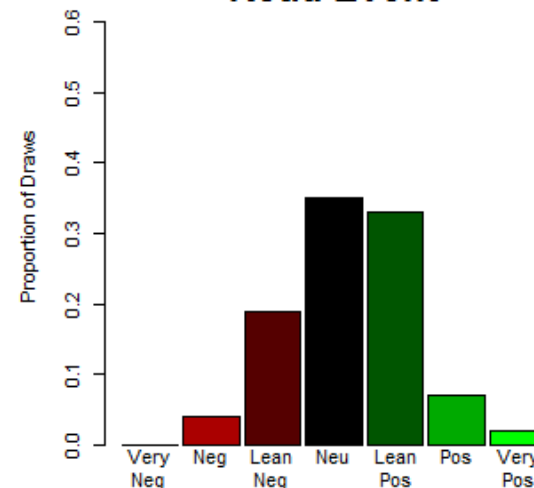| Select survey item for each event type | → | Estimate reactions using statistical model | → | Calculate distribution of reactions per respondent |

Estimated Opinion Afghan Govt Before Road Event
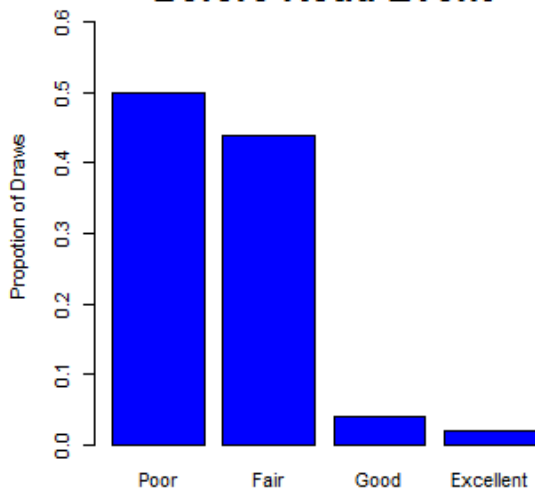
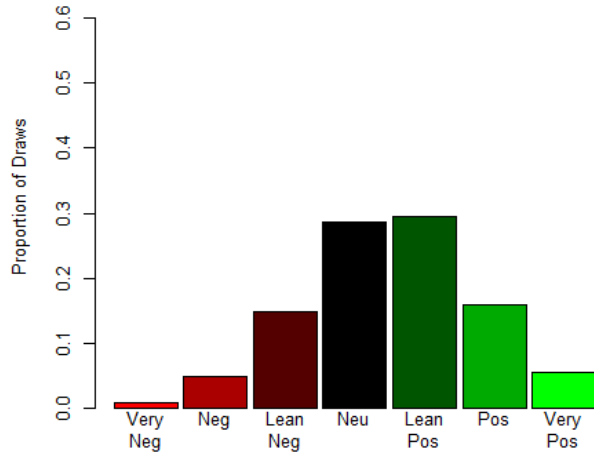**Estimated Opinion Afghan Govt After Road Event**
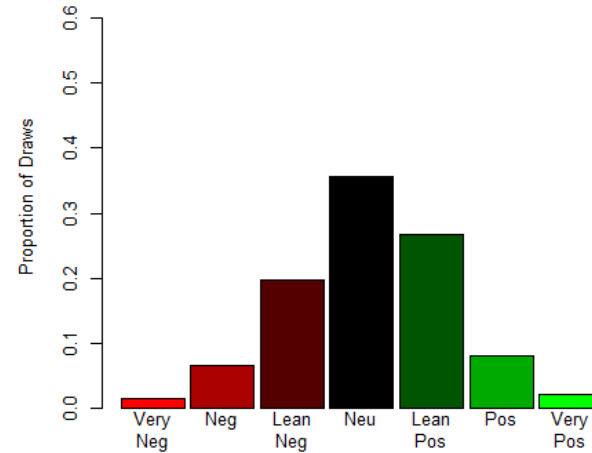
Reaction Distirbution Afghan Govt Road Event

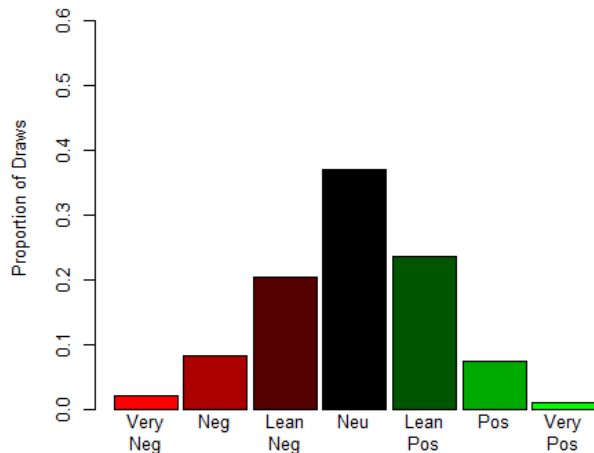# Data and analytical models:
Example Reaction - Road Reconstruction
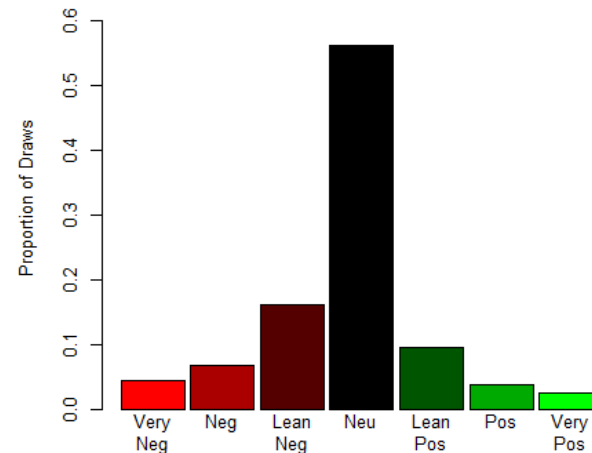
Reaction Toward US Road Reconstruction Event

Reaction Toward Afghan Govt Road Reconstruction Event

Reaction Toward Karzai Road Reconstruction Event

Reaction Toward Taliban Road Reconstruction Event

Data and analytical models: Media

- Processed data:
  - Afghanistan News Center
    - www.afghanistannewscenter.com
   - ~15000 articles from 2005-2008

Data and analytical models:
Media Analysis - Example Latent Topics

Topic 36 "Civilian Casualties"		Topic 70 "Elections"		Topic 95 "Election Fraud"	
Feature	Probability	Feature	Probability	Feature	Probability
civilian	0.0835	election	0.0810	round	0.0323
casualty	0.0297	candidate	0.0296	election	0.0229
air	0.0189	presidential	0.0276	vote	0.0216
death	0.0177	campaign	0.0220	fraud	0.0194
strike	0.0167	vote	0.0200	Commission	0.0182
killed	0.0150	voter	0.0158	Karzai	0.0162
incident	0.0141	provincial	0.0143	runoff	0.0153
report	0.0104	council	0.0133	ECC	0.0150
operation	0.0103	poll	0.0129	IEC	0.0112
"civilian casualty"	0.0095	polling	0.0118	electoral	0.0100

Data and analytical models:
Example Topic 25 -Road Reconstruction
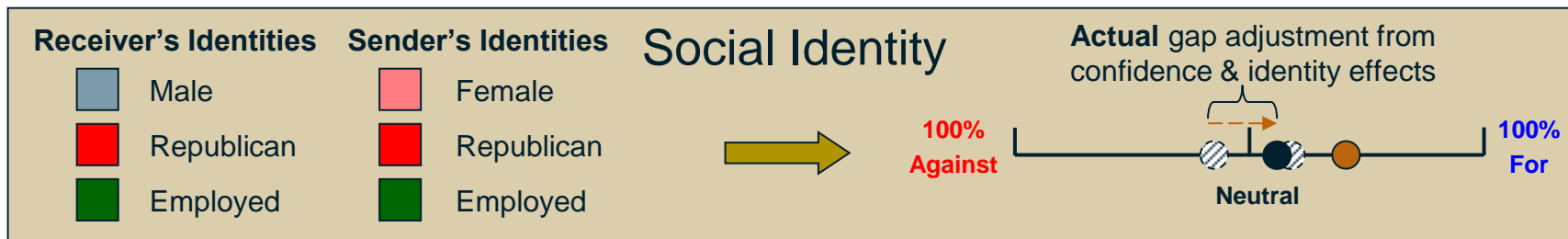

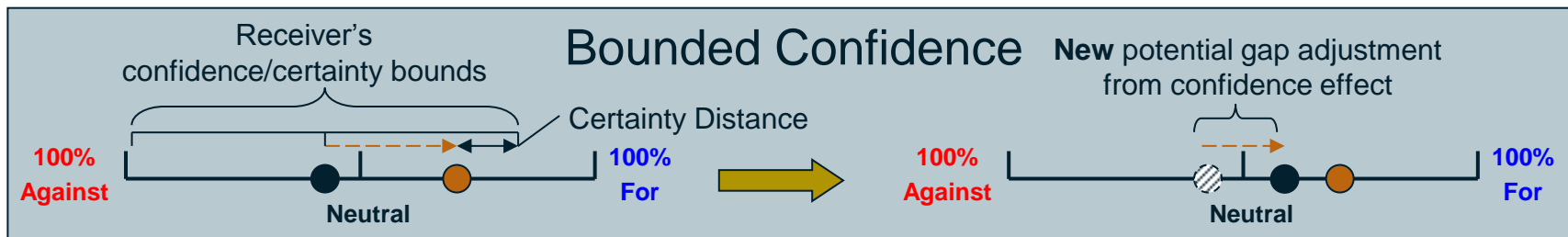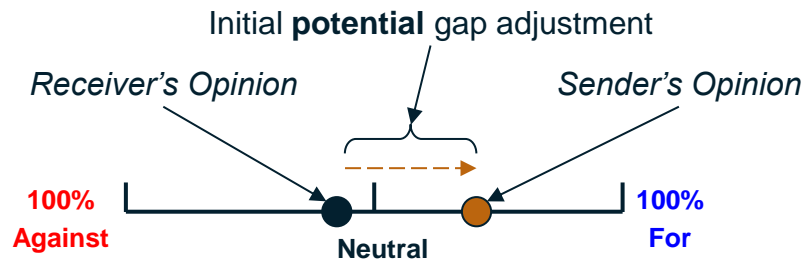Topic 25–Road Reconstruction Projects (roads)
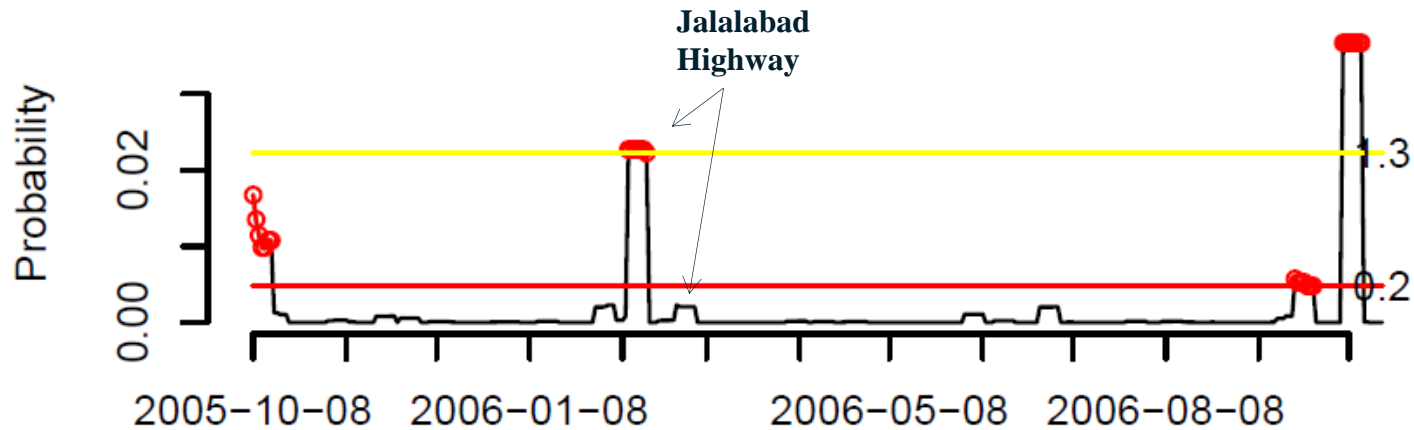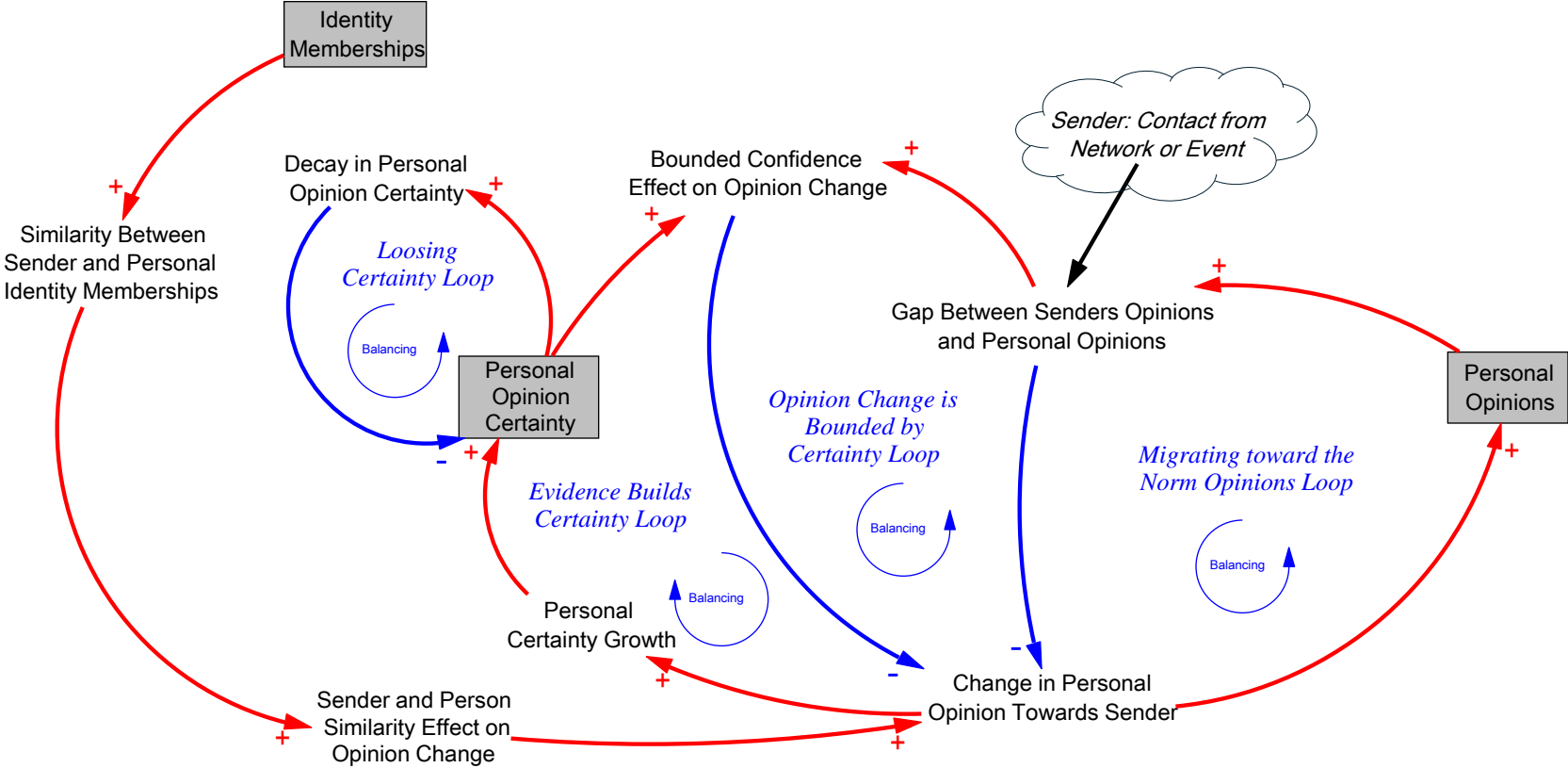
Document Excerpt

Document ID: 11661

Time: **2006-03-04**

Work resumes on Kunar - Jalalabad road JALALABAD, March 2 (Pajhwok Afghan News): Construction of the Kunar - Jalalabad road, which was halted for some time, was resumed on Thursday. Contract of the 122-kilometre road was earlier awarded to a Turkish company, CBS but the rest of the work will be completed by an Indian company….

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Simulation Model: Social Influence Theory

Initial **potential** gap adjustment

Receiver's Opinion — *Sender's Opinion*

100% Against — Neutral — 100% For

Bounded Confidence

Receiver's confidence/certainty bounds

Certainty Distance

New potential gap adjustment from confidence effect

100% Against — Neutral — 100% For

Social Identity

Receiver's Identities	Sender's Identities
Male	Female
Republican	Republican
Employed	Employed

Actual gap adjustment from confidence & identity effects

100% Against — Neutral — 100% For

Bounded Confidence Update

Receiver's initial confidence/certainty bounds

Opinion Adjustment Distance

Receiver's **new** confidence/certainty bounds

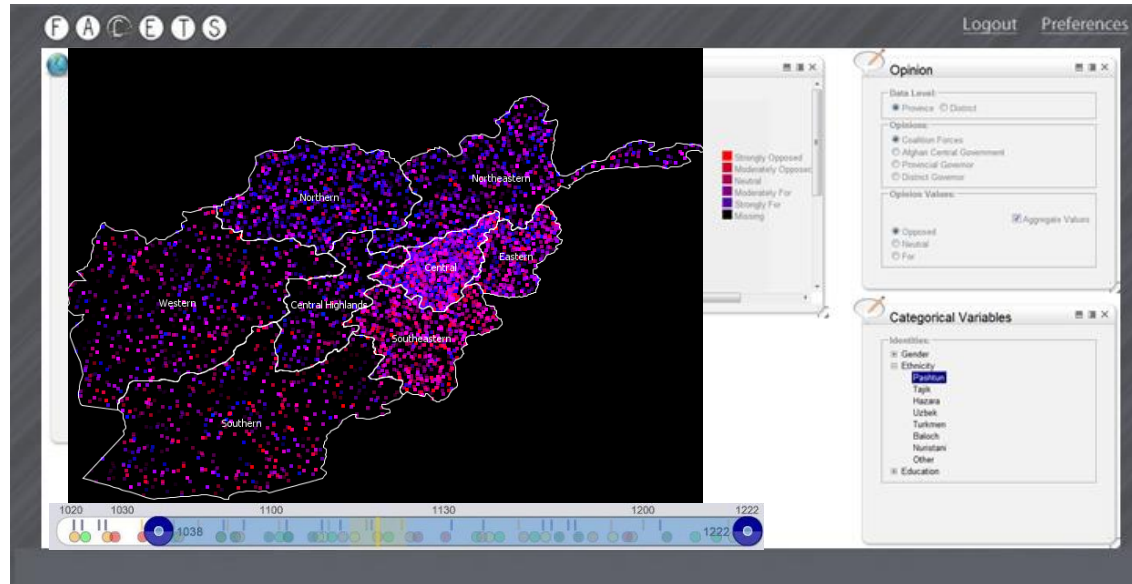100% Against — Neutral — 100% For

Simulation Model:
Social Influence Theory Implementation

Simulation Model:
Agent representation

Opinions
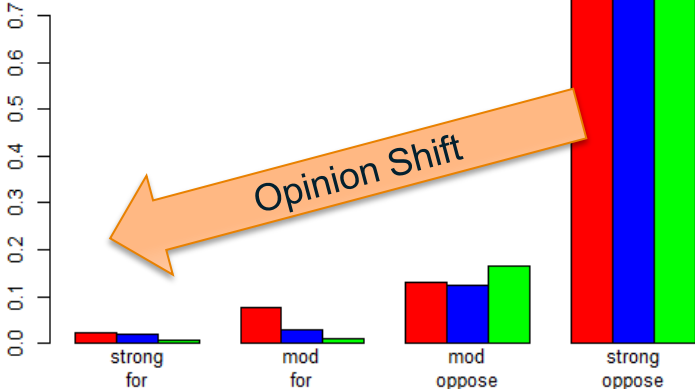
Identities
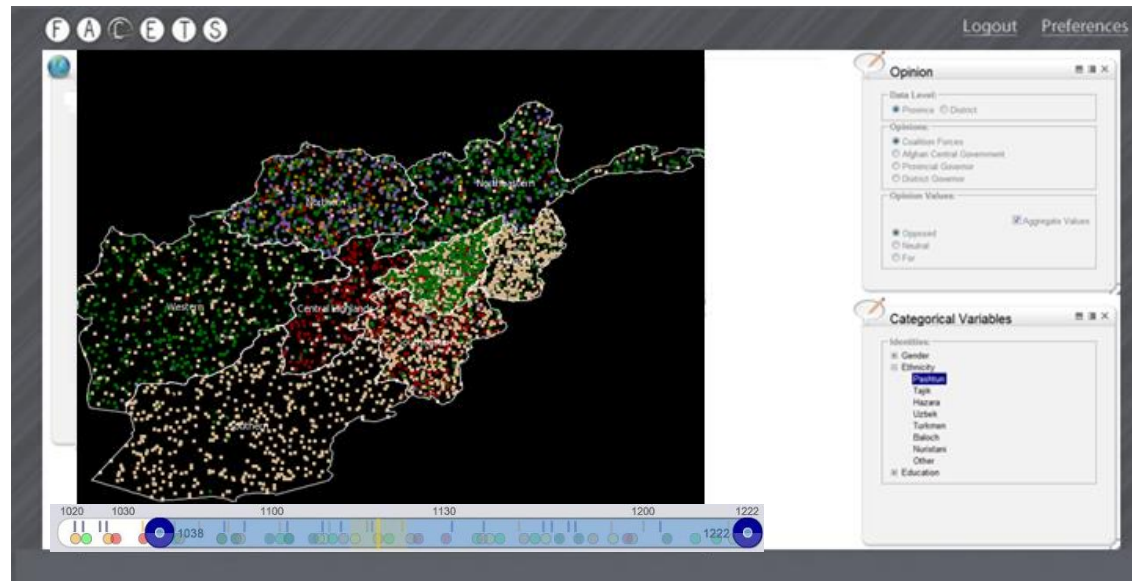
Preliminary Results
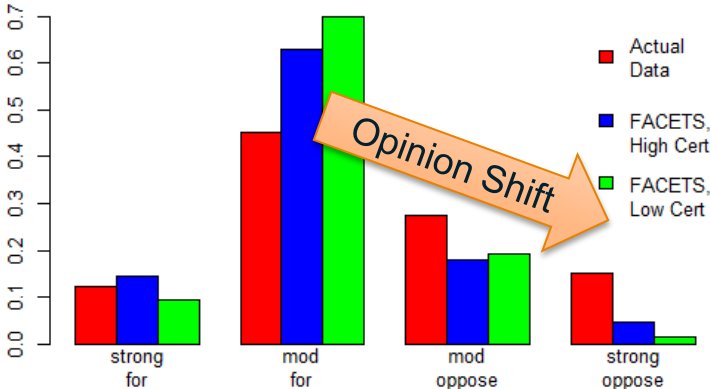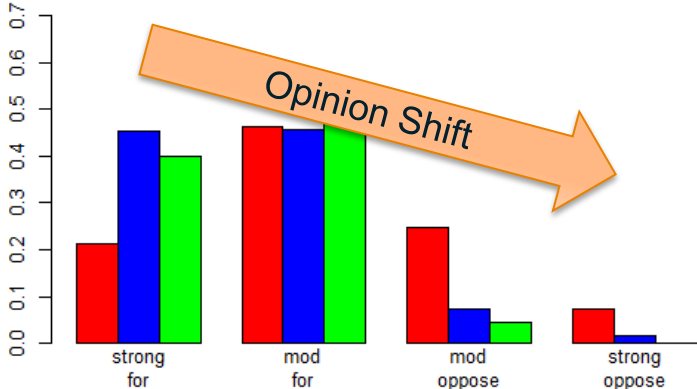
Future Research

- Tuning event extraction and simulation parameters
- Additional longitudinal studies without tuning
- Different region study without tuning