

SIMULATION OF ETHNIC CONFLICTS IN FORMER YUGOSLAVIA

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ABSTRACT

The paper describes an agent-based model of the escalation of inner-state ethnic conflicts. Model assumptions are derived from the case of the former Yugoslavia. To comprehend the appearance of war crimes, the model refers to the concept of ethnic norms. The cognitive complexity of norm emergence is represented by using the simulation tool EMIL-S. The model consists of two agent classes: politicians, who enforce value orientations, and citizens, who form paramilitary militia. Simulation results confirm the feasibility of the theoretical approach.

INTRODUCTION

Twenty years ago, the phenomenon of war re-appeared in Europe. Unlike the peaceful secession of Czechoslovakia, for instance, the breakdown of Yugoslavia was extremely violent. The series of wars went hand in hand with serious crimes that captured the attention of the world community. On the one hand, attempts to recruit young Serbian men for the army were rather unsuccessful. On the other hand crimes were undertaken by civilians who were not part of organised armed forces. The events in the former Yugoslavia had been a prime example for changing the focus of security studies from inter-state conflicts to inner-state societal security (Williams 2003). For instance, the term of so-called "new wars" (Kaldor 1999) had been coined to characterise such conflicts as anomic conflict societies (Geller 2006). These are characterised by private and non-state actors, acting outside the rules of the Haager convention. However, these wars are not without any order or rules of expectation, respectively. For this reason, Bhavnani (2006) has introduced the notion of ethnic norms to model genocide that "persuade members of an ethnic group to participate in violence against nominal rivals" (Bhavnani 2006: 122). Another theoretical framework that has been developed in the past decade is the theory of securitization (Buzan et al. 1997). This theory addresses the question of how security issues arise on a political agenda. Securitization is described as a speech act that declares an object of communication as being under threat. It describes a relation between a securitizing actor and its audience. However, the role of the audience

(Balzacq 2005) and the mechanisms of the process of securitization (Guzzini 2011) are in need to be further explored. Thus a number of attempts exist to grasp the security situation and challenges in the time after the cold war, but a concise comprehension is not at sight. It still remains a puzzling question how people became attuned to commit crimes as they had to be observed in the former Yugoslavia.

To shed light on the mechanisms of the escalation of inner-state, ethnic violence an agent-based model has been developed. The unclear and controversial theoretical starting position suggests to rely on a descriptive, empirical approach (Edmonds and Moss 2005). The fact that the wars in the former Yugoslavia are well documented suggests to use this empirical example to derive the model assumptions. The paper proceeds as follows: first, the case of the conflicts in the former Yugoslavia is described and integrated into the framework of ethnic norms. Secondly, the framework for modelling is outlined. Here, cognitively complex agents are introduced. Subsequently model architecture and implementation is described. First simulation results are displayed and finally an outlook and conclusions are provided.

THE YUGOSLAVIA CASE

Yugoslavia was a multi-national federal republic, consisting of six republics. Each republic comprised one of Yugoslavia's constituent nations. The territories of the republics were drawn along historically established borderlines. During the wars in the 1990s, Yugoslavia collapsed along these borderlines.

Soon after Tito's death, nationalist movements emerged in the political landscape. The beginning of the conflict was triggered by a power struggle within the Yugoslavian Communist Party about Tito's legacy. Formerly communist politicians took advantage of ethnic sentiments, allowing them to organise loyalty with an ethnic agenda. Milosevic was able to stimulate mass movements in Montenegro and the Vojvodina, bringing liegemen of Milosevic into power (Silber and Little 1997). The power struggles at the end of the 1980s still took place within the Yugoslavian Communist Party. However, the first free elections in the individual republics brought nationalist parties into power, albeit often with only marginal majorities. In April 1990, Franjo Tudjman won the first free elections in Croatia. Nevertheless, the degree of ethnic mobilisation in the population was rather small. Even in 1990, the results of opinion polls in Bosnia revealed that more than 90% considered

ethnic relations in their neighbourhood to be good, even though there were already political tensions at the political level (Calic 1995).

Yet, very soon civilians were also becoming involved in the battles and, in particular, in war crimes. The violence was not accidental, but aimed at establishing ethnically homogeneous nations out of the former multi-ethnic country of Yugoslavia. The escalation of tensions into open conflict started after Croatia declared its independence in 1991. The Krajina region in south-west Croatia was inhabited by a majority of Serbs. As a reaction to the Croatian independence, the establishment of a Serbian autonomous province of Krajina was declared on 28 February 1991, provoking armed conflicts. A further stage was reached on 26/27 August 1991, when the first ethnic homogenisation took place in the small village of Kijevo, inhabited mainly by Croatians (Rathfelder 1999). After the village had been attacked by the Yugoslavian Army, a paramilitary militia of the Krajina Serbs invaded the village and displaced the Croatian population. The militia consisted of the local Krajina Serbs, civilians who were not integrated into the command structure of the Yugoslavian army. As characteristic for the militia's course of action, they prewarned the Serbian inhabitants of the village, who chose not to pass on the information to their Croatian neighbours. This modus operandi turned out to be a template for later ethnic homogenisation in Bosnia-Herzegovina (Rathfelder 1999). At this point, a stage was reached in which civilians were mobilised for participating in war crimes. This review of the escalation shows that both politicians and citizens were involved in the process. While politicians created a political atmosphere of ethnic fear and hatred, crimes were undertaken by citizens as well.

MODELLING AND COGNITIVE COMPLEXITY

The empirical case fits into the framework of ethnic norms as it had been developed by Bhavnani (2006), insofar as citizens were persuaded to voluntarily participate at war crimes. While ethnic homogenisation still remained an extraordinary event in Yugoslavia, it was not a prohibited type of action but, on the contrary, was a behaviour that was actively enforced by norm setting agencies. This refers to the two aspects of norms as described by the institutional theory of norms (Kelsen 1934, Andrighetto & Conte 2012), namely being an obligation that is prescribed by a normative authority. This leads to the role of politicians. Norms consist of both behaviour patterns as well as norm enforcing agencies. In the case of Yugoslavia, these had been politicians who enforced nationalistic chauvinism. Indeed, "... tacit knowledge structures may be used by ethnic entrepreneurs as motivating templates ..." (Bhavnani 2006: 125), as Bhavnani observes for the case of Rwanda. However, neither the Genocide in Rwanda nor ethnic homogenisation in Yugoslavia were enduring events. Thus the question arises how such a norm emerges in the first instance.

To develop a framework for modelling we have to start with the idea that for norms to emerge it will be neces-

sary that agent societies must not consist of agents that are entirely lenient with respect to the behaviour of their fellow agents. Thus agents will have to be endowed with a set of goals which they do not necessarily share with all of their fellow agents. Thus the process of norm emergence or innovation in an artificial society of agents will have to start with actions arising from individual agents' goals. The process can be illustrated by an everyday example: *A* does not want to be exposed to the smoke of cigarettes. At this moment this is not yet a normative goal: to achieve the goal of living in a smoke-free world when the current environment contains a smoker, say *B*, a decision has to be taken which leads to one of several possible intentions which in turn lead to respective actions. One of the possible decisions *A* might take will be to demand from *B*, the smoker, to stop smoking. When *B* receives this message as a social input he will have to evaluate this message in the norm recognition procedure. If this event (*A* asks *B* not to smoke in her presence) is the first of this kind, *B* will not recognise a norm but store this message and the situation in which he received it as an event in his "event board". When an event like this is more often observed by *B* (but also by observers *C*, *D*, ...) this kind of messages might be interpreted as a norm invocation, and a normative belief – "the belief that a given behaviour in a given context for a given set of agents is forbidden, obligatory, permitted, etc." (EMIL 2009) – is stored in all the recipients of the repeated message. If it turns out that the current state of the world does not conform to the normative goal, the decision maker generates a normative intention which in turn ends up in an action.

However, the normative authority plays a different role in the case of ethnic norms than in the example of non-smoking norms. No legal sanctions (e.g. such as a fine for smoking in restaurants) exist for not participating at genocide. To represent the informal character of ethnic norms, Bhavnani followed Axelrod (1986) by modelling the Rwanda case as a norms game, i.e. punishment for nonconforming in-group members by ethnic entrepreneurs. Additionally to this, the Yugoslavian case includes an even more intricate element. Speeches such as Milosevic's famous claim that 'nobody should beat you' or the 600 anniversary of the battle at Kosovo Polje are no direct requests such as normative sanctions for smoking in a restaurant. In this respect they differ from normative sanctions. Instead they provide a form of symbolic communication by appealing to symbols of (in this case) national pride. The symbolic (e.g. speech) speech acts appeal to social identities (Hogg & Abrams 1990, Cruz 2000), which then triggers an internal motivation to voluntarily participate at war crimes.

ARCHITECTURE OF EMIL-S

This form of communication can be represented by using the Simulation framework EMIL-S. It has been developed to model the cognitive complexity involved in norm innovation processes (Lotzmann 2010). In the case of symbolic communication it is of central interest to model the decisions of the politicians to which kind of value

orientation they should appeal. This in turn generates voluntary actions of citizens which are based on their respective value orientation.

Any multi-agent simulation system will have to be able to simulate the processes which go on within agents (recognition, memory, decision making), among agents (communication) and between agents and their environment (action). Mental processes within agents are thus separated from actions that agents take with respect to other agents (including communication) and their environment. Thus one of the central requirements for this kind of simulation is that agents do not communicate by mind-reading but by messages which have to be interpreted by the recipients of messages before they can have any effect on the recipient agent's behaviour. Decision making does not only concern observable actions, but also internal actions, such as one to form or not to form a given mental state. This is modelled in the framework EMIL-S. This module is the core of the simulation system which represents the "minds" of normative agents. Each agent must be equipped with a set of initial rules, which allows him to act in the simulation environment. Rules in EMIL-S are represented as so-called event-action trees, which is a kind of decision tree that represents the dependencies between events and actions (Figure 1 shows an example). For each event an arbitrary number of action groups are defined (G1 in the example). An action group represents a number of mutually exclusive actions (A1 to A4 in the example). The edges of the tree are attached to selection probabilities for the respective action groups or actions.

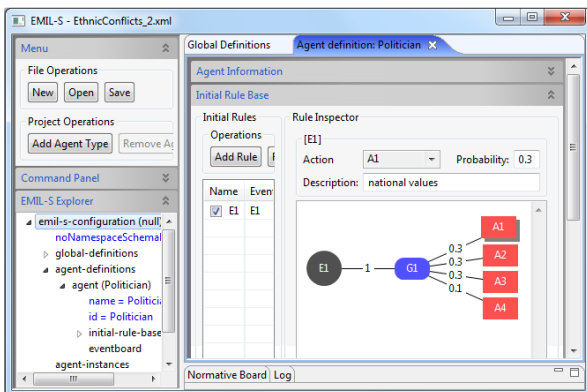


Figure 1: EMIL-S Agent Designer, displaying an event-action tree from the initial rule base

Based on perception of the environment, the decision tree generates some kind of action which in turn changes the state of the environment. Subsequently, the impact of the action must be evaluated in order to show modified (and preferably better in respect of goal achievement) behaviour at the next appearance of a similar environmental state. This process step is called valuation. The result of the evaluation from the previous step leads to an appropriate rule change, i.e. the actual rules must be adapted in some way. These steps are shown in Figure 2.

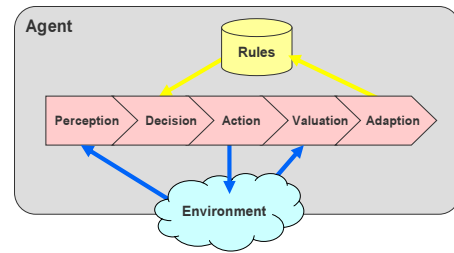


Figure 2: Generalized intra-agent process

MODEL DESIGN

In the following, it will be outlined how this agent design is integrated into the conflict escalation model. The model follows the KIDS principle (Edmonds & Moss 2005) to integrate as much empirical evidence in the architecture as possible. However, it has to be emphasised that only the processes of the early phases of conflict escalation will be considered, not the entire wars.

General design

The model consists of two types of agents: the political elite and the local population. However, the two types of actor are structurally coupled. On the one hand, politicians' careers are dependent on mass support; on the other hand, the mobilisation of mass support stimulates the mobilisation of individual value orientations and identities (Figure 3).

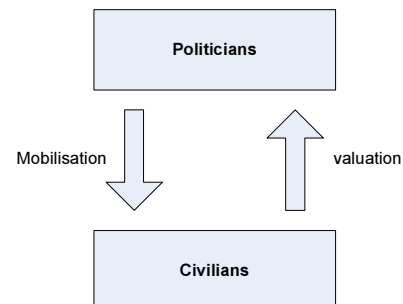


Figure 3: Relation of the two agent types of the model

Actor models

To represent the different motivation of citizens and politicians, the two agent classes are modelled using different actor models. Politicians act by holding speeches that either appeal to civil or nationalist values. Nationalist speeches can either be radical or moderate. Speeches represent the symbolic communication. While politicians are the norm enforcing actors for the society, their personal goals are represented by the rational actor model of the SEU (Subjective Expected Utility) theory. The goal of politicians is to make career advancements, by maximising their popularity. The strategic evaluation is undertaken in three dimensions:

- *Political atmosphere*
- *Credibility*: A politician is no longer credible if he or she changes the political agenda too frequently.

- *Exclusiveness*: It may be advantageous to opt for a type of agenda with fewer competitors, even if there is less overall support.

Learning arises from the fact, that all speeches are evaluated by the citizens. They form their own opinion and discuss with their neighbours. In dependence of that, they can take part on a pro or anti demonstration. All this goes in the evaluation process, so that the politician, who gave a speech, receives positive or negative feedback, i.e. sanctions in terms of EMIL-S. These sanctions cause the politician to continue to give speeches with the chosen type or to switch to another one.

Ethnographic accounts (Wilmer 2002) have described the involvement of the local population in war crimes as emotionally driven. This can be represented following the theory of the ‘identity preserver’, popularised by the German sociologist Uwe Schimank (Schimank 2000). Agents possess two value orientations: civil values and national identity. Individuals possess both types of value orientation. However, the strength of the respective value orientation may differ. This is illustrated in Figure 4, where the x axis represents the degree of civil values and the y axis represents the degree of national identity.

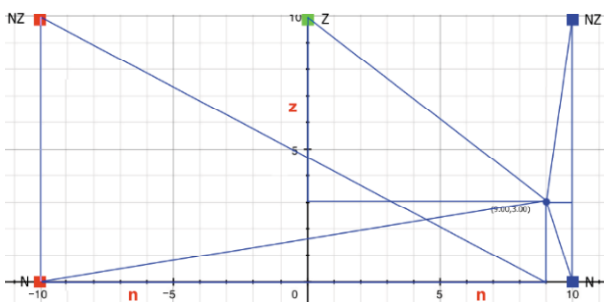


Figure 4: Evaluation of speeches

In this connection the orientation of an agent is a point in a two dimensional coordinate system limited by 10 in each axis. In Figure 4 the blue point with coordinates (9.00, 3.00) represents the civil and national values of a Croatian citizen. The speech types are represented as the maximum of each axis. In this connection a nationalist speech of a Croatian politician is represented as the coordinate (10.00, 0.00). A moderate nationalist speech of a Croatian politician is represented as (10.00, 10.00). Finally a civil speech is represented as (0.00, 10.00). The national and civil-national speeches of non-Croatian politicians are represented as (-10.00, 0.00) and (-10.00, 10.00). Hence the evaluation of a speech is the distance between the coordinates of the agent and the coordinates of a particular speech. The smaller the distance, the better the evaluation is, e.g. in this case, the Croatian agent would rate a Croatian national speech with 3.16 and a Croatian civil speech with 11.40.

Scheduling

The overview of the scheduling (Figure 5) highlights the fact that the scheduling consists of two phases: a state of social order and an anomic state. In principle, the recursive feedback loop between politicians and citizens

indicated by the two upward and downward bars may be maintained in the state of social order. This is a rather general mechanism, not specific to the Yugoslavian case. Namely, politicians hold speeches to organise support. Citizens discuss their evaluation of the speeches in friendship and neighbourhood networks. This represents the idea that the success of political campaigns is to become the topic of public debate. Support is signalled by participating in demonstrations in favour of the politician. This changes the value orientation of the citizens. The degree of support is observed by the politicians to evaluate which type of speech they should hold the next time.

Under certain circumstances the model may enter the anomic state. Following the KIDS principle (Edmonds & Moss 2005), the concrete mechanisms for the transition into the anomic state are specific for the Yugoslavian case. To abstract from this particular case, in the model an alarm function for the rise of a political conflict is activated if a nationalist politician gains support outside the territory of his or her home republic. This provides the opportunity for the emergence of paramilitary militia. Three conditions have to be fulfilled for their emergence:

- *Opportunities*: activation of the alarm function.
- *Motivation*: Militia consists of highly radicalised nationalists.
- *Complicity*: The militia planning to attack a certain village warned the inhabitants of their ‘own’ nationality. These could have warned their neighbours of different nationality, but they chose not to and often participated at the looting.

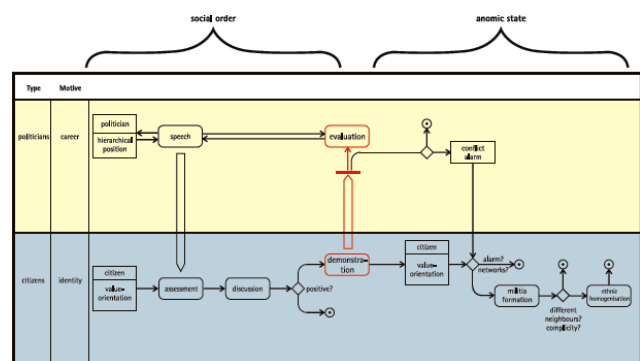


Figure 5: overview of the scheduling

MODEL IMPLEMENTATION

The implementation of the model (Marksic and Kilic 2012) is based on Repast Simphony (North et al. 2007). In addition, the normative behaviour of politicians is realised with the EMIL-S framework, and ArcGIS is used in order to create the geospatial data which is integrated into particular GIS projections.

Environment

To represent the boundaries or administrative districts with adequate precision, the geography has to be mod-

elled with a software like e.g. ArcGIS. The resulting geospatial data can then be loaded into GIS projections.

The environment is hierarchically structured from the state level to administrative areas. Each environmental context has an assigned shape file which holds information and whose records can be shown as objects. These objects are loaded into the specific context and displayed in the respective geographic projection (Figure 6). The three ethnic groups are distinguished by colours. The green dots are Bosniaks, the blue Croats and the red Serbs. These have three levels of intensity, depending on how strong the national identity of the agent is pronounced.

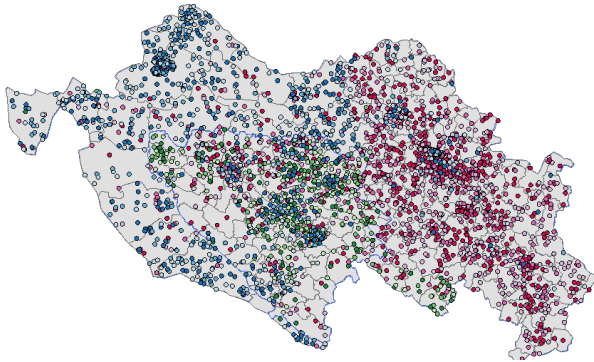


Figure 6: Initial Population distribution at the GIS Projection

Agents

- **Citizens:** Every shape file has an attribute table. Every modelled administrative district is handled as a record in that table. For each district the statistical data of population in former Yugoslavia of 1991 was used to fill the table. Every agent of each ethnic group represents 5,000 residents of this ethnic group.
- **Politicians:** The politicians have fixed coordinate points, so that each individual can be assigned clearly to a republic in which he operates. A politician of an ethnic group represents 100,000 residents of this ethnic group.

Time

Every tick in the simulation run represents a week in reality. In the model it is assumed, that a certain number of politicians can give only one speech every week. This means, that those politician agents executes an action every seven ticks. The citizen agents act within the seven-tick interval active. The simulation should cover a period of several years, namely the time before the disintegration of former Yugoslavia and subsequent wars.

Normative behaviour of politicians

The politician agent on the Repast layer has a mirror image on the EMIL Layer. This means that the same agent exists on two different levels. If an agent on the Repast layer wants to perform a certain action, then it triggers an event. In this case a politician would trigger

the event to give a speech. This is the action of the triggered event. This event is then processed by the agent on the EMIL layer. The result in terms of an action is delivered back to the Repast agent. In the next step, the Repast agent would perform that action.

SIMULATION RESULTS

According to the Bayesian design of experiments, at initialization of the simulation it is assumed that the prior distributions between the citizens' value orientations and the probabilities between the three types of speeches are equal. The following sketches of a simulation run show how opinions develop according to the mechanisms of the model. After 2190 ticks - which equals 6 years - the average civil and national values of Bosniaks have evolved as displayed in Figure 7.

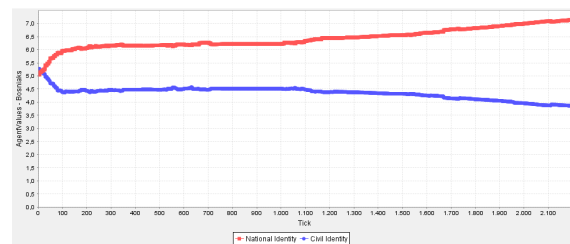


Figure 7: Bosniaks – Avg. civil and national values

The national values of Bosniaks showed a slight rise from the beginning up to middle of the simulation time interval. Also, the gap between the national and civil curve remained constant. This is caused by balanced acceptance of national and civil speeches. In the second half of the time interval the national values curve raised continuously. At the same time the civil values curve decreased also continuously. The reason for this is, that if an agent is displaced, then his national values rise up to the maximum. The logical outcome of this is the radicalisation of that agent, which also influences his new neighbourhood. Thus, in the progress of the simulation, the national speeches are going to be more accepted as the civil ones.

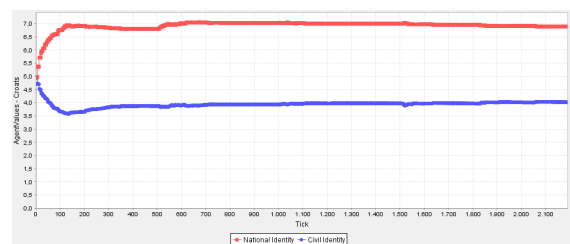


Figure 8: Croats – Avg. civil and national values

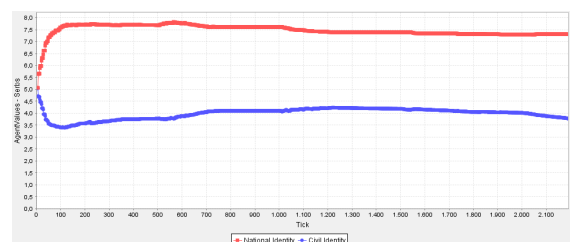


Figure 9: Serbs – Avg. civil and national values

From the beginning of the simulation the national values of Croats (Figure 8) and Serbs (Figure 9) have risen strongly. In this case, the politicians who held national speeches were more supported than the ones who held civil speeches. In consideration of this particular fact, the conflict was caused by the two ethnic groups which were directly radicalized. This can also be seen in the log file where the first militia was created by a part of the Serbian population.

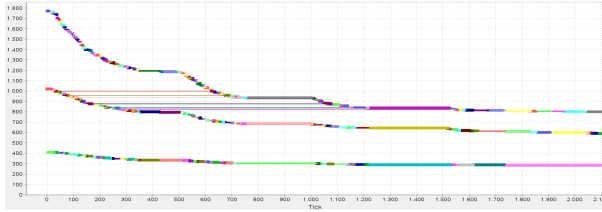


Figure 10: Population development

The curves in Figure 10 are labelling the population of the three ethnic groups during the simulation. From top to bottom the curves are standing for the number of Serbs, Croats and Bosniaks. It is clear that the two ethnic groups which were most rapidly radicalized, have suffered the highest numbers of victims.

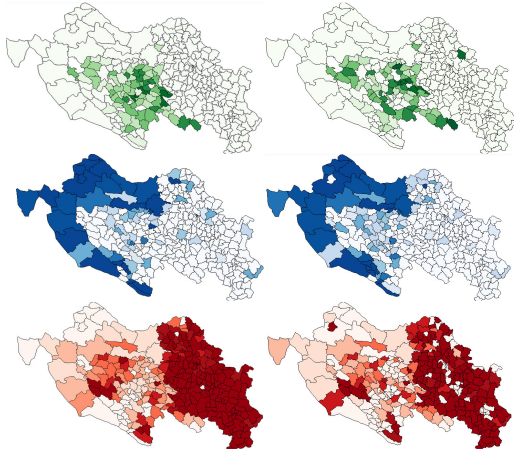


Figure 11: Intensity of ethnic groups (top: Bosniaks, centre: Croats, bottom: Serbs)

The choropleth maps on the left side in Figure 11 shows the state at the beginning of the simulation. The right side is the state at the end. The choropleth maps are showing the relative frequency of each ethnicity in a particular region, e.g. a dark blue region only says that there is a homogenous Croatian population. It can be determined, that all ethnic groups have defended their territory or have occupied adjacent territories.

Four types of actions can be undertaken by the politicians: holding a nationalist speech (A1), holding a civil speech (A2), holding a moderate nationalist speech (A3), and doing nothing (A4).

From the list of the politicians in Bosnia (Figure 12), it is evident that Bosniak politicians have kept their speeches fairly compensated. This confirms Figure 7 where the average national and civil values are quite balanced. However, because of displacement of Bosniaks and their concurrent radicalization, it can be expected that in

further simulation ticks Bosniak politicians will become increasingly nationalist.

Bosnia						
PolID	Ethnicity	NumSpeeches	STypes	Popularity	Avg	
17	Serb	17	A1:2-A2:0-A3:0	114,00	6,71	
11	Croat	20	A1:4-A2:2-A3:1	141,00	7,05	
15	Serb	20	A1:0-A2:6-A3:0	145,00	7,25	
6	Bosniak	20	A1:4-A2:4-A3:0	146,00	7,30	
19	Serb	28	A1:2-A2:7-A3:1	206,00	7,36	
2	Bosniak	19	A1:3-A2:1-A3:2	151,00	7,95	

Figure 12: Six most acceptable politicians in Bosnia

On the two top places in all republics are Serb (Figure 14) and Croat (Figure 13) politicians, who have appealed especially to the citizen through national speeches. This confirms the rapid radicalization of these two ethnic groups by the high acceptance of these speeches.

Croatia						
PolID	Ethnicity	NumSpeeches	STypes	Popularity	Avg	
49	Croat	27	A1:9-A2:0-A3:0	65,00	2,41	
46	Croat	32	A1:11-A2:0-A3:1	125,00	3,91	
31	Croat	32	A1:0-A2:11-A3:0	183,00	5,72	
38	Croat	21	A1:4-A2:0-A3:1	122,00	5,81	
87	Croat	7	A1:2-A2:0-A3:1	44,00	6,29	
37	Croat	30	A1:6-A2:2-A3:1	190,00	6,33	

Figure 13: Six most acceptable politicians in Croatia

Serbia						
PolID	Ethnicity	NumSpeeches	STypes	Popularity	Avg	
90	Serb	8	A1:3-A2:0-A3:0	28,00	3,50	
68	Serb	28	A1:7-A2:0-A3:2	137,00	4,89	
71	Serb	29	A1:8-A2:3-A3:0	154,00	5,31	
59	Serb	29	A1:8-A2:1-A3:1	157,00	5,41	
79	Serb	27	A1:5-A2:0-A3:0	149,00	5,52	
60	Serb	29	A1:8-A2:1-A3:3	162,00	5,59	

Figure 14: Six most acceptable politicians in Serbia

Concerning the mechanisms of the escalation process an observation that was made during the simulation is the relationship between the parameters *avgOpinionMultiplier* and *demoValueDivider*. If a speech has taken place, then each citizen evaluates it. However, there exists also a common opinion about that speech in the neighbourhood. The first parameter is used to give such a common opinion a particular weighting. Herewith it is possible to increase or decrease the influence of the neighbourhood on each citizen. This is the point where the citizen decides whether to go to a demonstration or not. The greater the *avgOpinionMultiplier* is chosen, the more is he dragged by the crowd. The second parameter, *demoValueDivider*, is used to control the strength of influence of demonstrations on each participant. If a citizen decides to go to a demonstration, then the average orientation of all participants is used in order to update the orientation of each individual. The relation between the two parameters can be interpreted as follows: if the influence of the neighbourhood of an individual is small, the less he is directed to go to a demonstration. That means that the second parameter has no impact on the individual. In the case that the influence of the neighbourhood is high, then the second parameter determines the speed of the radicalization.

CONCLUSIONS AND FUTURE WORK

So far, the model is not calibrated but presents only theoretical results. Further empirical work would allow for a validation of an empirically calibrated model. This has to be left for future work. The good empirical data

basis of the Yugoslavian example provide a source for deeper empirical substantiation of the general framework developed in this model.

However, the results confirm that, following the KIDS principle, empirically derived assumptions allow to generate the process of conflict escalation. Moreover, this supports an approach from the theory of securitization. Ethnic conflict can be triggered through the political level. However, the citizens are not simply passive entities. This clarifies the role of the audience in the securitizing act. The success of mobilising attempts of politicians depend on the network structure of the citizens. Mobilisation is successful only when in the particular ethnic group people exist who are at the beginning highly nationalized and pursue their own goals. In addition, it is also necessary that there are people which can be easily manipulated. This result is substantiated by Horowitz's (2001) observation of the central role of rumours in the escalation of ethnic violence. These are transmitted through networks that are implemented in the model. Dissecting the mechanisms of the escalation of ethnic conflicts through simulation allows theoretical clarification that suggests further empirical work.

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