Ian Lustick (2011)

Secession of the Center: A Virtual Probe of the Prospects for Punjabi Secessionism in Pakistan and the Secession of Punjabistan

Journal of Artificial Societies and Social Simulation 14 (1) 7

Abstract

In world politics the most important events are often rare events. Secession is a rare and important event. Secession of the center; when the dominant region of a country abandons its peripheries, is even rarer. But as the transformation of the Soviet Union into Russia and a collection of independent states demonstrates, it is an important kind of development. In this paper we illustrate the ambitious use of an agent-based virtualization model of Pakistan. By producing a large number of futures of the country, modeled according to best available data and theory, secession of the center—the emergence of Punjabistan—is shown to be rare although possible. Analysis of the trajectories leading toward that outcome suggests how it could come about; or be prevented.

Keywords: Secession, Virtualization, Pakistan, Simulation, Punjab, Rare Events

Introduction

1. Most studies of secession consider problematic peripheries from the point of view of the center. Usually one region, such as England in Great Britain or Russia in the former Soviet Union, is identified as or with the core of the national unit and as in control of the central state. The political story of the country is then told as an account of how relations with peripheries have been managed or how the boundaries marking those peripheries (regional, social, cultural, or economic) were erased. This approach follows a tradition in political science of understanding large states as built up from small but powerful cores as a result of political and military campaigns of aggrandizement, consolidation, and self-protection against external expansion prone neighbors. Economic theories of the state are similar, usually beginning with a nation that is figured as the capital city. State size is explained as a function of both economies of scale gained by expansion and the costs associated with the projection of power to distant peripheries. These processes are often seen as contributing to a process of state formation by the center. Eventually, one type of state contraction—"secession of the center." The standard story of state contraction is a response to a struggle originating from the periphery. By contrast, secession of the center is initiated by elites in the core of the state as a result of conditions, calculations, or circumstances not driven primarily by demands from its peripheries for independence. The standard story of state contraction is a response to a struggle originating from the periphery. By contrast, secession of the center is initiated by elites in the core of the state as a result of conditions, calculations, or circumstances not driven primarily by demands from its peripheries for independence.

1.1 The problem of "secession" is then typically posed as a centrifugal force that threatens the center with the loss of resources. Whether the calculus is strategic, economic, or political, the often unstated argument is that bigger is better, whether because of access to more resources or because of the beneficial terms of trade the center can establish and maintain with the peripheries. Accordingly, states are expected to treat secessionism as anathema. Generally speaking, that is the case. Indeed, the United Nations, as an organization of states, opposes virtually all secessionist movements within the borders of its members. The same is true of other inter-state organizations.

1.2 However, states sometimes do decide to shrink. Imperial states may take decades or even centuries to decide that colonies are more trouble than they are worth, but cost-benefit calculations almost always reveal the colony to be a net drag on center resources. But such calculations themselves do not predict the timing of decolonization. Indeed such calculations are usually irrelevant due to the political, cultural, psychological, or ideological importance often attached to the empire's rule of restive peripheries. It is institutional lag, not efficient exploitation, which tends to delay rational steps toward "right-sizing" states by making it difficult for imperial state elites to treat their cost-benefit calculations as decisive.

1.3 Yet there are cases in which the political core of a state does choose to dispose of peripheral regions and peoples. Often these cases are of spectacular interest—Rome under Hadrian withdrawing from Mesopotamia and Scotland, Britain under Lloyd George relinquishing the south of Ireland, France under de Gaulle extracting itself from Algeria—since the drama of "contracting" a state to preserve its character is a political achievement of the first order. State contraction may be defined as the purposeful abandonment of a central state's rule over a portion of its populated territory that does not arise as a result of the external application of force majeure. Instead of considering the general category, this paper focuses on one type of state contraction—"secession of the center." The standard story of state contraction is a response to a struggle originating from the periphery. By contrast, secession of the center is initiated by elites in the core of the state as a result of conditions, calculations, or circumstances not driven primarily by demands from its peripheries for independence.

1.4 The notion of secession of the center figures in accounts of the emergence of Singapore as an independent state from the Malaysian Federation in 1965 that emphasizes the extent to which the initiative for that separation came from Malaysia itself, impelled by its fear of the weight of Singaporean Chinese in its ethnic demography. For some students of the breakup of the Soviet Union, the change from Gorbachev's clumsy efforts to reform the state while keeping it intact was replaced by a Yeltsin strategy based, really, not explicitly, on Russian abandonment of the other Republics—a secession of the center camouflaged via the "Community of Independent States" as Moscow's loss of control over a process of radical decentralization of power. The break-up of Czechoslovakia is analyzed quite persuasively as triggered by a package of reforms imposed by a Czech Finance Minister, later Prime Minister, Václav Klaus that greatly reduced subsidies for the poorer Slovak region. Despite Slovak protests, the Czechs refused to compromise on these moves, which benefited the Czech core of the country. This led directly to the separation of the Czech Republic from Slovakia. In the 1948 Arab-Israeli War Transjordan conquered what is now known as the West Bank. In 1950 it officially annexed that region, making the West Bank a part of the Hashemite Kingdom of Jordan. But in 1988, after the outbreak of the Palestinian intifada against Israeli occupation, Jordan officially severed its ties with the West Bank, extruding it from the domain over which the regime in Amman claimed to exercise sovereign authority. Much to the chagrin of many Palestinians there, the Hashemite Kingdom thus performed an act of center secession.

1.5 The political story of the country is then told as an account of how relations with peripheries have been managed or how the boundaries marking those peripheries (regional, social, cultural, or economic) were erased. This approach follows a tradition in political science of understanding large states as built up from small but powerful cores as a result of political and military campaigns of aggrandizement, consolidation, and self-protection against external expansion prone neighbors. Economic theories of the state are similar, usually beginning with a nation that is figured as the capital city. State size is explained as a function of both economies of scale gained by expansion and the costs associated with the projection of power to distant peripheries. These processes are often seen as contributing to a process of state formation by the center. Eventually, one type of state contraction—"secession of the center." The standard story of state contraction is a response to a struggle originating from the periphery. By contrast, secession of the center is initiated by elites in the core of the state as a result of conditions, calculations, or circumstances not driven primarily by demands from its peripheries for independence.

1.6 Aside from examples of actual secession of the center or movements dedicated to achieving that end, ideological and political projects envisioning such a process may also be noted. In South Africa, the architects of apartheid entertained the goal of uniting the English and the Afrikaners as whites, relegating Africans to unattractive areas of the country—the Bantustans, and then moving toward a secession of the white dominated "center" from the non-white regions. An ideology of secession of the center was also the cornerstone of Enoch Powell's view that "England" was being ruined by the Empire it had built and the Commonwealth that succeeded it. In his famous "rivers of blood" speech in 1968 and in other writings and lectures he called for the re-emigration of immigrants, a radical transformation in England's relations with Commonwealth states, and a reassertion of English and England as the cultural and geographic focus of political identification and political rule from London.

Center Secession in Pakistan: Research Strategies for Rare or Unlikely Events

2. The focus of this paper is on prospects for and circumstances conducive toward secession of the center in Pakistan. It is important to emphasize that discussion of this possibility, and attempting to assess its relatively plausibility or probability, does not entail the claim or belief that this future for Pakistan will occur or is even likely to occur. Indeed the analytic challenge in assessing the relative possibility that a rare event could occur is precisely that it is not only unlikely in the specific case under consideration, but has been only rarely observed elsewhere.

2.1 On the other hand, it happens that the subcontinent as a whole is no stranger to center secession. In Ayesha Jalal's treatment of the separation, India from the peripheries of the subcontinent in 1947 a fundamental contributing factor, and perhaps a necessary element, was the decision by Hindu elites to abandon densely populated Muslim areas in west Punjab and East Bengal rather than pay the political price (cultural and political decentralization of some sort) that would have allowed the subcontinent to remain united. Indeed the division of Pakistan itself in 1965 can also be understood as an instance of secession of the center. Although usually described as a secessionist conflict fought by Bengalis, supported and backed by India, and featuring a brutal war in Bengal waged against secession by the Pakistani military, the separation of the East and its emergence as Bangladesh can just as accurately be seen as the secession of the wealthier Punjabi dominated center of the country, in the West, following the emergence of a Bengali political bloc powerful enough in organizational and demographic terms to win control of the government in Karachi/Islamabad.

2.2 The question posed in this paper is a continuation of this South Asian "tradition." In 2004 one of the leading students of contemporary Pakistan politics, Stephen Philip Cohen, posed...
the question explicitly. He concluded his book, *The Idea of Pakistan*, by considering various possible futures for the country, including its break-up due to ethnic rivalries and conflicts. Within this category he asked: "Could Pakistan evolve into a Punjabistan—a nuclear-armed, smaller, more efficient and generally secure state?" He answers this question summarily, with no extended analysis, and without a great deal of certainty.

This seems doubtful, but Punjab, like Russia, is the educationally and economically most advanced part of the country, and Punjabis regard themselves as culturally and civilizationally distinct, if not superior, to Sindhis, Baluch, and the tribes of the Northwest Frontier Province (NWFP).[10]

2.4 Cohen ended his book with a variety of scenarios for the future of Pakistan. The emergence of "Punjabistan" is one of them. He described it as "doubtful." But in fact he described each of the scenarios he offered as unlikely. That is because, individually, they are all unlikely. Yet Pakistan has had, since 2004, and will have, some kind of future, and it might be Punjabistan. It is just that Cohen can only trace some trajectories that may be slightly less "doubtful" than others, and these, in his judgment, include the "Punjabistan" future.

2.5 To say more than Cohen did about such an interesting but unlikely future as secession of the center in Pakistan, we need a modeling strategy for studying possible, important, but unlikely or rare events. We would particularly like to know the conditions that might arise that would increase the likelihood of that type of future and if certain configurations of political circumstances could be identified that, if not necessary or sufficient to produce a Punjabistan, would make that outcome more likely than not. In other words we aim to understand more about the mechanisms that might successfully push Punjabis toward the risky, unconventional, but perhaps ultimately satisfying step of abandoning the peripheries of Pakistan to embrace a firm domination of its core territory, population, and resources.

2.6 Of course if we had a general theory of secession from the center, based on strong patterns of documented relationships between potent explanatory variables and either the occurrence or non-occurrence of center secession, we could simply measure those variables in the Pakistan case, or prepare ourselves to measure them as Pakistan moves forward in time, in order to assess the changing probability of this kind of outcome. The problem with events as rare as center secession, however, is that building up an N of cases sufficiently large to afford opportunities to achieve statistical significance for our findings would require stretching the concept, fuzzing its meaning, and including cases from great swathes of time and space that would introduce insuperable problems of comparability, data availability, and data reliability. The tiny number of accessible outcomes also reduces to virtually nil the possibility that we might arrange a "natural experiment" in which one or two other cases could be intensively compared—cases similar enough to Pakistan to control for the variables not thought to be interesting, but different enough to allow both independent and dependent variables to vary instructively.

2.7 To surmount this problem, we employed a computer assisted agent-based modeling platform to prepare a virtual space within which clear and widely accepted principles of political competition among boundedly rational groups and individuals can be implemented via simple algorithms. We then fed into this model reasonable initial conditions (i.e. the best data available for distributions of influence and affiliation among Pakistanis) to create a "Virtual Pakistan"—VirPak.[11] Events impacting the trajectory of Pakistan but originating from forces below the analytic horizon were included by exposing simulation runs to streams of randomly generated perturbations. For each simulation run VirPak the stream of small exogenous shocks acted as a sequence of changing signals regarding the general attractiveness or disutility of publicly affiliating in a particular way. These perturbations did not determine agent behavior. They are factored in to agent calculations in simple ways consistent with standard social psychology, bounded rationality, and constructivist theories. This procedure was followed in an experiment conducted in 2002 with a VirPak model built with data available at that time. Simulations were run forward for 600 "time-steps," representing in this mode approximately 3 years. Thus, analysis of the distribution of trajectories of VirPak is a model of the state space within which, according to the model, the trajectory of actual Pakistan would travel between January 2002 and January 2006.

2.8 This work was conducted to investigate contending views about the likelihood of political collapse in Pakistan, the potential for ethnic fragmentation, and the implications of substantial increases in the influence of Muslim fundamentalism in that country. In the context of the hundreds of futures generated within this experiment, the emergence of "Punjabistan," while still rare, occurs in circumstances that are systematically comparable to the circumstances present in trajectories of futures when it does not occur. In particular we use one run of the experiment, involving the production of 100 possible futures (possible based on the expertise and information about Pakistan built into the model) to produce reasonable hypotheses about center secession in Pakistan and, by extension, about the broader category.[12]

2.9 By analyzing this array of 100 trajectories, or futures, we sought to:

1. determine if (given the assumptions built into the model) secessionist tendencies by Punjabis can exist;
2. measure their relative strength and prevalence in comparison to other kinds of major political outcomes;
3. gauge the relative frequency of center secessions;
4. identify the key mechanisms capable of and most likely to produce center secession by the Punjab.

2.10 Before presenting data from the experiments and the analysis of results, the "anatomy" of the VirPak model will be briefly summarized. Following that account, statistics will be provided describing the batch of 100 futures generated with the model under "baseline" conditions. That will set the stage for analysis of Punjab secessionism and of those relatively few futures in which a "Punjabistan" does emerge.

The Anatomy of Virtual Pakistan

3.1 It is reasonable to assume that data available about the intricacies of Pakistani politics are no more reliable and perhaps less so, than comparable data about many other countries. Nevertheless, specialist knowledge about the polity is available, and is not inconsiderable. In that context, VirPak can be understood as a vehicle for incorporating considerably more information into a theoretically disciplined model of the dynamics of Pakistani politics than any expert who might be consulted on Pakistan's future could reliably include in his/her informal analysis. The amount of data incorporated in VirPak is also an order of magnitude greater than the amount that could be included even in the most complex of closed form models. The fundamental commitment in agent-based modeling is to begin by implementing simple things that we believe about how politics works rather than implementing algorithms or rules for a model which we know cannot be true, but which offer the simplicity required for algebraic solution. The relative complexity of a "virtualization" model such as VirPak, compared to abstract or ensemble models more often employed by agent-based modelers, arises because instead of modeling only what we imagine as the contingent aspects of an otherwise purely abstract entity, or a particular type of problem abstracted from a large set of cases, we have sought to model (and therefore simplify, of course) a specific entity, all of whose politically relevant attributes can in principle be at least partially knowable.[13]
Virtual Pakistan begins at time 0. Figure 1 shows the pattern of identity activation by agents in VirPak at \( t=0 \). Once a simulation begins, the landscape quickly changes its appearance as agents rotate alternative identities into "activated" status—the "identity" or affiliation publicly advocated, put previously activated identities into their repertoires, or substitute existing identities in their repertoires with newly available and more attractive identities.\(^{[14]}\) See Figure 2 for one example of Virtual Pakistan, baseline condition, after an eight time step period in which we increase the volatility of the stream of small exogenous perturbations to which the array is subjected throughout the simulation. We use the term "biases" to refer to the values exogenously assigned to identities, incorporated by agents as part of their calculation of "identity weights," as they make their local updating decisions. Although all identities begin with a bias of "0," in the initial eight-step period of each future we "scramble" the biases by shuffling assignments randomly and rapidly. This "scramble" produces VirPak futures that each begin "in media res," connected to the same initial template, but not moving forward from an artificially calm, "history-less" beginning of time.

Figure 2. Example of Virtual Pakistan, baseline condition, after 8 time-steps. Note: Biases are "scrambled" to offer a distinctive beginning point for future to be produced. The dominance of crimson/orange color signifies Punjabi activation.

3.2 Some agents (reflecting cultural or ideological rigidities) have as few as two identities in their repertoire. Others, reflecting educational sophistication, opportunism, or cultural complexity and flexibility, have as many as 9. Figure 3 presents a color coded list of identities present in the spectrum of identities theoretically available to any agent in VirPak along with information regarding the number of agents currently displaying as "activated" on each particular identity and the number of agents holding that identity in their repertoires. The fact that each agent has multiple alternative identities in its repertoire but only one activated identity explains why the numbers in the "subscribed" column (the number of agents containing a particular identity in their repertoires) are so much larger than those in the activated column (the number of agents currently activated on that identity).

3.3 There are thirty different identities available to agents in VirPak.\(^{[15]}\) Most agents can deploy alternative identities within their repertoires and most agents can absorb new identities into their repertoires, but must discard an identity not currently deployed to do so. A black border surrounds the country and divides it from Iran in the west, India in the east, and Afghanistan in the north. The Indian Ocean is to the south, "populated" by agents mostly carrying a globalizing identity. There is substantial cross-border traffic in the northwest, with Afghanistan, but in general VirPak is focused not on its specific relationships with Iran, India, and Afghanistan, but with implications of its internal balance of forces. Virtual Pakistan is designed with the intention that 200 time steps correspond roughly to one year in real time. Experiments reported here are run to 608, or approximately three years.\(^{[16]}\)
3.1 Punjab where such agents are likely to be located. Criminal, might be considered potentially corrupt, ready to serve the interests of the landowning rural elite, and an obstacle to dependable government control over the rural areas of Punjab where such agents are likely to be located. Indeed there are eleven such agents (most having several other identities as well) in the rural (mostly southern) Punjab.

Table 3. VirPak Identities

<table>
<thead>
<tr>
<th>ID</th>
<th>Identity</th>
<th>Activated</th>
<th>Color</th>
<th>Subscribed</th>
<th>Tension</th>
<th>Bias</th>
<th>Opposition Count</th>
<th>Si</th>
<th>Oi</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Punjabi</td>
<td>608</td>
<td>Red</td>
<td>1396</td>
<td>2846</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Sunni Muslim</td>
<td>155</td>
<td>Blue</td>
<td>2250</td>
<td>1024</td>
<td>0</td>
<td>79</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Westernized Liberal</td>
<td>7</td>
<td>Green</td>
<td>52</td>
<td>54</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Sindhi</td>
<td>180</td>
<td>Yellow</td>
<td>374</td>
<td>941</td>
<td>0</td>
<td>18034</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Shia Muslim</td>
<td>58</td>
<td>Purple</td>
<td>385</td>
<td>421</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Qaum/Clan 1 (Pushtun)</td>
<td>12</td>
<td>Pink</td>
<td>161</td>
<td>72</td>
<td>0</td>
<td>54</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Seraiki</td>
<td>129</td>
<td>Orange</td>
<td>324</td>
<td>558</td>
<td>0</td>
<td>68</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Baluch</td>
<td>68</td>
<td>Brown</td>
<td>167</td>
<td>273</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>USA/Globalizing</td>
<td>0</td>
<td>Gray</td>
<td>268</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Qaum 2 (Pushtun)</td>
<td>9</td>
<td>Blue</td>
<td>105</td>
<td>60</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Qaum 3 (Pushtun)</td>
<td>5</td>
<td>Green</td>
<td>100</td>
<td>36</td>
<td>0</td>
<td>203</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Pushtun</td>
<td>203</td>
<td>Yellow</td>
<td>425</td>
<td>835</td>
<td>0</td>
<td>84</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Muslim Fundamentalist</td>
<td>104</td>
<td>Red</td>
<td>403</td>
<td>616</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Qaum North 1 (Punjabi)</td>
<td>25</td>
<td>Blue</td>
<td>251</td>
<td>188</td>
<td>0</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>Urban worker</td>
<td>32</td>
<td>Green</td>
<td>448</td>
<td>232</td>
<td>0</td>
<td>229</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Muhajir</td>
<td>229</td>
<td>Yellow</td>
<td>297</td>
<td>1262</td>
<td>0</td>
<td>84</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Military</td>
<td>269</td>
<td>Pink</td>
<td>505</td>
<td>1014</td>
<td>0</td>
<td>37</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>Kashmir</td>
<td>38</td>
<td>Brown</td>
<td>110</td>
<td>186</td>
<td>0</td>
<td>238</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>Peasant</td>
<td>534</td>
<td>Gray</td>
<td>1269</td>
<td>2923</td>
<td>0</td>
<td>30</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>Landowner</td>
<td>75</td>
<td>Orange</td>
<td>282</td>
<td>558</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>Qaum North 2 (Punjabi)</td>
<td>1</td>
<td>Blue</td>
<td>315</td>
<td>8</td>
<td>0</td>
<td>81</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21</td>
<td>Pakistan Government</td>
<td>133</td>
<td>Green</td>
<td>277</td>
<td>902</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>22</td>
<td>Criminal/Smuggler</td>
<td>13</td>
<td>Pink</td>
<td>474</td>
<td>92</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>Commercial Elite</td>
<td>23</td>
<td>Yellow</td>
<td>200</td>
<td>166</td>
<td>0</td>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>Afghan/Refugee</td>
<td>23</td>
<td>Red</td>
<td>52</td>
<td>171</td>
<td>0</td>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>Middle Class Urban</td>
<td>21</td>
<td>Brown</td>
<td>126</td>
<td>156</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>26</td>
<td>Qaum South 1 (Punjabi)</td>
<td>9</td>
<td>Blue</td>
<td>222</td>
<td>66</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>Qaum South 2 (Punjabi)</td>
<td>4</td>
<td>Green</td>
<td>189</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>Indian/Hindu</td>
<td>0</td>
<td>Gray</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>29</td>
<td>Nuclear Affected</td>
<td>0</td>
<td>Orange</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 3. VirPak Identities

Note: A color coded list of identities present in the spectrum of identities available VirPak, information regarding the numbers of agents currently displaying as "activated" on each identity and holding that identity in their repertoires.

3.5 It will be noted that the identities listed here do not comprise a complete list of ethnic, linguistic, religious, or political categories in Pakistan. Nor do they all play important roles in the landscape. The Indian/Hindu identity (28) exists only as a marker of "India" to the east of Pakistan. The black border between India and Pakistan, and Pakistan and Shia (4) Iran, prevent cross-border contact, simplifying our analysis of the internal dynamics of Pakistan but leaving open possibilities for future work in which these borders might be made penetrable by different cultural or political influences. In addition, it was decided not to try to include attachments to political parties as identity markers since except for relatively small cadres of professional politicians, their importance lay in the extent to which they reflect clusters of interests and identities (landowners, government bureaucrats, peasants, Pashuns, Muhajirs, commercial elites, workers, etc.) which are present in the complexities of agents.[17]

3.6 Individuals and the groups they comprise are represented by 3208 agents located within the borders of Virtual Pakistan. VirPak's overall configuration, the geographical patterns of concentration and proximity of various identity markers within it, along with the distribution of identity resources and political power with which agents in it have been endowed, are designed to capture key realities of contemporary Pakistan. Thus the shape of Virtual Pakistan corresponds (roughly) to the geographical shape of real Pakistan, though some distortion is inevitable in this regard because of the drastic differences in population density in different regions of the country. The most powerful drivers of virtual Pakistan are pressures by Pakistanis and Pakistani sub-communities to respond to opportunities and constraints imposed upon them.

3.7 By maintaining or changing their activated identities, or by substituting a new identity for an identity previously in their repertoires, agents respond to streams of small changes in the advantages or disadvantages of presenting themselves in public according to various ethnic, economic, religious, political, or kinship categories. As noted, different "runs" of the model, which is to say different "futures" of VirPak, are generated by randomizing the initial distribution of "biased" (the relative advantages and disadvantages of "activating" different identities currently available to each person or community) as well as by randomizing the stream of changes in bias assignments that follows the initial "scramble."[18]

3.8 Virtual Pakistan is divided, as is Pakistan itself, into four major provinces—the Northwest Frontier Province (NWFP), Baluchistan, the Sindh, and Punjab (with a "Seraiki" dominated area in the frontier region of southern Punjab bordering Sindh). To these regions may be added Pakistani ruled Kashmir and the Federally Administered Tribal Areas located in the area broadly associated with the NWFP. In each area distinctive ethnocultural, political, and rural-urban habitation patterns prevail and were implemented in the construction of VirPak. Largely uninhabited regions, or very sparsely inhabited regions, were implemented by using "uninhabited cells" (marked as gray). In addition to capturing broad relationships among religious, ethnolinguistic, regional, economic, and clan loyalties, three crucial kinds of decisions were required "virtualize" Pakistan.

1. Decisions about modeling Pakistan "Society": how to distribute identities among agents between regions and within the different regions so that characteristic clusters of latent identities are located in proportions that reasonably correspond to the best data available;
2. Decisions about modeling the "current state of play": how to achieve a reasonably accurate pattern of activated identities at t=0 (set to late 2002, when the study was conducted);
3. Decisions about modeling the Pakistan "State": how to create networks of different types of agents (agent classes) so as to correspond with various patterns of power relations within rural and urban areas and with respect to the organizational capacity of key groups, including, in the case of Pakistan, the national government, the military, the Muslim fundamentalist movement, criminal networks, rural landowners with feudal ties to peasant communities, and provincial bureaucracies.

Society: Distribution of Identities in Virtual Pakistan

3.9 The distribution of subscribed identities to different agents is crucial. An agent can activate much more readily on an identity already present in its repertoire than if it needs to absorb that identity into its repertoire first and discard an already present identity. By distributing identities carefully, a significant amount of the nuance associated with complex political realities and multiple loyalties can be captured.

3.10 For example, an agent's repertoire might be comprised in part or in full by identities: 1,15,19, 21—indicating Sunni, Muhajir, Landowner, and Pakistan Government. This kind of agent would be a Muhajir, relatively loyal to the government but likely to be located in a rural area, probably in Sindh. Indeed there are two such agents with these identities in their repertoires. Both are low level government bureaucrats, meaning each is activated on identity 21 at t=0 and has an influence level of 2 (see below). One is located in rural Sindh. The other, in western Punjab, has a military identity in its repertoire as well. On the other hand, an agent whose repertoire had 0,1,19, 22, indicating Punjabi, Sunni, Landowner, and Criminal, might be considered potentially corrupt, ready to serve the interests of the landowning rural elite, and an obstacle to dependable government control over the rural areas of Punjab where such agents are likely to be located. Indeed there are eleven such agents (most having several other identities as well) in the rural (mostly southern) Punjab.
3.12 An important element in designing and implementing ViPak was to determine which identities tend to cluster with one another and then realize those patterns within a geographical and temporal statistical framework that corresponds to available data about real Pakistan. A fairly good sense of the overall landscape of ViPak can be gained from the table presented as Figure 4. This table, describing the baseline condition of ViPak at t=0, cross-tabulates all identities to indicate how often particular identities in ViPak are present within the same agent repertoire. For example, identity 0 (Punjabi) is present in 1417 ViPak agents. More of these agents contain the repertoire the Sunni Muslim identity (1), than any other identity. 1122. The other identities present in large numbers of these Punjab agents are, in order of their most frequent appearance, 18,20,16,13, and 14 (peasant, north Punjab clan affiliation, military, north Punjab clan affiliation, worker, south Punjab clan affiliation, Shia). The most salient identities in ViPak, those with the agents activated on them at t=0, with the largest agent subscriptions, and those most relevant to the trajectories into the future produced from the template are: Punjabi (0), Sunni Muslim (1), Sindhi (3), Pashtun (11), Muslim fundamentalist (12), Worker (14), Muhajir (15), Military (16), Peasant (18), Landowner (19), Pakistani Government (21), and Criminal/Smuggler (22).

![Figure 4](http://jasss.soc.surrey.ac.uk/14/1/7.html)

3.13 In ViPak at t=0 44% of agents have a Punjabi identity, meaning that they have identity (0) in their repertoire. Seventy-nine per cent are Sunni, 15% are Shia. These proportions correspond quite closely to what we know about Pakistan's ethnic and religious make-up. Few if any Punjabis have Muhajir, Baluch, Sindhi, or Pashtun identities in their repertoire though some have Seraiki or Kashmiri. Forty-eight per cent of Punjabis are peasants, living in the rural areas of the Punjab, excluding the Seraiki area. Fourteen per cent are workers, located mainly in the urban areas. Twenty-one per cent are oriented positively toward the military and are readily available for recruitment. Punjabis predominate in the urban areas of the Punjab, meaning the wide corridor stretching southeast from Rawalpindi and Islamabad toward Lahore and then south-south west toward Bahawalpur and Multan. But Punjabis are not concentrated in the Punjab cities, as many are in the countryside. Of Punjab's Punjabis include the urban middle class identity (25) in their repertoires. Sunnis in the rural Punjab are almost all affiliated with kinship networks of importance, linking them to regionally concentrated populations of other Punjabis. Although the overwhelming majority of Punjabis live in the Punjab, significant numbers are also present in Sindh and in Baluchistan.

3.14 Seventeen percent of agents in ViPak are Sindhis—agents with Sindhi [3] in their repertoire. Almost all located in Sindh, where they predominate in the rural areas but are outnumbered in Karachi and Hyderabad. Few if any share Punjabi, Pashtun, Kashmiri, or Muhajir identities. Pockets of Shia are present in the northwest of Sindh, but the overwhelming majority are Sunni. Sixty-four per cent of Sindhi agents, reflecting the "sons of the soil" dimension of Sindhi identity. Ten percent are Muslim fundamentalists. In the borderland with the Seraiki area many share a Seraiki identity. Criminal identities are common. Only 7% have military orientations or sympathizers and even fewer begin with attachments or connections to the Pakistani government.

3.15 In ViPak, those agents with Punjabi (11) in their repertoire, represent 13% of agents in ViPak. The vast majority are located in NWFP, but they can be found as well in the Punjab and in Sindh, especially in Karachi. Few if any share Sindhi, Baluch, Muhajir, Kashmiri, or Pashtun identities. More than 80% have either or both of the Sunni Muslim and Muslim fundamentalist identities. Nine percent are Shia. The great majority of non-Shia Punjab agents are all affiliated with specifically Punjabi kinship networks (5, 9, 10). An unusually high proportion of Punjabis (41%) have ties to or from religions other than the military. Thirty-eight percent are peasants, Muslim fundamentalist tendencies are also strong, present within 40% of non-Shia Punjab agents. Thirty-two percent of Pashtuns share the criminal/smuggler identity (22). Very few are associated with the urban middle class.

3.16 Muslim fundamentalists are those agents containing (12) in their repertoires. In the baseline condition of ViPak 13% of agents have this identity in their repertoires. Agents containing this identity are spread throughout geographical ViPak, but relatively less prominently in the urbanized corridors of the northernwestern Punjab. Centers of Muslim fundamentalist identity affiliation are in the NWFP, eastern and central Sindh, Kashmir, and the rural Punjab, particularly around the city of Multan. Reflecting the largest identity groups in ViPak, Muslim fundamentalists are relatively well represented in the military, reflecting the Sunni identity (16) in ViPak. Eighty percent of agents in ViPak have both "Shia" and "fundamentalist" identities. The movement is weak, of course, among westernized liberals (2) and is also only rarely present in agent repertoires containing the military identity.

3.17 Workers are non-elite Pakistanis living in urban rather than rural areas. They comprise 14% of all agents in ViPak. Ethnically they are disproportionately Punjabi and Muhajir, with a fair representation of Baluch and Sindhi, but relatively few Punjabis. Seventeen percent identify with or are part of the Pakistani government, though a relatively small percentage has positive orientations toward the military. Naturally there are few agents with the worker identity who also have the commercial elite (23), the urban middle class (25), or westernized liberal (2) identities. They have a moderate representation in the ranks of the fundamentalists.

3.18 Muhajirs they are closely associated with the Pakistani government, with 55% of Muhajirs in ViPak sharing a Pakistani government identity (21). They are located almost entirely within the urbanized areas of Sindh and the Punjab. No Muhajirs are peasants, but, as mentioned, many are workers. They are also strongly represented within the middle class and...
The identity (16) is subscribed to by 18% of the agents in VirPak. It is mostly Sunni Muslim with a moderate representation of Shi’a. The Punjab and Pashtun ethnic groups predominate, with 53% of military-oriented or involved agents including the Punjab identity and 31% including the Pashtun identity. Few Baluch or Muslim fundamentalists share the military identity. But it does overlap strongly with the Pakistani government identity. Twenty-five percent of agents subscribed to the military identity are also subscribed to the Pakistani identity (21). As we shall see, many of these are in the government bureaucracy or in the military itself at t=0 in baseline VirPak. The military contains disproportionately few peasants and workers. Geographically, agents with the military identity are concentrated heavily in the NWFP, the northern Punjab, and in nine areas around the country, including Karachi, Quetta, and the regions bordering India, where various formations of the Pakistani military are known to have their headquarters.

The peasant identity (18) is present in the overwhelming majority of Sindh and Punjab agents not living in urban areas, not of an administrative authority structure (a bureaucracy —see below). These agents comprise 41% of VirPak. Eighty-three percent are Sunni, affiliated with various clans if they are Pashtun or Punjab. Almost all the rest are Shi’a. Agents with the peasant identity may have an attachment to their local landlord, and hence have the landlord identity (19) but few or none have identities suggesting education or worldliness, such as westernized liberal, urban middle class, commercial elite, or worker. The peasant identity is prominent among the Seraki (6) in a southern extension of the Punjab, the Baluch and among the Pashtuns. Only 2% of peasants also have a military identity. Importantly, the size of peasant identity repertoires is smaller than other VirPak agents. Many have four identities: peasant, a religious identity, an ethnic identity, and perhaps a clan identity. Other agent repertoires are comprised of three or even just two identities. This reflects the narrower field of political vision associated with peasant life.

The landlord identity (19) is established within a relatively small number of VirPak agents—9%. But 25% of these, located in the rural areas, are activated on that identity at t=0 and endowed with an influence level of 4. This means they have inordinate influence over their (mostly peasant) surroundings. Agents in their proximity are mostly activated on Peasant or Sunni Muslim, or on the regionally specific ethnic identity (Punjabi, Sindhi, Seraki, or Pashtun. The criminal/smuggler identity is present in the repertoires of 39% of agents with the landlord identity at t=0. Although none of the Agents activated on the Landlord identity at t=0 and exercising the influence of landlords have the globalization identity (8), reflecting contacts with extra-Pakistan networks and values, a substantial proportion of those agents who are not landlords, but have attachments to landlords via inclusion of that identity in their repertoire, do have the globalization identity. This is meant to simulate the connections that tie together criminal/smuggler elements, wealthy landlords, and international networks of illicit trafficking activity. In this context it is important to note that 21% of VirPak agents with the landlord identity also have the military identity, and that 16% have the Pakistani governing identity, both reflective of the significant levels of corruption and of the informal influence of the landed oligarchy in Pakistan on governing institutions, especially in the rural areas. On the other hand, Muslim fundamentalism is not commonly present among landlord or landlord attached agents.

The Pakistan governing identity (21) is figured as a positive orientation toward Pakistan, per se—an identity associated with the founder of Pakistan, Mohammad Ali Jinnah, who famously envisioned Pakistan as a country for Muslims but not of Islam and sought to enshrine a “Pakistani” identity above various ethnic, linguistic, and sectarian attachments. Agents having this identity in their repertoire are concentrated in the urban areas of the Punjab—the corridors running between Islamabad and Lahore and between Lahore and Multan—and also in the Hyderabad and Karachi areas of Sindh Province. Agents with this identity are very scarce in Kashmir, NWFP, Baluchistan, and the Seraki area. Reflecting the rather weak institutionalization of this identity among agents, only 6% of agents in VirPak have this identity in their repertoire. Fifty-six percent of these agents exercising more than the usual influence, including a high proportion directly affiliated with the bureaucratic apparatus of the government or the military. Among the identities that are disproportionately associated with the Pakistan governing identity are, in addition to the military, Muhajir, commercial elite, and globalizing. The Muslim fundamentalist identity is present in 10% of agents with identity 21 in their repertoires.

The importance of the black economy in Pakistan is reflected in the large number of agents in VirPak with the criminal/smuggler identity (22) in their repertoire—15%. The identities most commonly associated with this identity in VirPak agents at t=0 are: Sunni Muslim and Globalizing, followed by Military, Punjab, Pashtun, Peasant, and Landlord. In keeping with the idea of a black economy and the illegality of criminal and smuggling activity, the ratio of agents activated on this identity to those harboring the identity within their repertoires is unusually small (3%—compared, for example, to an activated/subscribed ratio of 43% for the Punjab identity and 37% for Shi’a). Agents with identity 22 are present throughout VirPak, but are particularly concentrated in a wide corridor running through the NWFP, down through Baluchistan, western Punjab, and western Sindh to Karachi, thereby simulating the primary smuggling routes connecting Afghanistan to the Indian Ocean.

State: Distribution of Power in Virtual Pakistan

The power structure of the regime in Pakistan is represented by interlocking networks of “influentials” including “bureaucrats” if they are associated at t=0 with an official civilian or military authority structure. These agents are located in patterns of proximity and regularity that multiply the ability of these actions and the networks within which they participate to remain activated on the identities they share—mainly the Pakistani governing identity and the military identity, but also Punjab and, to a lesser extent, Muhajir, Pashtun, and Muslim fundamentalists. In this way, bureaucrats, military officers, or activists reinforce one another’s activation patterns and greatly increase the likelihood that agents in their neighborhoods, and bordering neighborhoods, will activate on one of these identities or maintain activation on those identities even when biases or outside influences turn against them. The networks of influential may be considered an instantiation of the Pakistani state, including organized power structures within civil society and the bureaucratic, military, legislative, and judicial apparatuses of the regime.

The number of government bureaucrats and activated military agents in VirPak corresponds roughly to the combined proportion of government officials and the uniformed military to the total adult population in Pakistan. The administrative and political center of the Pakistani regime is located in the urbanized corridors mentioned above, and including the primary Punjab cities of Lahore, Gujranwala, Rawalpindi, Islamabad, Faisalabad, Multan, and Bahawalpur. The regime’s bureaucratic center is located within these areas, where its authority is best established. Additional centers of regime power, as reflected by the presence of relatively dense webs of influential activated on either the Pakistani governing identity or the military identity, are located in Hyderabad and Karachi. The presence of longer strings or more isolated influential in the rural areas of Punjab and elsewhere corresponds to the relative weakness of Pakistani national institutions in the rural areas, and especially in outlying districts of the NWFP, Kashmir, Baluchistan, and in rural Sindh. The weakness of these bureaucratic networks allow locally powerful identities (Sunni Muslim, landlord, criminal/smuggler, or regional/ethnic) to strongly influence the behavior of these agents and make their “capture” by identities other than the Pakistani governing identity and the military identity more likely. Figure 5 shows a portion of VirPak, focused on the northeastern Punjab and containing the more densely populated areas of the country within which the national authority structure is most firmly entrenched. The display is magnified to help identify the different icons representing agent classes discussed in this section.
3.26 There are three echelons of bureaucratic authority. The most common type is "influential2," having an influence level of 2 (twice that of a basic agent) and marked by the icon of a plus sign. Mid-echelon elites, with an influence level of 3 are "influential3's" and are marked by a pink hexagon. High echelon bureaucrats and military commanders are "influential4's," marked by a circle icon. In a well-disciplined bureaucracy lower echelons receive orders from above and act only within the parameters set for them by superiors. In a disciplined bureaucracy more discretion may be exercised the higher a bureaucrat is located in the hierarchy. Modeling such a hierarchy would mean, in this case, making the repertoires of higher echelon bureaucrats larger than those in the lower echelons. Pakistani public bureaucracies, both at the national, but especially at the provincial level, are infamous for their lack of discipline, their penetration by extra-governmental forces, and for corruption. Hence the authority structure in VirPak contains a large numbers of lower echelon bureaucrats with larger repertoires, reflecting the openness of these erstwhile agents of the state to influences from their local surroundings. Mid and upper level bureaucrats may also have medium or large repertoires, but the average repertoire size of upper level bureaucrats is quite small. [24]

3.27 Although the low echelon of the bureaucracy is modeled as relatively open to external influences from dominant groups, the high-echelon influential not only relatively small repertoires, but those repertoires also reflect a coherence corresponding to the dominance of the regime by individuals and groups with worldviews and interests shaped powerfully by Punjabi and Military identities. There are 24 influential3s and influential4's activated on the Pakistan governing identity at t=0, each one has either the Punjabi identity (0) or the Military identity (1) in its repertoire. Of 55 influential3s and influential4's activated or the Military or the Pakistani governing identity at t=0, 26 of them have Punjabi, Military, and Pakistani identities in their repertoires. The government bureaucracy is also heavily influenced and intertwined with the commercial elite. Thus the commercial elite identity (23) is present in the repertoires of 64% of agents activated on the Pakistani governing identity at t=0. Forty-two percent of influential2s, 3s, and 4s in VirPak at t=0 have the commercial elite identity in their repertoires.

3.28 There are also 68 influential2's in VirPak activated at t=0 on the Sunni Muslim identity. These agents are located mostly in the rural Punjab and the Seraiki areas. They represent the diffuse but locally significant influence of traditional Muslim clerical elites. Many are local clerics located in close proximity to powerful landlords in their areas. These landlords, activated on the Landlord identity (19), located primarily in the rural areas, and having influence levels of 4, can therefore transform these Muslim clerics (each of which has the Landlord identity in its repertoire) into local instruments of their own power. A large proportion of these rural clerics (83%) have the criminal/smuggler identity in their repertoire. In the baseline condition described here only a few (6%) have the Muslim fundamentalist identity.

3.29 Entrepreneur agents, marked by the icon of a small square in an agent's center, emulate well-placed and relatively persuasive opportunists. Entrepreneur agents have rather larger repertoires, averaging twice the size of that of basic agents, corresponding to their political flexibility. They are "updated" by other agents, reflecting their more aggressive scanning of their neighborhoods and of the general political scene for opportunities to more effectively align themselves with ascendant forces. Their "triggers" for the rotation of latent identities into activation and for substituting a new identity for one not in their repertoire are also lower than these triggers for basic or influential agents. These lower triggers simulate the greater sensitivity of political entrepreneurs, or entrepreneurs of identity, to hints of political opportunity.

3.30 There are 60 such agents in VirPak, concentrated mostly in the urban areas, though in the rural areas they are commonly found in proximity to influencers associated with various groups, including ethnic leaders, religious leaders, landlords, and provincial bureaucrats. Many of those in the urban areas are in direct contact with the national civilian or military bureaucracy, acting as transmission belts for influences on the government (when the regime is relatively weak) and for influences from the government on the society (when the regime is relatively strong). Thirteen of these agents are actually within the civil bureaucracy, meaning that they are entrepreneurs activated on the Pakistan governing identity (21) and located within the web of Pakistani bureaucrats. As "entrepreneurs" they contribute to the indiscipline and corruption of the Pakistani bureaucracy, but also to what sensitivity it has to extra-governmental influences.

3.31 Fanatics are marked by a diamond icon. These agents refuse to change their activated identities no matter how unattractive that identity may be in comparison to others. Each has an influence level of 3, and therefore provides a constant source of support for any other agents in their neighborhoods with inclinations toward its activation. It also helps secure a base of support during difficult times for that identity should circumstances change to make it once again attractive to large numbers of agents. There are 15 fanatic agents inside Pakistan in VirPak. Eight of these are Muslim fundamentalists, located in areas of core strength for the Deobandists in Pakistan—NWFP, Multan, and Karachi. [21]

3.32 The opposite of a "fanatic" is an apathetic agent. Whereas fanatics are "immutable" with respect to their activated identity, but are "active" with regard to influencing those agents in their neighborhood, apathetic agents are "inactive"—they do not influence agents in their neighborhoods—but do change their activated identities in response to the same forces that affect basic agents. Apathetic agents are marked with an icon of a small square inside a diamond. There are 31 apathetic agents in the baseline VirPak condition. [22] All are located in rural areas, especially the Punjab and the Seraiki area, and are activated on the peasant identity. [23]

3.33 There are also 32 "scared" agents in VirPak, again mostly in the rural Punjab and the Seraiki area. These agents, also predominantly peasants, do influence their surroundings, but are timid in their behaviors. They are designed to monitor a wider local neighborhood than do other agents before deciding to change their activated identity, but are quick to rotate a new identity into activation once a relatively slight reason for doing so seems to be present. [24]

3.34 Another agent class in VirPak is Innovators. Innovators, marked with an icon of a black slash in the upper left hand corner have an influence level of 1, rather than 2. They update early, as do entrepreneurs, but unlike entrepreneurs have an influence level of 1, rather than 2. In VirPak, the innovator triggers for change of repertoire and activated identities are identical to those of basic agents. [25] There are 45 Innovators in VirPak, figuring mainly as rapid exploiters of situations who do not then act as leaders or strong influences on their surroundings. All contain the criminal/smuggler identity. They help to capture the role played by Afghan refugees, criminals/smugglers, and corrupt contacts with bureaucrats. They are mostly concentrated in Karachi and other parts of Sindh and in the Quetta area of Baluchistan where the writ of the government does not run dependably. Just off-shore of Pakistan, near Karachi, innovator agents operate, activated on the Globalizing identity, to simulate contacts with international networks for illicit trafficking.

3.35 The only other distinctive agent class in VirPak is "Broadcaster." Broadcasters agents are used to simulate the effects of media in Pakistan promoting particular kinds of messages.
Broadcasters have an influence level of 1. They “broadcast” their identity to listeners meeting requirements specified by the user. In VirPak agents listen to broadcasters if they have a “politically attentive” identity in their repertoires. There are four broadcaster agents in VirPak. Two are activated on Muslim fundamentalist and located in zones in the NWFP and near Multan, in which support for that identity is strong. The third broadcaster is in the center of Pakistani government control and is activated, initially, on the Pakistani governing identity. A fourth is located offshore, near Karachi, and is activated on identity (8), the globalizing identity. Whatever identities these agents are activated on receive extra support for those identities in the calculations of the agents who are listening. Although the off-shore Broadcaster can only broadcast the globalizing identity (unless that identity is replaced in the course of time as a result of regional pressures), the Broadcasters inside Pakistan have wider repertoires. If captured by identities or political affiliations other than those on which they were initially activated, then those identities or affiliations receive the boost of media support that previously went to their originally activated identities. Agents listening to these media include the message they hear as a count of an additional identity weight calculation, making it more likely that, ceteris paribus, they will activate on that identity or substitute it for an identity they already have but are not activated on.

**Center Secession in VirPak**

4.1 Having now presented the anatomy of VirPak and the logics and techniques used to build it in reference to real world data about Pakistan, we proceed to consideration of the problem as originally posed: in simulations run with this virtualized model of Pakistan, does the Punjab center secede or exhibit secessionism in the two to three year period estimated to be modeled by the trajectories we generated? To use the model for this purpose available theoretical understandings of secessionism must be translated into behaviors that may or may not be present in the model.

4.2 Secession is defined as the separation of an ethnically and geographically coherent region from the larger state of which it had been a part. Secessionism refers to efforts by supporters of such a separation to move toward that objective. We code the presence of secessionism in VirPak as the transformation of agents activated on ethno-regional identities into black “border cells.” Border cells are immutable and inactive sites and as such can constitute barriers to contact between regions depending on their number and distribution. These cells are located along the external border of Pakistan at t=0, but not within the borders of the country. Border cells arising within Pakistan_shape can only arise as a result of basic agents transforming into border cells during a dynamic run.

4.3 The algorithm determining eligibility for basic agents to transform into border cells is based on three theoretical principles that form the consensus basis for expectations of secessionism within the literature. Secessionism can arise when relations are polarized between a sizeable minority group, compactly organized within a particular region of a territorial state, and the dominant group in the state, and when members of that minority encounter direct experiences of friction or conflict with out-group members. Conforming to these principles, basic agents in VirPak with ethno-regional identities can transform into border cells if three conditions are met. These conditions pertain to both macro circumstances of which individual agents are unaware and local realities of which they are aware. When for any particular agent in any particular time step each of these conditions is met, a low but non-trivial probability is created that that agent will be transformed into a border cell.[20] The rules we have implemented to operationalize these conditions governing the production of border cells can be stated, non-technically, as follows:

1. **Polarization:** Secessionist activity can be expected to be unlikely or impossible to the extent that members of a potentially secessionist group also harbor the identity of the dominant group. Accordingly, no agent, at any particular time, can transform into a border cell if 25% or more of the agents activated on that identity at that time have the dominant identity within their repertoires.

2. **Size of a qualifying identity group:** Secession of the leading group in a society is excluded from these experiments insofar as the leading group is considered to be the identity activated at any particular time by a plurality of agents in the polity. Similarly, secessionism cannot be produced by a group unless it constitutes a substantial proportion of its region. In VirPak no agent is allowed to transform into a border cell unless its activated identity is activated by at least 10% of VirPak agents.

3. **Individual action:** Some otherwise qualifying agents are less likely than others to engage in secessionist activity, and those lacking very much contact with agents activated on identities other than their own can reasonably be expected to be less inclined to take the risks of secessionist action than liminal agents, exposed to other identities but not harboring those identities within their repertoires. Accordingly, no agent can transform into a border cell unless half or more of the agents is in direct contact with are activated on an identity other than its own activated identity.

4.4 By registering the number and location of agents that, by t=608, transformed into border cells we measured the amount of secessionism of different types, e.g. Sindhi, Pashtun, or Punjabi, in any particular future of VirPak. By considering that index in combination with measures of the uniformity of Punjab domination over substantial and contiguous portions of the Punjab, we identified outcomes classifiable as instances of center secession, i.e. of the emergence of a Punjabistan, separated from Pakistan. The measures used in this regard, that is in addition to border cells produced from Punjabi activated agents, include the number of agents activated on the Punjabi identity and the average tension experienced by these agents (a measure of the number of encounters agents experience with agents not activated on the Punjab identity). For any one of the regionally concentrated ethno-national groups, an instance of secession, as opposed to secessionism, was coded in VirPak if four conditions were met at t = 608:

1. The number of agents activated on the secessionist identity at t=608 of a particular future was equal to at least ten per cent of the agents in VirPak (approximately 320).
2. The number of border agents produced from a secessionist identity, at t=608 of a particular future, exceeded the median number of border cells produced by that identity in the futures that featured secessionism of any kind by that identity.
3. The number of influentials activated on the secessionist identity, at t=608 of a particular future, exceeded the average number of influentials activated on that identity in all 100 futures of VirPak.
4. The average tension of agents activated on the secessionist identity at t=608 was no more than 1.0 (meaning that, on average, agents activated on that identity, at t=608 in that VirPak future, had no more than one adjacent agent activated on a different identity).[27]

4.5 The rationales for these rules are as follows. Rule 1 corresponds to the minimum proportion of the population treated by PS-I as rendering agents activated on a particular identity eligible for transformation into border cells. The intuition here is that too small a minority could not sustain a secessionist movement and would be exceedingly unlikely to successfully organize itself as such. Rule 2 ensures that a significant amount of secessionist activity by the agents affiliated with the secessionist identity has indeed occurred. Rule 3 requires there to be a substantial authority structure activated on the secessionist identity within the regions of its domination. Rule 4 excludes futures in which the putatively seceding region is not quite thoroughly filled by agents activated on the secessionist identity. These benchmarks combined distinguished VirPak futures that visually presented themselves as including secession from those that did not.[28]

**Can Punjabi Secessionism Exist?**

5.1 Before considering the question of Punjabi secessionism as an example of “secession from the center” it is necessary to note that indeed Punjabis are the single most potent political force in VirPak, as they are generally acknowledged to be in actual Pakistan. Figure 6 displays data describing average prevalence of competing identities according to their activation at t=608. We see that the Punjabi identity does register the highest average, closely followed by the Pakistani identity and the traditional Sunni Muslim identity. The fact of Punjab dominance is registered even more emphatically in Figure 7, where we see that the Punjabi identity achieved a plurality of the activated agents in VirPak at t=608 in 44 futures compared to 26 futures for Sunni Islam and 24 futures for Pakistan.
Analysis of VirPak futures corroborates the assessment offered by Stephen Cohen in his book, cited above, regarding the future of Pakistan, namely that the emergence of Punjabistan from Pakistan is possible but should be considered very unlikely. Our analysis suggests that although the actual secession of Punjabistan is unlikely, the appearance of pressures in that direction, i.e., Punjabi secessionism, was generated by the model in 30% of its futures. In other words, while secession of the Punjab is appropriately thought of as a "rare event," Punjabi secessionism should not be approached in that way. Based on the assumptions, data, operationalizations, and codings employed in VirPak and described above, a majority of the 100 Baseline VirPak futures did not include any secessionism; forty-three futures did; and of those Punjabi secessionism appeared in 30, often accompanied by the appearance of secessionist activity on the part of other ethnoregional identities. Thirteen futures that did not feature even low levels of Punjabi secessionism did register secessionism by other groups—Seraiks (south of the Punjab), Sindhis (in the Sindh), and/or Pashtuns (in the NWFP). Within the 30 futures that registered Punjabi secessionism, numbers of Punjabi border cells ranged from a low of 7 to a high of 153 with an average of 31.8.

5.3 Figure 8 displays the Punjab in VirPak at t=608 as it appears in three of the one hundred simulation generated futures. The image labeled Future 67 features Punjabi secessionism (Punjabi activation is signified by crimson/orange; Punjabi Landlords and their clients are signified by the highlighted black and white cells), including the presence of some, but not many and not well organized [black] border cells. The image also lacks a sizeable densely "Punjabi" space. The image labeled Future 72 features substantial Punjabi secessionism, but without the coherence or territorial compactness coded as "secession." The image labeled Future 24 shows an instance coded as Punjabi secession—the emergence of "Punjabistan"—featuring a well defined region of activated Punjabi and Punjabi Landlord agents separated from other zones of activation by large numbers of border cells.

Figure 7. Plurality rates across 100 Baseline VirPak Futures of Selected Identities, t=608

Figure 8. Three examples of Punjabi secessionism. Highlighted cells represent Punjabis publicly affiliating with landowners.
6.4 Along the X-axis of Figure 10 are the 100 VirPak futures at t=608. The X-axis indicates the number of agents activated on each of the five identities registering a plurality of agent activation in at least one future at t=608: Punjabi—the plurality identity in 44 futures; Pakistani, 24; Sunni Muslim, 26; Muslim Fundamentalist, 6; and Military, 1. The futures are arrayed, from left to right, in order of the number of Punjabi border cells, i.e. in order of the amount of Punjabi secessionism. We see, as noted earlier, that in 70 futures there was no Punjabi secessionism. The black-shaded portion of the figure in the lower right hand corner represents the rising number of Punjabi border cells in these futures (arrowed precisely this way, in order of an increasing number of Punjabi border cells at t=608.) By noticing the changing width of the bands of different colors above this black shaded area we can see several instructive patterns in the complexion of VirPak futures featuring Punjabi secessionism.

1. The most common settings within Punjabi secessionism does not occur (those to the left of the black region in the lower right hand corner of the figure) are those futures in which Punjabis, qua Punjabis, are the senior partner in a dominant political alliance that includes either or both traditional Islam and the Pakistani government identity.
2. If Punjabis are in a weak position, secessionism tends not to occur if the country is dominated by a combination of traditional Islam and the Pakistani government identity (aquamarine and purple).
3. The most common configuration of power associated with Punjabi secessionism is an unusually strong position for the Pakistani government, and a displacement of the influence of traditional Islam in the dominant coalition by a very strong Pakistani government backed by and an important role for fundamentalist Islam (khaki color) and/or the military (yellow). In other words, the model suggests that Punjabis would exhibit secessionist behavior if they remained a potent force in Pakistan but were excluded by a government that drew its support instead from the military and fundamentalist Islam.

Patterns in the Relative Strength and Prevalence of Punjabi Secessionism within the Distribution of VirPak Futures

6.1 Figure 9 shows the general relationship between tendencies toward Punjabi secessionism and the overall success of the Punjabi identity as measured by its prevalence in VirPak at t=608. The figure presents data on Punjabi identity prevalence, secessionism, and status as the plurality identity in order of the lowest Punjabi identity prevalence to the highest. We observe that that, as might be expected, Punjabi secessionism was absent from the four highest deciles, when very large numbers of VirPak agents were activated on the Punjabi identity and when that identity was, quite often, the plurality identity, dominating the public sphere. Punjabi secessionism did make appearances at the lower end of the spectrum but was most regular and most potent in the range from 15 to 35 on this 100 point scale. [20] In other words, Punjabis were much more likely to engage in secessionist activity when they were, as a community, in a relatively weak position within VirPak as a whole, though several futures that registered higher than the median point of Punjabi prevalence did feature Punjabi secessionism.

6.2 To be sure, the transformation of Punjabi activated agents into border cells does itself reduce, by that number of cells, the number registered as Punjabi activated agents. However, that direct effect of the transformation rule is overshadowed by the indirect effects of the barriers to interaction imposed by the newly emergent border cells. Those barriers serve

- to protect clusters of Punjabi activated agents that have already formed in their vicinity;
- to encourage conformance to activation on Punjabi by agents within these clusters activated on other identities;
- as a barrier against expansion of the Punjabi identity from dense clusters on one side into territory prominently featuring other identities—expansions which could dilute the intensity of secessionism by increasing the proportion of agents activated on Punjabi whose repertoires contain the dominant identity.

6.3 Having observed that Punjabi secessionism is most likely when the Punjabi identity does relatively poorly but not terribly in comparison with other identities, we can now ask whether Punjabi secessionism is associated with the prevalence, the success, of particular non-Punjabi identities. In other words, in response to domination of VirPak by which other identities is Punjabi secessionism most likely to arise? An important part of the answer to this question is contained in Figure 10.

7.1 We see that Punjabi secessionism is not a probable aspect of Pakistani futures as generated by VirPak at the end of 2002. But it is not only a possible future, but a quite plausible one (occurring in approximately 30% of VirPak futures). But what about secession itself—the actual appearance of a separate “Punjabistan?” Only if it occurred (with occurrence defined according to the 4 coding rules listed above) in at least one of the futures can we say that we have evidence, from this exercise, of its possibility. Indeed we do have such evidence.

Center secession—the emergence of “Punjabistan” was observed in two of the 100 baseline VirPak futures, Future 24 and Future 63. These were not the futures with the most or even particularly high numbers of border cells produced by Punjabi activated agents, but these futures did feature substantial, compact, non-fractured zones of Punjabi domination including within them substantial authority structures under the control of agents activated on the Punjabi identity. The relevant portions of VirPak from t=608 are presented in Figure 11. See Figures 12, 13, and 14 for dynamic statistical depictions of three particular futures referred to in the following section (46, 24, and 63). These figures show the changing numbers of activated agents on key identities in the top row and the pattern of bias assignments for those identities, over time, in the bottom row.

Figure 9. Patterns of Punjabi Prevalence, Plurality, and Secessionism

Figure 10. Prevalence of Selected Identities: Sorted by Punjabi Secessionism

Can Center Punjabi Secession Occur?
7.2 By examining the trajectories that produced these "Punjabistan" outcomes, along with several others that scored high on a number of the Punjabi secession markers but could not be coded as full-fledged or successful secession, we can suggest some of the conditions conducive to center secession in Pakistan, though a thorough analysis of this key question would require significantly more work.\(^3\) Theoretically there could be several routes to Punjabi secession consistent with the algorithms and the initialization conditions contained in ViPak and consistent as well with existing theories of secessionism. These routes represent plausible narratives for the emergence of Pakistan.

1. Punjabs could begin as a regionally dominant minority, alienated from the state and other dominant groups, but not strong enough to launch a secessionist movement. Favorable circumstances might then attract more Pakistanis with Punjabi connections to publicly affiliate with the Punjabi cause against a dominant identity group with relatively little support among Punjabs (e.g. Muslim Fundamentalists). If those Punjabs sharing this alternative leading identity chose to affiliate with it, this could then yield geographically concentrated masses of Punjabs lacking political or cultural connections to the new dominant group. The result could be secessionism and the production of a boundary separating "Punjabistan" from the rest of Pakistan.

2. Punjabs could constitute a large but not dominant proportion of the Pakistani political space. If the plurality identity in Pakistan were shared by a minority or even a large minority of publicly affiliated Punjabs, secessionist pressures would be weak or non-existent. But if a third group, with little connection to Punjabs, suddenly and successfully challenged the dominance of the Punjabi-friendly plurality group, the Punjabi community as a whole could find itself suddenly alienated from the dominant group or groups in the country and unleash a powerful secessionist movement, which, depending on a variety of specific circumstances, could lead to the secession of Punjab.

3. Punjabs could enjoy the dominant position in Pakistan, assisted by but dominating the Pakistani government, traditional Muslims, and/or the military. If specific circumstances, however, lead to a sharp increase in the popularity of one of these groups and if that is associated with a sharp drop in the attractiveness of identifying as a Punjabi (for example, effective government sponsored land reform in the rural Punjab, external support for the Pakistani military, or mass defections of traditional Sunni Muslims to the fundamentalist banner), the previously dominant Punjab community could quickly find itself in a subordinate and threatened position. Depending on how widespread within the Punjabi community were affiliations to the newly ascendant identity group, strong secessionist pressures could develop leading to a substantially sized but culturally compact "Punjabistan."

Although each of the trajectories leading to substantial secessionism is unique, the dominant sequence within those ViPak futures was (3). Indeed both futures coded as actual secession followed this particular storyline.

7.3 To be sure, there was one substantial ViPak future that followed the trajectory described in (1). In Future 46 the traditional Sunni Muslim identity dominated ViPak in tandem with a slightly smaller but still potent Pakistani governing identity, with Punjabis a distant third. In the context of that set of relationships, many Punjabs retained their Sunni Muslim identity but were not affiliated with the Pakistani identity. When circumstances led to a sudden move by many Punjabs who had publicly affiliated as Sunni Muslims to adopt instead an explicitly Punjabi stance, Pakistan became the dominant identity in ViPak. As a result, Punjabs most closely attached to the identity—those activated on it—were suddenly confronted with a governing apparatus from which they had become alienated, triggering a brief but potent eruption of Punjabi secessionism.

7.4 In the majority of futures containing substantial Punjabi secessionism, the impetus for secession arose from Punjabis being displaced as the group dominating the Pakistani political landscape. The cascade of change in political affiliations associated with this displacement increased the level of alienation between the Punjabi community as a whole and the newly dominant identity. In the model this means that the proportion of agents activated on Punjabi but retaining the dominant identity in their repertoires fell sharply. Punjabi secessionism and secession was thus closely associated with what may be understood as an experience of intense and rapid "relative deprivation," as a Punjabi community with its own recent domination of the country as its referent, and enjoying overwhelming control over the governing structures within the rural Punjabi heartland, moved toward independence by trading a declining position in a transforming Pakistan for some variation of an independent state as an isolated region. Both futures featuring the emergence of Punjabistan correspond to this pattern, though in Future 24 the cascade to the challenger identity and the production of a "hump" Punjabi community alienated from the newly dominant identity or coalition of identities occurs earlier than in Future 63.

7.5 To the extent that our baseline simulations of ViPak model a representative array of the possible Pakistanis lying within a relatively accessible region of the state space of actual Pakistan (in late 2002), the following conclusions were drawn.

1. Punjabi secessionism was not only possible, but stood as a more potent challenge to the integrity of the country than more commonly discussed threats of secession that have emanated from Baluchistan, the Sindh, Seraiki region, or the Pashtun dominated NWFP. In the event, of course, it did not occur (in the three years simulated by the model (2003-2005)—but neither did a successful peripheral secessionist movement materialize.

2. The threat of Punjabi secessionism was likely to be sharpest precisely when the government of Pakistan, alone or in partnership with other (non-Punjabi-oriented groups), makes progress toward establishing more thorough and effective governance throughout the country. On the other hand, it can also arise in reaction to an ascendance of Muslim fundamentalism within the state.

3. For those concerned to avoid, or foster, prospects for Punjabistan, it is important to note that analysis of the trajectories featuring that outcome suggests certain strategies are likely to be important in reducing its likelihood. Based on the most common route to potent center secessionism in Pakistan, strategies that suggest themselves for reducing that likelihood include maintaining a strong identification of Pakistan as a state with traditional Sunni Muslim values; promoting civic identification through enriched educational programs within the Punjabi heartland; and recruiting civil servants who can remain proudly and publicly Punjabi while carrying out their duties as representatives of the "Pakistani" state.

7.6 More generally, our exercise suggests the utility of computer assisted agent-based modeling and the production of large batches of virtual futures for studying patterns of outcomes, both possible and probable, that may arise from the same ethnic demography and the same basic set of political institutions. It also suggests the crucial role this methodology can play in the systematic study of "rare events" such as center secession: not only in providing existence proofs of their possibility, but in efforts to assess their plausibility and the conditions under which their occurrence, however rare, should be considered more or less likely.
Acknowledgements

The author gratefully acknowledges different forms of crucial assistance in the preparation of this article and the studies upon which it is based, received from Vladimir Dergachev, Ben Eidelson, Dan Miodownik, and Matthew Tubin. Support for this research contributing directly to this study was received from the Carnegie Corporation, the National Science Foundation, the Solomon Asch Center for Study of Ethnopolitical Conflict at the University of Pennsylvania, and agencies of the United States government.

Notes

1 See, for example, Pounds and Ball (1964); and Gourevitch (1979).
2 For a example of this approach that includes a strong discussion of previous efforts see Alesina and Spolaore (2003).
3 On the concept and theory of political "right-sizing" see O’Leary et al. (2002).
4 For an extended theoretical treatment and empirical exploration of a model of state contraction and expansion see Lustick (1993).
5 On Russia’s secession from the Soviet Union see Hanson (1998) and Hale (2004).
8 Markovits (2002).
9 Naor (2002).
11 Although the large majority of agent-based modeling applications are designed to explore highly stylized environments for insights into very general processes or particular kinds of problems, the exercise here illustrates the potential of computer assisted ABM for the "virtualization" of specific spatio-temporal problems and situations. Regarding the theoretical justification for this ambitious use of ABM modeling in relation to available social science theory and the normal (but undisciplined) way that "expertise" is used, see Lustick and Miodownik (2009).
12 In this essay we concentrate only on 100 futures of VirPak generated with our "baseline" conditions (to be explained below). That is to say, batches of histories run with VirPak that reflected slightly different initial conditions or assumptions about the relative strength of different identities or types of political influence are not exploited directly for our purposes in this paper, although they can be seen as having served as sensitivity tests establishing the robustness and plausibility of our findings across a range of possible parameter settings.
13 For detailed discussion of these three types of agent-based models see Lustick and Miodownik (2009).
14 For an explanation of the fundamental operating rules of PS-I and of the terminology used to describe PS-I simulations see Lustick (2002a). Detailed information and justification for the various trigger settings that determine the sensitivity of different kinds of agents to changes in their surroundings are not provided in this summary of Virtual Pakistan.
15 Technically there are 30. In fact, identity 28 (Hindu/Indian) is not present in the repertoire of any Pakistan agent and identity 29 is a special condition, rather than identity, that allows PS-I to estimate the effects of nuclear events unleashed by terrorism or instability on the "performance" of Virtual Pakistan. So it is reasonable to think of VirPak as including a spectrum of 28 politically relevant identities (identities 0-27).
16 The real equivalent of a time step in VirPak was established based on wide-ranging experiments with other arrays modeling other regions and countries. By studying very large numbers of simulations, rare but extremely consequential events, comparable to the collapse of the Soviet bloc, can be discovered and measured for their duration. By taking into account that relationship as well as the implications of the size of the array and the volatility setting for changes in the bias values, a reasonable judgment can be made about appropriate time values that can be used across models built for different purposes. Establishing time equivalencies remains a challenging problem for agent-based models, but work with this kind of virtualization can show that one can quite confidently judge the outside boundaries of reasonable time equivalences. Some values are obviously too slow or too fast. If those boundaries are not honored, patterns produced are extremely difficult to interpret in relation to the real world as we experience it at the analytic level of interest.
17 Muhajirs are Pakistanis whose families came from India to settle in Pakistan as a result of the violence in 1947.
18 For a detailed explanation and illustration of the algorithms determining agent behavior calculation in response to changing patterns of local activation on available identities and changing biases assigned to different identities, see "Central Agent-One Time Step in the Life of an ABIR Agent," (Lustick 2002b), which is the appendix to Lustick (2002a).
19 This virtualization of Pakistan is not sufficiently granular to include details of specific clan affiliations. Instead, the presence of politically important kinship groups is implemented by distributing a small number of "gau" identities within the Punjabi and Pashtun ethnic groups. No agent can have more than one of these identities. In this model, all members of a gau are members of the same ethnic group and inhabit the same region of the country.
20 In general discipline is considered to be stronger in the military than it is in the civilian sector of the national authority structure. The average size of the repertoire of a basic agent in VirPak is 3.8. It is relatively small, reflecting the largely peasant, mostly illiterate, and parochialized nature of Pakistani society.
21 Ten more fanatics, including eight Muslim Fundamentalists, are located in Indian controlled Jammu and Kashmir, in VirPak. But these agents are outside "Pakistan_shape" and so are not included within the statistics reported here.
22 Low voter turnout in the recent Pakistani elections suggests higher levels of political apathy in Pakistan than were used to design VirPak. Increasing the amount of apathy in VirPak by increasing the prevalence of apathetic agents in the population had significant effects on outcomes.

Figure 14. Trajectories of Activation by Competing Identities and Bias Assignment Histories—Future 63 of VirPak

08/10/2015
The information in this table is correct as to the design of Virtual Pakistan. Due to technical problems not recognized until after data analysis had been conducted, the implementation did not include two of these settings. Fanatics remained unchanged in their activation, but did not influence their neighbors. Scared agents did not use a range of 2 and so acted essentially as basic agents. Since there were only 25 fanatics and 32 scared agents in VirPak, the influence of these problems on patterns identified in our data was small to negligible. Nonetheless visual analysis and a batch of new baseline futures generated with a corrected VirPak snapshot suggest that the results would have shown a somewhat more robust pattern of Muslim Fundamentalist effects and a somewhat greater sensitivity to manipulations and alternative scenarios.

Ibid.

The trigger settings for innovators are normally set to be as sensitive as those for entrepreneurs. Two of these settings were, however, omitted erroneously in VirPak. As a default PS-I treated the innovators, in this specific respect, as basic agents. So instead of trigger points of 1, 3, and 6, their trigger points were 2.4, and 6. Given the small number of innovators in VirPak and the similarity of basic agent settings to those normally assigned to innovators, this impact of this error on experimental results is almost certainly negligible.

In the experiments reported in this paper the probability of an otherwise qualifying basic agent turning into a border cells was 20% per time step in which the basic agent remained qualified. This probability can easily be adjusted for experimental purposes. Sensitivity tests conducted in relation to our “Beta” studies (see note 23) indicated that adjusting this probability value between 15% and 25% did not alter the frequency with which border cells appeared. The effects on these adjustments on the number of border cells produced were linear, relatively small, and in the expected directions.

In practice this means a tension level of less than 1.1.

For more details on the theoretical rationale and algorithms for our operationalization of secessionism and our coding of secession see Lustick et al. (2004). The measures used in that study of secessionism in one region of an ethnically divided society—Beta, were adjusted in minor ways in this study. For example, secession in the Punjab region of Virtual Pakistan was coded using weighted proportion of Pakistanis activated on the landowner identity but located within the Punjab.

This scale range from “1,” the VirPak future registering the fewest Punjabi activated agents at t=608, to “100,” registering the future with the most Punjabi activated agents at t=608.

It is instructive to consider that a more finely grained analysis would not differentiate among similar trajectories on the basis of the particular sub-regions where the secessionism occurred and on the basis of particular sub-groups that participated. This task, difficult but possible, is methodologically equivalent to the impossible task confronting a scholar using conventional techniques. That researcher would need to discover and then analyze 100 different thoroughly documented actual histories of Pakistan from 100 parallel but not precisely identical universes.

References


