

Simulating State Order Dynamics: Real State vs. Virtual State

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Subject and Aim

- The Subject: disintegration of the state's territorial rule caused by domestic armed conflict
⇒ The most serious dimension of state "failure" and "collapse"
- Diverse Dynamics: prolonged division, reunification, disappearance of formal government, ...
- The Aim: to construct a theoretical platform for the comparative analysis of these diverse phenomena

Background

- Missing Perspective in the Literature:
Linking local behaviors of spatially distributed inhabitants to the macro dynamics of the state's territorial division
 - Congruity with MAS: Cederman's model of nationality formation(1997), Lustick et. al.'s model of secessionism(2004),...
- ⇒The "Virtual State Model" reproduces these spatial micro-macro dynamics in empirically more realistic virtual environments.

The Model: Virtual States

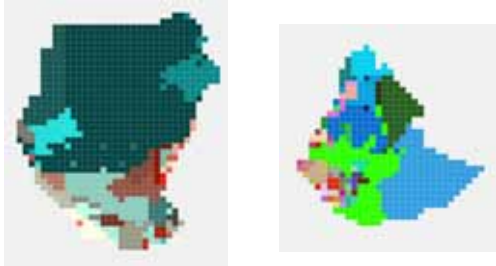
Processing geo-referenced data of real countries...



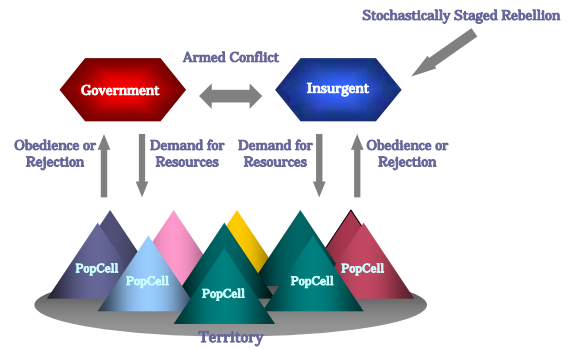
Population Distribution, Ethno-Linguistic/Religious Distributions,
Government's Support Base in the Territory...

The Model: Virtual States

Construct their gridded representations in computer !



The Model: Interactions



The Model: Agents

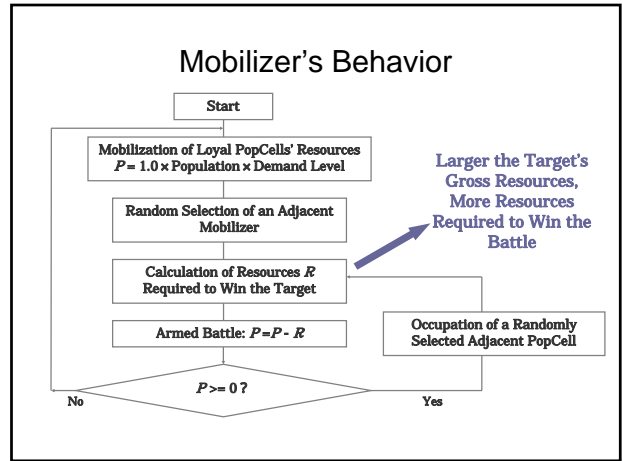
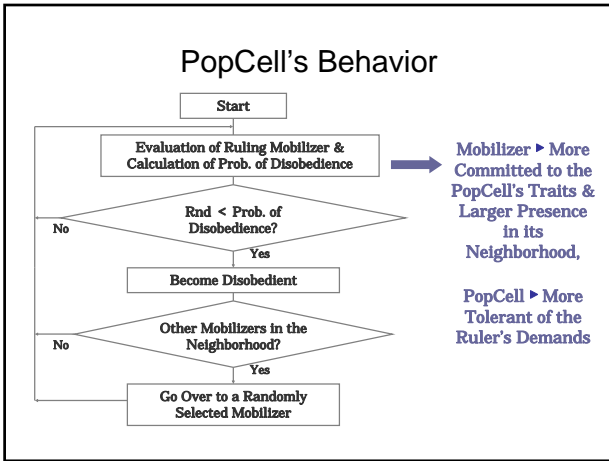
1. **Population Cell (PopCell):** inhabited grid area (30 arc minutes resolution in the following experiments) ,

- Having a population of inhabitants,
- Characterized by the inhabitants' "Traits"
e.g. [03•93]⇒ethnically Amhara([03]), religiously Orthodox Christian([93])
(see Axelrod(1997) / Cederman(1997))


The Model: Agents

2. **Mobilizer:** politico-military organization (government or insurgents, the latter's variables are generated randomly),

- Demanding some level ("DemandLv") of resources from PopCells,
- Taking some stand (committed or indifferent) on PopCells' Traits
e.g. [**•93]⇒ethnically indifferent([**]), religiously committed to Orthodox Christians([93])
(see Cederman(1997))

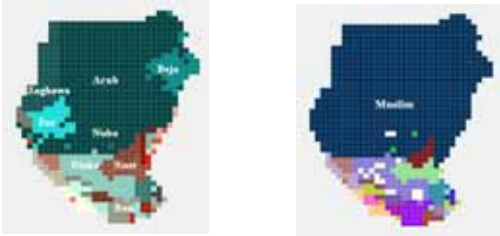


Example1: the Sudan



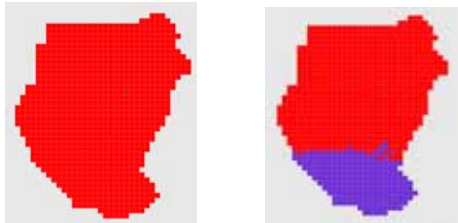
- More than 20 years of territorial division caused by the civil war in the South (1983-2005)
- Having faced bitter conflicts in the west (Darfur) and other regions

Example1: the Virtual Sudan



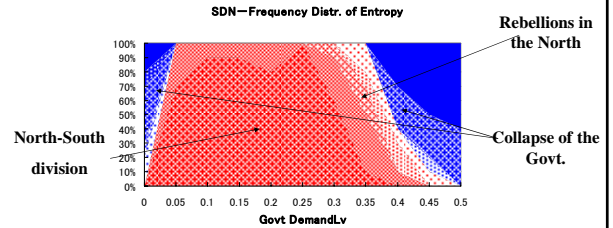
- Relatively high level of social integration based on Islam in the North, but a sizable non-Arab population also present
- Ethnically and religiously diverse inhabitants concentrated in the South

Example1: Simulation



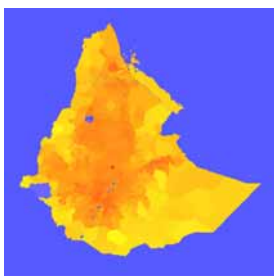
- Initial State (Left): the whole territory under the rule of a government deeply committed to Arab and Muslim inhabitants
- Given various levels of the government's mobilization, what will happen to the virtual Sudan after 250 time steps (Right)?

Example1: Results



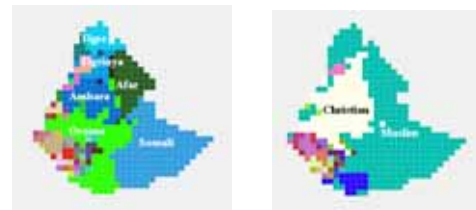
- Almost certain occurrence of the North-South divide as a long-term state
- Under much higher levels of extraction, the government can also face rebellious populations in the North.
- The government has some robustness against total collapse

Example2: Ethiopia and Eritrea



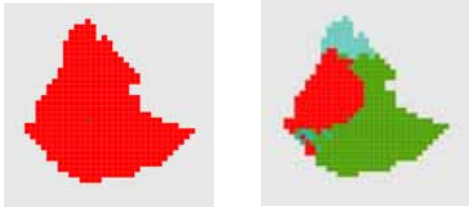
- Emergence of liberation movements in Eritrea and Ogaden during Haile Selassie's reign
- Spread of the conflicts to the whole country after the revolution in 1974
- The independence of Eritrea and the reunification of Ethiopia under the new government in the early 1990s

Example2: the Virtual Ethiopia



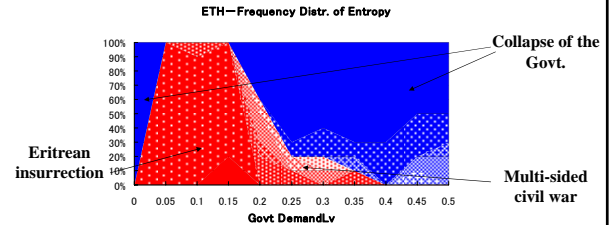
- Characterized by spatial division among major "ethnic regions" and the extremely heterogenous south-west
- Spread of both Christianity and Islam also conspicuous
- Distinction between Eritrean and Ethiopian populations also added

Example2: Simulation



- Initial State (Left): the territory under the rule of a government deeply committed to Amhara and Christian inhabitants (representing the imperial government)
- What will happen to the virtual Ethiopia after 500 time steps (Right)?

Example2: Results



- The government is more prone to total collapse.
- Almost certain occurrence of Eritrean insurrection under lower levels of mobilization.
- Spontaneous emergence of major insurgents under higher levels of extraction, which can lead to prolonged civil war.

Summary

- Diverse patterns of state order dynamics can emerge in the virtual Sudan and Ethiopia.
- Some of them capture (or at least touch) the reality. e.g. the prolonged territorial division in the Sudan, the spontaneous rebellions in Ethiopia, ...
- These dynamics are largely influenced by spatial properties of the country. e.g. concentration/dispersion of politically excluded inhabitants, territorial extension of government's support base, ...

Prospects

- More experiments in more virtual states and unremitting revisions of the model
- Comparative studies of real countries and construction of state integration/disintegration theories, based on the empirically reliable model
- GIS and MAS: promising collaboration

References

- Axelrod, Robert, 1997, *The Complexity of Cooperation: Agent-Based Models of Competition and Cooperation*, Princeton University.
- Cederman, Lars-Erik, 1997, *Emergent Actors in World Politics: How States and Nations Develop and Dissolve*, Princeton University Press.
- Lustick, Ian S., 2004, Dan Miodownik, and Roy J. Eidelson, 2004, Secessionism in Multicultural States: Does Sharing Power Prevent or Encourage It?, *American Political Science Review*, Vol.98, No.2.