

# A THEORETICAL MODEL OF IDENTITY SHIFT IN PROTRACTED REFUGEE SITUATIONS

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## ABSTRACT

Refugees are increasingly spending time displaced from their home countries—either in camps or other arrangements. This prompts questions about the role of a traditional, territorially-based notion of national identity during long-term displacement. Do refugees separated from home for generations still retain their national identities? Using an algorithm based on attitude shifts, we developed a theoretical model to represent identity shifts among long-term encamped refugees. Findings from the simulation indicate that refugees, due to the limited types of interactions they may encounter when confined to a camp, may experience identity shifts away from that of their home country, as well as away from territorial nationality. The theoretical model presented in this paper serves as a starting point to question the ability of the UN's 'durable solutions' to refugee crises in a global climate where forced migration endures for increasingly long periods of time.

**Keywords:** refugee identity, protraction, agent-based modeling

## 1 INTRODUCTION

Global forced migration—to include refugees, asylum seekers, and internally displaced persons—is at an unprecedented high in our world's history (Edwards 2016). Not only that, but time spent in refugee camps often extends for decades, on average 25 years (UNHCR 2015), which equates to generations being born into camps not knowing any other life. While camps only represent a small portion of accommodation types for refugees, we chose this situation as a starting point for building an identity model based on the primary author's fieldwork experience in a refugee camp (Frydenlund 2015) as well as to explore the impact of identity on durable solutions. The United Nations proposes three 'durable solutions' to refugee crises (in preferred order): repatriation to the home country, local integration in the host country, or resettlement in another (usually developed) country. In reality, very few refugees see any solution to their forced displacement. Most endure years and even generations away from their home country. While many may

question the plausibility of the durable solutions for most refugee situations, little progress has been made toward alternatives.

Previous research has shown that camp-based refugees construct a different national identity than those living in urban areas of the host country (Malkki 1995). Additionally, those refugees in camps who are often thought of as ‘apolitical’ by humanitarian care institutions actually do practice political agency (Turner 2010). Even with a shared language and history, refugees in camps may reject the social identity of their host communities, instead constructing imagined communities (Anderson 1991) linked to their homeland or a broader global citizenry. For instance, young Congolese refugees in protracted Rwandan camps who have never visited the Democratic Republic of Congo (DRC) may feel more Rwandese than Congolese and have trouble assimilating during voluntary repatriation campaigns. Yet, they are not considered Rwandese by the local population. Conversely, elder Congolese in the camps may struggle to imagine local integration options as they envision themselves citizens of the DRC. Others, realizing their exclusion from the host citizenry as well as the limited prospects of integration in the DRC, instead conceptualize their national identities in more global terms, seeing themselves as neither Congolese nor Rwandese (Frydenlund 2015).

In this paper, we build upon a mathematical algorithm for attitude adjustment proposed by Jager and Amblard (2005) to model simple agent interaction that can lead to identity shifts. We introduce additional agent types—nongovernmental (NGO) workers and local host country citizens—and give each different weights of influence over refugee identity shifts. The refugees, beyond the agents in the work of Jager and Amblard (2005), also possess heterogeneous weighting values and thresholds of their own. By exploring these interactions, we seek to add to the conversation about the UN’s durable solutions, particularly about their real-world applicability when the refugees undergo identity changes over time. As such, the study’s leading research question is: how can a shift in identity away from the traditional, territorially-based national identities of their home country happen over time?

## **2 MODEL DEVELOPMENT**

Agent-based modeling (ABM) is the paradigm used in this study to conceptualize and analyze how refugee identity might change over time. Identity is a complex term that constitutes many various layers of one’s self knowledge and self-perception. Here, we simplify “identity” to be a value representing national citizenship identity. The refugees are seeded with two heterogeneous, uniformly distributed identity variables—local and global—ranging (-1, 1).

‘Local’ identity here refers to a refugees’ identification with the local population, where -1 is in complete alignment with the host population’s national identity, and 1 is in complete alignment with the refugee’s home country national identity. For instance, if refugees are from the Democratic Republic of Congo originally, but living in a camp in Rwanda, -1 would be a refugee who thinks and acts as Rwandese and 1 would be a refugee who thinks and acts Congolese. The transition of this identity variable is influenced by interactions with locals in the model. Locals in the model are assigned heterogeneous, uniformly distributed Local identity variables ranging from (-1, 0), where 0 is neutral.

‘Global’ identity, on the other hand, reflects identification with traditionally territorial-based identity or a more cosmopolitan non-national global sense of self. In this variable, -1 represents a completely traditional, territorially-based nationality value, while 1 represents an individual who identifies with no country and may instead see themselves as a citizen of the world. Global identity is affected by interaction with NGO workers, who, in the real world, represent a variety of ethnicities, nationalities, and educational backgrounds including locals and refugees with special skills who work in service of international, regional, or national humanitarian organizations. NGO workers in the model are assigned heterogeneous, uniformly distributed Global identity variables ranging [0,1], where 0 represents a neutral value. In fact, this is an oversimplification as many NGO workers are often drawn from the local population or even refugee population. In this model, since NGO workers are employed by regional and global organizations, we

generalize their identity to be broadly between neutral or globally oriented, simply from their exposure to transnational identity structures (e.g. international employers). Beyond a theoretical model—in future iterations—we could examine a specific refugee camp as a case and estimate the percentage of NGO workers who are locals and give them the ability in the model to occupy a more local-level identity.

While these conceptualizations of ‘identity’ are simplistic, they represent a first attempt to understand how many agents interacting over long periods of time (protraction) might affect clusters of different types of identities arising in the model. These ranges are not based on survey data or other quantitative metrics, but inspired by qualitative data collected from refugees. The foundation for this study is based on interviews conducted among protracted refugees in Rwanda (Frydenlund 2015) which led to questions about how, over decades of encampment, one’s identity might shift away from that of one’s home country.

## **2.1 Agent-based Model**

To construct a model of heterogeneous identity formation through repeated interaction between individuals, we developed an agent-based model with three types of agents: refugees, NGO workers, and local nationals. Since we are primarily focused on the transformation of encamped refugees’ identities, in this model representation, NGO workers and Locals do not adjust their own identities, they only influence the identities of refugees they encounter.

Each agent type has a different geographic limitation. Refugees in the model are confined to a central geographic space (the camp—see Figure 1). NGO workers may move to any location in the model space, representing their ability to move in and out of camps and local communities freely in the real world. Local nationals may not enter the camp. The geographical limitations imposed on the refugees and locals confines their interactions to the borders of the camp. While this is an over-simplistic representation of real life, for the purposes of this theoretical model, the approach mimics limited interactions with locals for the majority of refugees in camps. We acknowledge that in real-world camps, locals often enter the camp to trade or otherwise interact with refugees.

Each type of agent moves randomly around within its geographic confines during each model time step. Identities update when agents meet each other and assess the distance between their own identity and that of the other agent. The algorithm for assessing identity will be described in the following section.

ABM is an appropriate paradigm for understanding individual-level transitions that lead to macro-level effects. In this case, individuals interact to evolve identities, which lead to an overall environment where the population is suited toward certain long-term solutions to their refugee status and not others. For instance, a population of refugees that strongly identifies with the host nation may struggle to reintegrate back into their home communities, but local integration into the host country may be very difficult. Here we draw on the extensive work of political scientists and sociologists who have used ABM to theorize about and test hypotheses on evolving identities and norm diffusion (Lustick and Miodownik 2009, Rousseau and van der Veen 2005). This prior ABM work builds on social theories to understand social group formation (Smaldino et al. 2012), emergence of shared identities (Rousseau and van der Veen 2005), and latent identities (Kuran 1991, Ring 2014, Lustick 2000). This work on identities also leads to implications for research on ethnic mobilization and potential radicalization or militarization among refugee populations (Lustick 2011, Miodownik 2006, Miodownik and Cartrite 2010, Yamamoto 2015). As well as early work on ethnic violence and norm diffusion (Bhavnani and Backer 2000) that resembles a potential precursor for the contagion-like effects of psychological affects that could, for instance, explain how mobs arise from seemingly calm populations (Epstein 2013).

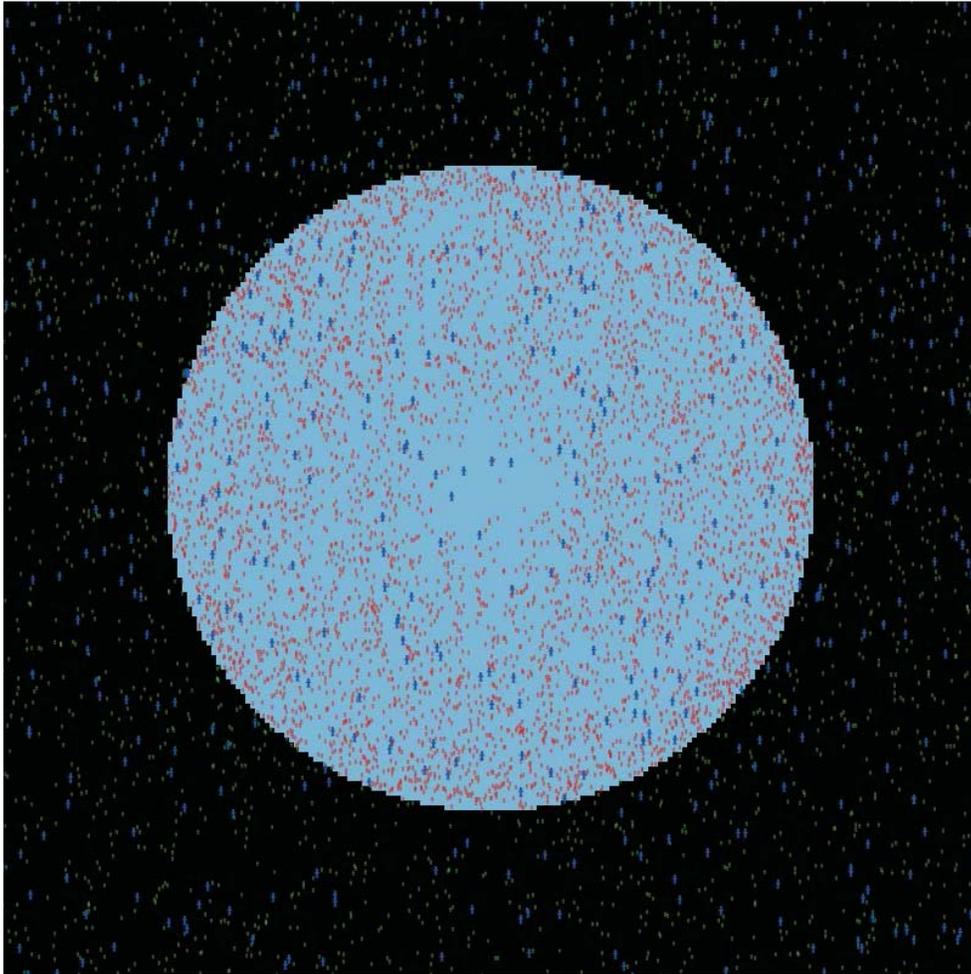


Figure 1: NetLogo Model of Refugee Camp  
Red = Refugee; Blue = NGO worker; Green = Local

## 2.2 Identity Constructs

Existing models have been derived to explain attitude or opinion shifts in populations (Jager and Amblard 2005, Weisbuch et al. 2002). The perspective of simple rules to describe attitude shifts resulting in population groupings can be thought of as a dynamic version of Schelling's famous Segregation Model in which agents use limited input about the types of agents around them to make decisions, ultimately leading to neighborhood segregation (Schelling 1978). In the attitude/opinion shift models, agents have heterogeneous *identity* values and thresholds for change. These thresholds dictate an agent's willingness to change its identity after interaction with an agent of differing identity. As agents interact with one another, they adjust their identities, leading to macro-level shifts in the distribution of identities in the population.

The basic algorithmic components of the national identity shift model presented here are based on the work of Jager and Amblard (2005), in which each agent  $i$  has an identity  $x_i$  and two threshold values,  $t_i$  and  $u_i$ . The upper threshold,  $t_i$ , represents the "latitude of rejection," or the point past which agent  $x_i$ 's identity is so different from that of  $x_j$ , that its identity moves in the opposite direction from  $x_j$ . On the other hand,  $u_i$  represents the "latitude of acceptance," where  $x_i$  and  $x_j$  share close enough identities that, upon interaction,  $x_i$ 's identity moves closer to that of  $x_j$ . This is represented by the following rules, where  $\mu$  is the strength of influence parameter (Jager and Amblard 2005):

$$\begin{aligned} \text{If } |x_i - x_j| < u_i & \quad dx_i = \mu \cdot (x_j - x_i) \\ \text{If } |x_i - x_j| > t_i & \quad dx_i = \mu \cdot (x_i - x_j) \\ \text{If } u_i \leq |x_i - x_j| \leq t_i & \quad \text{No change in identity} \end{aligned}$$

To represent the different influences of Locals and NGOs on Refugees in the model, Locals all share the same  $\mu_L$  and NGOs all share the same  $\mu_N$ . This allows for experimentation by adjusting different weights of influences for each agent type in the simulation runs. Refugees are seeded with heterogeneous, uniformly distributed  $\mu_{Ri}$  that they use to weight interactions with other refugees. As these are heterogeneous and randomized, they cannot be manipulated in the simulation runs.

### **3 DATA AND ANALYSIS**

#### **3.1 Simulation runs**

The model was simulated by varying:

- Number of Locals [0, 2000] by increments of 500
- $\mu_L$  [0.1, 0.5] by increments of 0.1
- $\mu_N$  [0.1, 0.5] by increments of 0.1

The number of refugees was held constant at 5,000 throughout all of the runs. The number of NGO workers, for simplicity, was also held constant at 2,000. Future iterations of the model will consider variations to these values. The model is based on a theoretical conceptualization of identity in order to explore the potential for shifts caused by interactions between refugees and other types of populations. As such, we do not know real-world estimates for  $t_i$  or  $u_i$ . These values are randomly set in the model following a uniform distribution, which allows agents to be heterogeneous in both  $t_i$  or  $u_i$ . This simplification allows us to model the theoretical identity shift, with future versions of the model considering alternative distributions for these values. The model was run to 1,000 ticks and each combination was repeated three times for a total of 1,875 runs. Figure 2 shows a summary of the results for the mean Local and Global identities of all Refugee agents at each of  $\mu$  weight for Locals and NGOs.

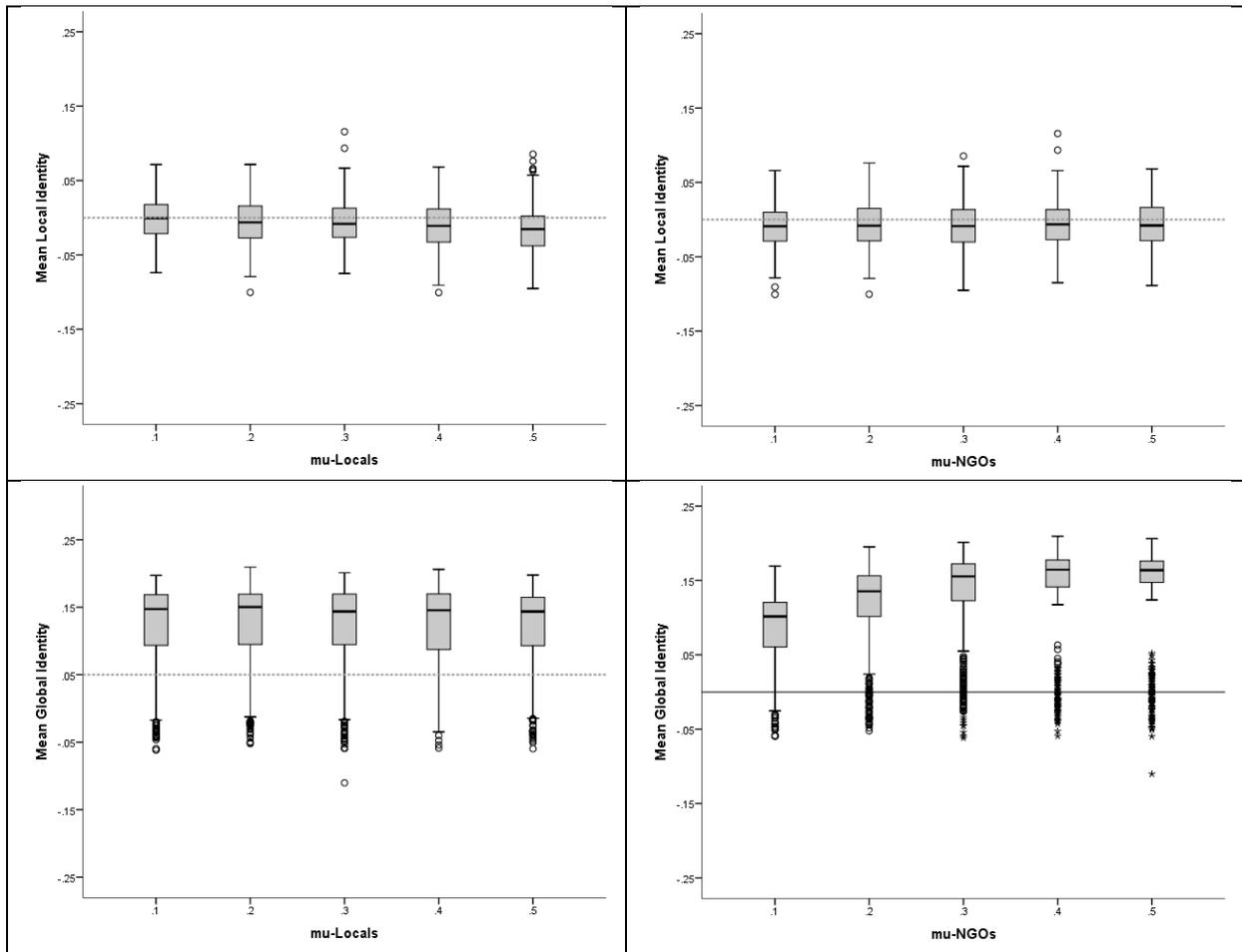


Figure 2: Simulation Run Results varying Locals and NGOs weights of influences

Mean Local identity for Refugee agents in the model at all levels of  $\mu$  for Locals and NGOs follow a normal distribution centered around zero, indicating a mostly neutral identity. In these cases, refugees seem to not identify strongly with their home nationality nor their host nationality. Though this is a theoretical model, this reflects the perception in the refugee camp study previously mentioned.

Since the data follows a normal distribution, the authors performed a regression analysis on the mean local identity for refugee agents using just the number of locals and  $\mu_L$  as independent variables. The Local agents in fact explain very little ( $r^2 = 0.063$ ) of the variation in refugees' identities.

Mean Global identity values for Refugee agents were not normal according to statistical tests and P-P and Q-Q plots. This can be observed in the bottom half of Figure 2 as well, where many outliers appear and the bulk of identities are grouped far from zero (represented by the dotted horizontal line). Figure 3 below breaks the mean Global identity values by  $\mu_N$  values. Since Locals cannot affect Refugee agents' Global identity values, it is unnecessary to consider  $\mu_L$  here. The x-axis in Figure 3 shows the identity values which, in the simulations, cluster around zero (the vertical dotted line) rather than extending to the full range of (-1,1).

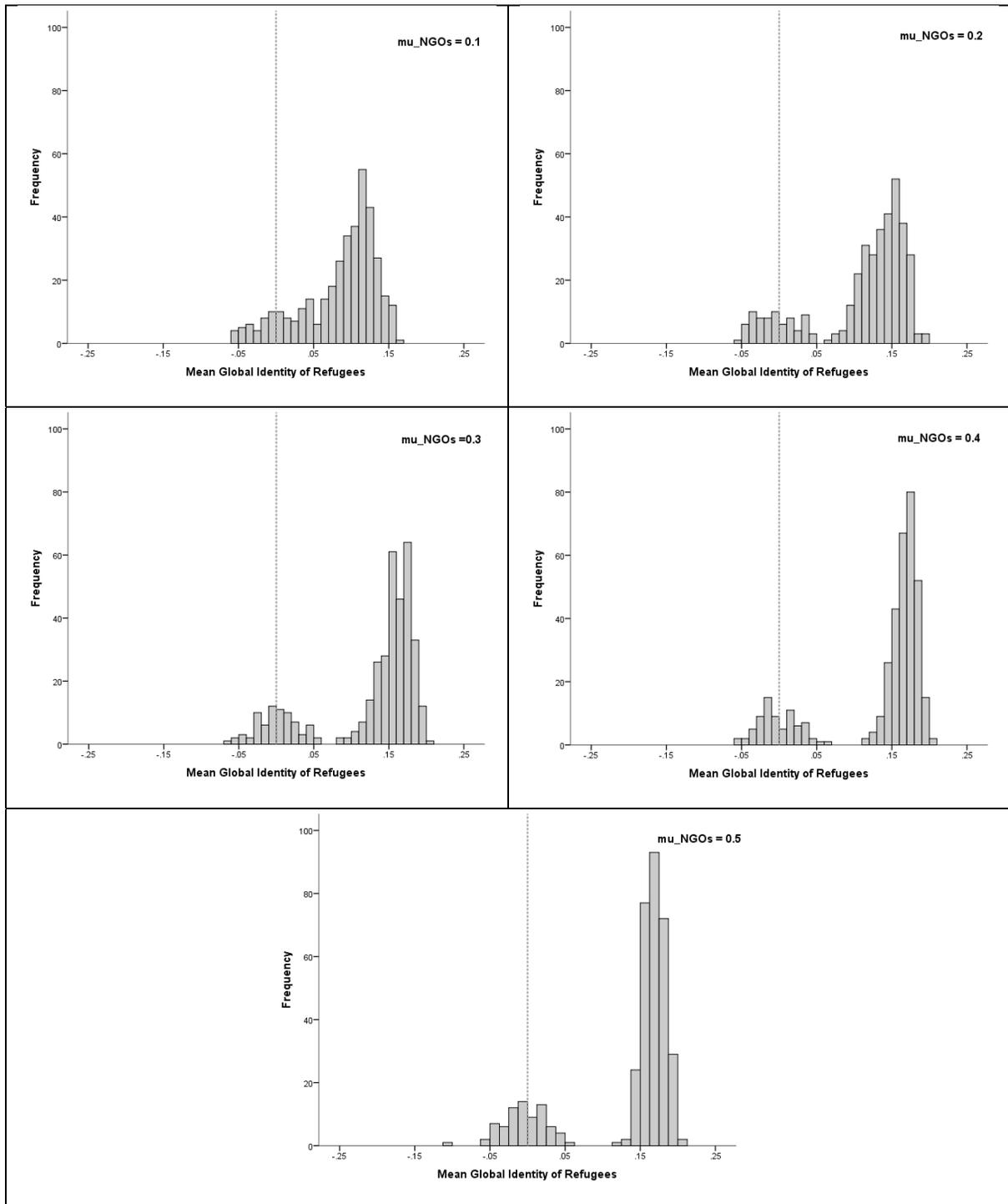


Figure 3: Mean Global Identity Values of Refugee Agents

Notice that as the weight of influence  $\mu_N$  gets bigger (toward 0.5), while one group of refugees continue to maintain a relatively normal distribution around a neutral identity value, a large number break off from the group and develop a more global identity. This transformation into two separate identity groups, while still relatively close to one another—recall that the global identity variable goes up to 1 and the mean of the

upper group is under 0.2—takes nearly the full 1,000 time steps to achieve. This may support hypotheses about long-term identity shifts in protracted refugee situations where refugees remain displaced for decades.

Using a bootstrapping method to account for the bimodal nature of the data, statistical analysis reveals that number of NGO workers and  $\mu_N$  accounts for much more variation in the identities of refugees ( $r^2 = 0.613$ ). This is likely due to the fact that NGO workers are allowed to walk through the entire geographic space of the model, facilitating more interactions with refugees than refugee encounters with Locals. A stronger NGO influence is possible in real-world refugee camp scenarios where aid workers regularly interact with and attend to refugees' needs, allowing the personal communication and exposure that would lead to shifts in identity over the long-term.

## **4 MODEL VALIDATION AND VERIFICATION**

Validation of social models is particularly difficult, as different social values arise in different contexts. What we propose here is a theoretical model to illustrate the possibility of general trends in identity values over long stretches of time, speaking specifically to protracted refugee situations. Based on qualitative comparison with the trends found in the prior fieldwork performed by the first author, the results of this theoretical model indicate that there may be some connection with the shift in national identity seen in real-world refugee camps. Two other methods were used to test the model, explained below.

Without real-world data or measures of identity phenomena, it is unrealistic to validate this type of social model (Ormerod and Rosewell 2009). As Ormerod and Rosewell (2009) propose, one way that we ensured our model was true to its desired purpose, we maintained parsimony and simplified agent interactions and identity constructs. What we desire to show is the theoretical possibility of identity shift in a constrained environment, such as a refugee camp, where interaction with those different than you is infrequent but impactful. This model could generically apply as well to one of the Amish community or similar isolated pocket of culture and society. Given the data constraints on validation, which similarly face many social models, we performed some tests to ensure the model was performing as we expected—types of model verification.

### **4.1 Model Comparison**

In a vein similar to model “docking” (Axtell et al. 1996), we compared the results of our model under similar values of  $U$  and  $T$ , where all agents were homogeneous, to determine visually if the results resemble those from the mathematical paper on which our agent behaviors are based. Jager and Amblard (2005) provide some set, homogeneous values among all agents where the threshold of rejection  $T = 1.6$  and the threshold of acceptance  $U = 0.2$ . To confirm the model was functioning in accordance with the mathematical algorithms proposed by Jager and Amblard (2005), we ran the model with no Locals or NGOs, and all  $t_i = 1.6$  and  $u_i = 0.2$ . The graph shapes roughly follow the same structure as the graphs presented by Jager and Amblard (2005), providing a basic level of model validation.

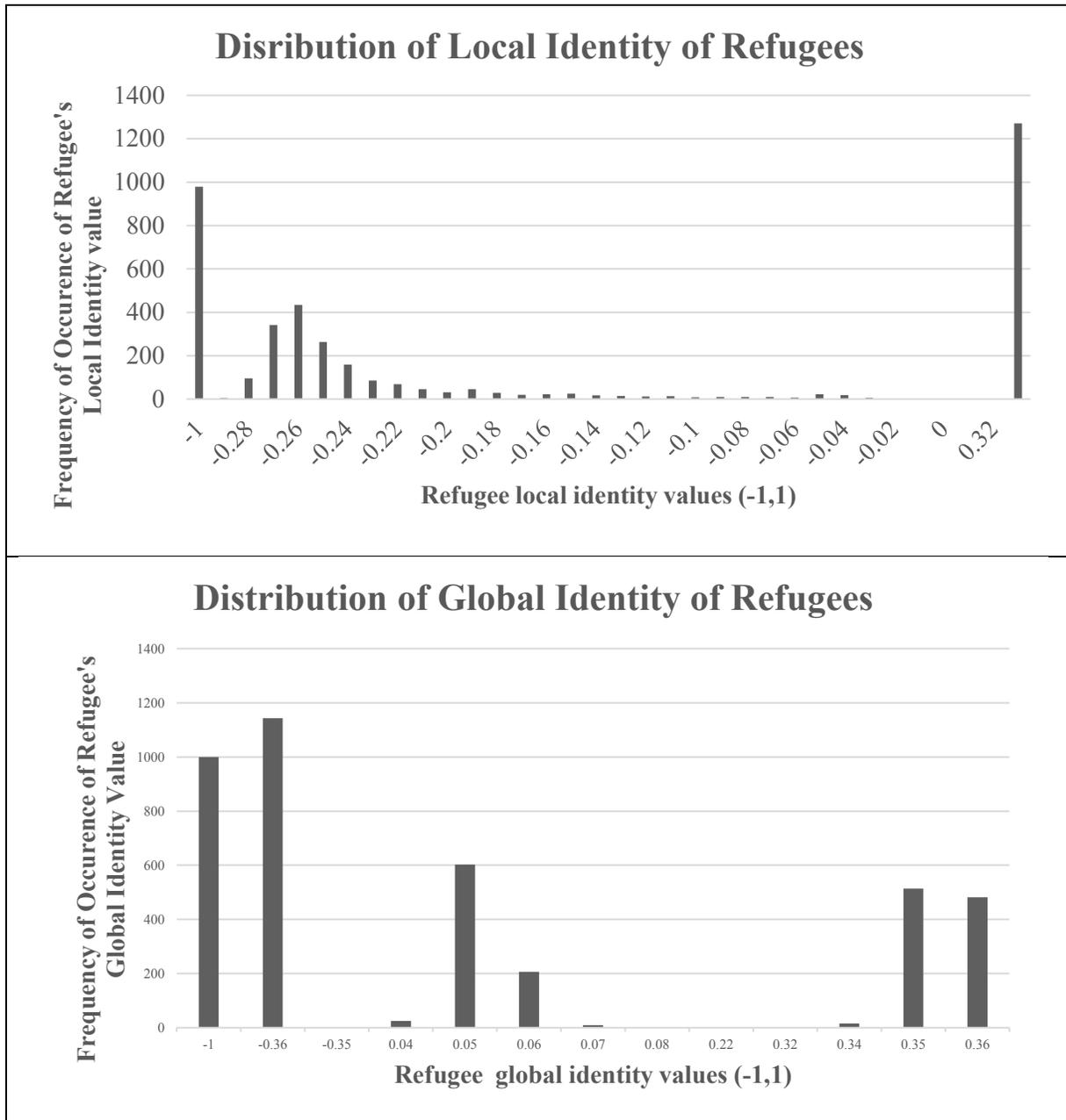


Figure 4: Distribution of Identities with  $T = 1.6$ ,  $U = 0.2$

The model presented in this paper, however, adds two additional agent types and allows different weighting strategies than the original paper considered. That, in combination with the heterogeneity of Refugee agents'  $\mu$  values takes the model well beyond direct comparison with the tests performed by Jager and Amblard (2005).

#### 4.2 ANTS (Verification)

Miller (1998) proposed a class of algorithms for testing the sensitivity and 'breakability' of a model. The algorithms, in this case genetic algorithms, allow one to explore the combination of model parameters to understand any strange outcomes. This immediately flags potential bugs in the model code or sites for particularly interesting emergent behavior. Likewise, attempting to 'break' the model leads to insights about

potential coding problems or aspects of the model that may lead to chaotic behavior. In this case, the model neither broke nor proved sensitive to any of the combinations of model parameters.

While this model is still in its early stages of development, these two tests leave us relatively confident that the model is performing as expected. Means to calibrate the model and compare outcomes with real-world data remain an area of future research and discovery.

## 5 CONCLUSIONS

The theoretical model revealed that, under simplistic assumptions about refugee identity and interaction with other types of agents, over a long window of time, identities can in fact shift away from their original locations. In these models, refugees converged around relatively neutral identities—not aligned with their home country nor with their host country. In terms of a global identity, a small grouping remained relatively neutral, while a portion of the population broke off and moved slightly toward a more international citizenship unbounded by territorial identities. This move was motivated by long-term interaction with NGO workers who represented more non-territorially based identities themselves. It is curious to note that although refugees start out with identities all along the spectrum of national/host-national and territorial/global, the identities over the long-term converge around a more neutral position. This conveys to real-world conversations with refugees' during the first author's fieldwork among protracted refugees in Rwanda. More research is required. Future work will consider alternative starting distributions of refugee identities to evaluate the impact on convergence around alternative identities. In addition, variations of other parameters, like NGO workers and number of refugees, are needed to identify their impact on identity change. Lastly, data acquisition and identity characterization is needed to not only improve the model but also calibrate the model and compare the outcomes with real refugee situations.

## REFERENCES

- Anderson, Benedict. 1991. *Imagined communities : Reflections on the origin and spread of nationalism*. New York, NY: Verso.
- Axtell, Robert, Robert Axelrod, Joshua M. Epstein, and Michael D. Cohen. 1996. "Aligning simulation models: A case study and results." *Computational & Mathematical Organization Theory* 1 (2):123-141. doi: 10.1007/BF01299065.
- Bhavnani, Ravi, and David Backer. 2000. "Localized Ethnic Conflict and Genocide." *Journal of Conflict Resolution* 44 (3):283-306. doi: 10.1177/0022002700044003001.
- Edwards, Adrian. 2016. "Global forced displacement hits records high." *UNHCR News*, 20 June. Accessed December 7, 2016. <http://www.unhcr.org/en-us/news/latest/2016/6/5763b65a4/global-forced-displacement-hits-record-high.html>.
- Epstein, Joshua M. 2013. *Agent zero : toward neurocognitive foundations for generative social science*. Edited by Simon A. Levin and Steven H. Strogatz, *Princeton Studies in Complexity*. Princeton and Oxford: Princeton University Press.
- Frydenlund, Erika. 2015. "'Home was Congo': Refugees and durable displacement in the borderlands of 1,000 hills." Doctor of Philosophy Dissertation, Graduate Program in International Studies, Old Dominion University (3739972).
- Jager, Wander, and Frédéric Amblard. 2005. "Uniformity, Bipolarization and Pluriformity Captured as Generic Stylized Behavior with an Agent-Based Simulation Model of Attitude Change." *Computational & Mathematical Organization Theory* 10 (4):295-303. doi: 10.1007/s10588-005-6282-2.
- Kuran, Timur. 1991. "Now Out of Never: The Element of Surprise in the East European Revolution of 1989." *World Politics* 44 (1):7-48. doi: 10.2307/2010422.
- Lustick, Ian S. 2000. "Agent-based modeling of collective identity: testing constructivist theory." *Journal of Artificial Societies and Social Simulation* 3 (1).

- Lustick, Ian S. 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). doi: DOI: 10.18564/jasss.1696.
- Lustick, Ian S., and Dan Miodownik. 2009. "Abstractions, Ensembles, and Virtualizations Simplicity and Complexity in Agent-Based Modeling." *Comparative Politics* 41 (2):223-244.
- Malkki, Liisa. 1995. *Purity and exile: Violence, memory, and national cosmology among Hutu refugees in Tanzania*. Chicago, IL: University of Chicago Press.
- Miller, John H. 1998. "Active Nonlinear Tests (ANTs) of Complex Simulation Models." *Management Science* 44 (6).
- Miodownik, Dan. 2006. "Cultural Differences and Economic Incentives: an Agent-Based Study of Their Impact on the Emergence of Regional Autonomy Movements." *Journal of Artificial Societies and Social Simulation* 9 (4).
- Miodownik, Dan, and Britt Cartrite. 2010. "Does Political Decentralization Exacerbate or Ameliorate Ethnopolitical Mobilization? A Test of Contesting Propositions." *Political Research Quarterly* 63 (4):731-746. doi: 10.1177/1065912909338462.
- Ormerod, Paul, and Bridget Rosewell. 2009. "Validation and Verification of Agent-Based Models in the Social Sciences." In *Epistemological Aspects of Computer Simulation in the Social Sciences*, edited by Flaminio Squazzoni, 130-140. Springer Berlin Heidelberg.
- Ring, Jonathan. 2014. Iowa City, IA.
- Rousseau, David, and A. Maurits van der Veen. 2005. "The Emergence of a Shared Identity: An Agent-Based Computer Simulation of Idea Diffusion." *The Journal of Conflict Resolution* 49 (5):686-712.
- Schelling, Thomas C. 1978. *Micromotives and Macrobehavior*. New York, NY: W. W. Norton & Company.
- Smaldino, Paul, Cynthia Pickett, Jeffrey Sherman, and Jeffrey Schank. 2012. "An Agent-Based Model of Social Identity Dynamics." *Journal of Artificial Societies and Social Simulation* 15 (4):7. doi: 10.18564/jasss.2030.
- Turner, Simon. 2010. *Politics of Innocence: Hutu identity, conflict and camp life*. Edited by Roger Zetter. 30 vols, *Studies in Forced Migration*. New York, NY: Berghahn Books.
- UNHCR. 2015. UNHCR Global Trends: Forced Displacement in 2014.
- Weisbuch, Gérard, Guillaume Deffuant, Frédéric Amblard, and Jean - Pierre Nadal. 2002. "Meet, discuss, and segregate!" *Complexity* 7 (3):55-63. doi: 10.1002/cplx.10031.
- Yamamoto, Kazuya. 2015. "Mobilization, Flexibility of Identity, and Ethnic Cleavage." *Journal of Artificial Societies and Social Simulation* 18 (2):8. doi: 10.18564/jasss.2669.

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