Political options tested in a virtual wind tunnel

July 11 2013, by Peter Rüegg

Emblematic of the high social distance between the Israelis and the Palestinians is the separation barrier which restricts Palestinian mobility in and out of the city. Credit: André / flickr.com

A team of researchers from ETH Zurich, the Graduate Institute for International and Development Studies in Geneva and the Hebrew University of Jerusalem have developed an evidence-based model of

violence in Jerusalem. The model explores alternative scenarios for the future of Jerusalem, in particular, their implications for the spatial distribution of violence in the city.

Jerusalem is characterized by a continued level of territorial conflict. Rarely does a day go by without media reports of violent clashes between Orthodox Jews, secular Israelis, Palestinians and the Israeli police and security forces. Ethnic, religious and ideological tensions determine the social life of the city, and efforts to find a political solution to the city's future status have thus far failed.

Researchers from ETH Zurich, the Graduate Institute of International and Development Studies (IHEID) in Geneva and the Hebrew University of Jerusalem have developed a [computer model](#) to better understand the sources and patterns of violence in urban areas, employing Jerusalem as a demonstration case. They seeded their model with microlevel, geocoded data on settlement patterns for each of the city's 77 [neighbourhoods](#).

After selecting an optimal set of parameters to best fit the observed [spatial distribution](#) of violence in the city, the authors used the calibrated model to assess how different levels of segregation, reflecting various proposed "virtual futures" for Jerusalem, would affect the level of violence. The study was recently published in the prestigious *American Journal of Political Science*.

The logic of violence in Jerusalem

Ravi Bhavnani from IHEID initially conceived the project. Building upon a series of papers he and his colleague Dan Miodownik, from the Hebrew University of Jerusalem, had authored on violence in Israel, Gaza and the West Bank. "The idea of analysing the logic of violence in Jerusalem came to us on a tour through the city," says Bhavnani. Shortly

thereafter, Bhavnani and Miodownik responded to a call for visiting scientists by Dirk Helbing, an ETH-Zurich professor of sociology, and spent a number of weeks in Zurich refining the core idea for the project. During this time, a collaboration with Helbing was initiated, and doctoral student Karsten Donnay from Helbing's group was assigned the task of programming the model for Jerusalem.

The empirical data for the simulation was furnished and coded by the Israeli project team. The researchers assembled a geo-coded dataset on all deaths and injuries related to the political conflict from police reports, newspaper articles and reports by non-government organisations for the 2001-2009 period. The simulation, in turn, uses geo-coded data on the location, size, and shape of neighborhoods, as well as data on the general location of housing settlements. The population of each neighborhood is likewise based on empirical data and dynamically updated for each group using a natural rate of growth to reflect demographic trends.

The model was developed by Karsten Donnay. Despite its few parameters, it accurately reproduces the occurrence of violence in 59 of 77 neighborhoods (76.6%) for the 2001–2004 period and in 64 of 77 neighborhoods (83.1%) for the 2005–2009 period, and matches the citywide distribution of targets for each group with high precision. For instance, during the 2001-2004 period (the Second Intifada) most of the city, though primarily the East and city-centre, was embroiled in violence. In the subsequent period (2005-2009), violence was concentrated in the East—patterns that the model generates with a high degree of fidelity.

In and around the neighbourhood of Silwan in East Jerusalem, some 40'000 Palestinians live alongside 2,000 Jewish settlers, resulting in a highly tense situation. Credit: Karsten Donnay / ETH Zurich

Social distance as a key mechanism

"One major factor to explain the likelihood of violence between members of nominally rival groups is social distance, be it religious, ethnic or ideological, class or gender-based" says Bhavnani. All else being equal, higher levels of social distance increase the likelihood that day-to-day contact between group members will lead to violence. In Jerusalem, the scientists account for the social distance between four different groups - moderate orthodox and secular Jews, ultraorthodox Jews, Palestinians and Israeli security forces. Based on the premise that the nature of intergroup relationships, represented by social distance,

matters decisively, the authors account for patterns of violence in each of the two time period analyzed: from 2001-2004 (the Al Aqsa Intifada), violence occurred primarily between secular Jews and Palestinians, whereas violence between security forces and Palestinians accounted for the largest share of events between 2005 and 2009.

By focusing on social distance as a key mechanism to explain violence, the authors bridge the divide between two competing theoretical perspectives. The first assumes that intermixed group settlement patterns reduce violence, as more frequent interactions enable rivals to overcome their prejudices towards each other and become more tolerant, effectively raising the threshold for violence. The second approach suggests just the opposite, namely that group segregation more effectively reduces violence, given less frequent contact and fewer possibilities for violent encounters to occur. As noted by Nobel-Laureate Thomas Schelling, segregation is widespread and natural phenomenon in a variety of social systems.

The future of Jerusalem

Applying their computer simulation model, the scientists also examined the distribution of violence under four proposed scenarios for the future status of Jerusalem: a "business-as-usual" scenario, a scenario based on the Clinton Parameters of 2000, a scenario following the outlines of a Palestinian proposal, and a scenario assuming return to the borders of 1967. The researchers therefore use what may be loosely termed a "policy wind tunnel" to explore the feasibility of the four political proposals for the city's future status.

Their findings suggest that segregation, as envisaged in the "Return to 1967" scenario, is expected to have the greatest violence-reducing effect. The proposal of the Palestinians for more autonomy would also reduce violence, as would the "Clinton Parameters" proposal. The peace-making

impact of the latter, however, would be weaker than that of the Palestinian proposal, especially in the Eastern districts, where the most Palestinians live.

As with any modelling exercise, caveats are in order. Segregation entails costs, including but not limited to the relocation of residents to other parts of the city. This could itself trigger new tensions between the demographic groups. The team does not address the issue whether such a fundamental reconfiguration of the urban space would be desirable or feasible.

Furthermore, the scientists stress that reducing violence in the individual scenarios depends critically on the state of intergroup relations characterized by social distance and how these relations may change as a result of the political developments coming along with the adoption of a particular policy for the city's future status. In particular, the study indicates that even a slight deterioration in the relationship between Israelis and Palestinians could jeopardise any positive impact associated with a separation of Jewish and Palestinian residential areas along the borders of 1967.

Further simulation results suggest that an improvement in the relationship between the demographic groups, namely a reduction in the social distance, could, under current conditions, significantly reduce the violence. "Our findings underscore the notion that there are various possibilities for peace in Jerusalem, highly contingent on the nature of group relations," says Bhavnani. For him, this is where the strength of the approach pursued in the study lies: it allows one to compare the potential of various alternatives in a manner that is amenable to calibration and validation and thus has real-world plausibility and relevance.

Grand challenge of the social sciences

ETH-Zurich professor Dirk Helbing is also delighted of the model: "It's one of the first to demonstrate the potential of empirically grounded agent-based modelling in the social sciences for an age-old problem and a complex area, taking cultural factors into account," he says. It was calibrated and validated with empirical data. "This makes the model quite realistic."

They do not want to make politics with the simulations, the researchers stress. Until now, however, there have been no public, scientific what-if scenarios for Jerusalem or any other troubled areas. It is extremely positive that the simulation reveals possibilities to reduce the violence and thus save human lives, says Helbing. "Models like this could one day help to take difficult political decisions on a better information basis."

On an abstract level, conflicts have causes that are similar to financial market crises, revolutions and mass panic, stresses Helbing – namely, systemic instability. As a result, cascade effects can occur. Responding to violence with [violence](), which eventually leads to escalation, is a good example of how local disturbances can soon spill over and lead to large-scale damage throughout the system. "For the social sciences, overcoming conflicts is one of the biggest challenges and perhaps even comparable to some long-term problems in physics and mathematics," concludes the ETH-Zurich professor.

Provided by ETH Zurich

Citation: Political options tested in a virtual wind tunnel (2013, July 11) retrieved 12 July 2024 from https://phys.org/news/2013-07-political-options-virtual-tunnel.html