

# A Model of Intergroup Contact and Social Influence in Shaping Intergroup Attitude

○ムクタフィアフマド 唱爽 出口弘 (東京工業大学)

## A Model of Intergroup Contact and Social Influence in Shaping Intergroup Attitude

\* Muqtafi Akhmad, Shuang Chang, Hiroshi Deguchi (Tokyo Institute of Technology)

**Abstract** Group membership is one of the main components of an individual's concept of the self. The social identity theory states that once an individual acknowledges the self as a member of a certain group then it will affect the individual to share the group's shared beliefs. One of them is the group's attitude toward the outgroup i.e. intergroup attitude. In this paper, we propose a model of intergroup attitude by incorporating intergroup contact and social influence. A simulation of intergroup attitude within segregated and desegregated neighborhoods also presented to demonstrate the model's applicability.

**Keywords:** agent-based model, intergroup attitude, intergroup contact, social influence

### 1 Introduction

Group membership is an integral part of a self the concept, particularly when an individual is a part of a group he/she will be inclined to hold certain beliefs or act in a certain manner than apparent in all of the group members<sup>1</sup>. Particularly if the group is in a conflict with an outgroup then the individual and other fellow ingroup members will hold a negative attitude toward that outgroup as if in a 'consensus'<sup>2</sup>. Thus the analysis of consensus needs to take into account how social influence shape attitude since it is also possible for an individual to shape attitude toward certain outgroup without even any contact experience with the target outgroup<sup>3</sup>.

Intergroup contact<sup>4,5</sup> is a method to dispel such negative attitude toward the outgroup. The main idea is that the more intergroup contact happens between two groups then the lesser the prejudice among those groups will be. The theory has been tested in many lab experiments but there are findings in the real-world settings which differ from what the theory predicts. First is the contextual contact effect in which the majority of prejudice toward minority is in line with the number of the minority within the neighborhood<sup>6</sup>. Second is the realization of integrated communities to improve intergroup relationship which yields mixed results<sup>7</sup>.

There are two contributions to the proposed agent-based model. The first contribution is the formalization of intergroup attitude formation which takes into account the intergroup contact and social influence mechanisms. The second contribution is the exploration of the amount of contact between two groups, which reflected by the different segregation levels between the two groups, affects the intergroup attitude. The agent-based model is deemed to be a suitable method to investigate this issue because of its capability in

linking a macro phenomenon with micro-interactions. This capability is a 'bridge' to utilize findings from social psychology to be relevant in explaining a social phenomenon and to take a suitable intervention to improve the condition.

### 2 Model

This section presents the proposed agent-based model in set notation. The model is run on a discrete time set *Time*. First, consider *Individual* which is the set of individuals or agents in the model. Individuals belong to groups which represented as the set *Group*. Every individual belongs to a certain group which specified by a group membership function  $f_{Group}: Individual \rightarrow Group$ . The individuals are embedded within a social network represented as an undirected graph  $G=(Individual, Connection)$ . Each individual holds attitude toward existing groups at time  $t$  which determined by the function  $f_{Attitude}: Individual \times Group \times Time$ . This attitude is changed during the intergroup contact and social influence among individuals. The final constructs is  $f_{Weight}: Group \times Group$  which determines how open a group is toward social influence from the other group.

The intergroup contact mechanism is implemented as prisoner's dilemma game in which the individual's decision is based on his/her attitude toward the partner's group. Consider a contact between  $i_i$  (a member of group  $g_i$ ) with  $i_j$  (a member of group  $g_j$ ). Now let's consider the  $i_i$ 's point of view. The decision on whether to cooperate or not is formulated as follows

$$f_{Attitude}(i_i, g_j, t) \geq 0 \Rightarrow \text{cooperate}$$

$$f_{Attitude}(i_i, g_j, t) < 0 \Rightarrow \text{not cooperate}$$

The individual  $i_j$  also decide his/her strategy in the same manner, based on his/her attitude on  $g_i$ .

After each individual decide on which strategy is used in the prisoner's dilemma game, each individual update his/her attitude toward the partner's group. Now consider  $i_i$ 's point of view,  $i_i$ 's attitude toward  $g_j$  is updated as follows

$$f_{Attitude}(i_i, g_j, t + 1) = f_{Attitude}(i_i, g_j, t) + \alpha_i$$

In which

$$\alpha_i = \begin{cases} \delta, & \text{if } i_j \text{ cooperate} \\ -\delta, & \text{if } i_j \text{ not cooperate} \end{cases}$$

The value of  $\delta$  is set as a simulation parameter. The individual  $i_j$ 's attitude toward  $g_i$  also updated in the same manner, based on  $i_i$ 's strategy during the prisoner's dilemma game.

The social influence mechanism is implemented as social influence mechanism with a certain attitude difference tolerance. Consider  $i_i$  (a member of group  $g_i$ ) that receives social influence from the individual  $i_j$  (a member of group  $g_j$ ) at time  $t$ . The individual  $i_i$ 's attitude regarding any group  $g$  in *Group* is updated as follows

$$f_{Attitude}(i_i, g, t + 1) = f_{Attitude}(i_i, g, t) + \Delta Attitude * w_{ij}$$

In which

$$\Delta Attitude = f_{Attitude}(i_j, g, t) - f_{Attitude}(i_i, g, t)$$

$$w_{ij} = (\gamma - |\Delta Attitude|) * f_{Weight}(g_i, g_j)$$

The  $\Delta Attitude$  denotes attitude difference between the individuals, while  $\gamma$  denotes the attitude difference tolerance, and  $w_{ij}$  denotes the influence weight. Negative value on  $w_{ij}$  result in attitude divergence while positive value, on the other hand, result in attitude convergence.

### 3 Simulation and Discussion

A simulation of intergroup attitude between two groups within the same neighborhood has been conducted. In the simulation, three neighborhood realizations were created with different levels of segregation. The segregation level was measured by the Moran's I statistics which ranged from 0 to 1. I=0 means the two groups are completely integrated while I=1 means the two groups are completely segregated. Three neighborhoods were constructed with the respective I statistics 0.2 (low segregation), 0.5 (medium segregation), and 0.8 (high segregation). Based on each neighborhood, a social network is constructed which based on the individuals' Moore's neighborhood.

Simulation results show the persistence of the norm on the outgroup attitude and also the correlation between the outgroup attitude with the number of outgroup connection in the individuals' social network which consistent with existing

findings from the real-world cases. Besides that, the simulation result also shows support on the social learning in the city planning<sup>8</sup> i.e. the consideration of the community condition in deciding what kind of approach is the best to maintain intergroup harmony.

### References

1. Hogg, M. A. Social Identity Theory. in *Understanding Peace and Conflict Through Social Identity Theory: Contemporary Global Perspectives* (eds. McKeown, S., Haji, R. & Ferguson, N.) 3–17 (Springer International Publishing, 2016). doi:10.1007/978-3-319-29869-6\_1
2. Haslam, S. A., Turner, J. C., Oakes, P. J., Reynolds, K. J. & Doosje, B. From personal pictures in the head to collective tools in the world: How shared stereotypes allow groups to represent and change social reality. in *Stereotypes as explanations: The formation of meaningful beliefs about social groups*. 157–185 (Cambridge University Press, 2002). doi:10.1017/CBO9780511489877.009
3. Bar-Tal, D. Development of social categories and stereotypes in early childhood: The case of "The Arab" concept formation, stereotype and attitudes by Jewish children in Israel. *Int. J. Intercult. Relations* (1996). doi:10.1016/0147-1767(96)00023-5
4. Allport, G. W. The Nature of prejudice. *The nature of prejudice* (1954).
5. Pettigrew, T. F., Tropp, L. R., Wagner, U. & Christ, O. Recent advances in intergroup contact theory. *International Journal of Intercultural Relations* (2011). doi:10.1016/j.ijintrel.2011.03.001
6. Stein, R. M., Post, S. S. & Rinden, A. L. Reconciling Context and Contact Effects on Racial Attitudes. *Polit. Res. Q.* (2006). doi:10.2307/449282
7. PALUCK, E. L., GREEN, S. A. & GREEN, D. P. The contact hypothesis re-evaluated. *Behav. Public Policy* 1– 30 (2018). doi:10.1017 / bpp .2018 .25
8. Bollens, S. A. Urban planning and intergroup conflict: Confronting a fractured public interest. in *Dialogues in Urban and Regional Planning 1* (2004). doi:10.4324/9780203314623