

Case-based Model of Emotional Expression Influence on Work Group Socialization and Performance

Lu Yang and Nigel Gilbert

Centre for Research on Social Simulation, Department of Sociology,
School of Human Sciences, University of Surrey, Guildford, GU2 7XH,
UK.

Email: {l.yang, n.gilbert}@surrey.ac.uk

Abstract

An agent-based computational model, based on longitudinal ethnographic data about the dynamics of intra-group behaviour and work group performance, has been developed from observing an organizational group in the service sector. The model, in which the agents represent workers and tasks, is used to assess the effect of emotional expressions on the dynamics of interpersonal behaviour in work groups, particularly for groups that have recent newcomers.

The model simulates the gradual socialization of newcomers into the work group. Through experimenting with the model, conclusions about the factors that influence the socialization process were studied in order to obtain a better understanding of the effect of emotional expressions. It is shown that although positive emotional display accelerates the socialization process, it can have negative effects on work group performance.

Keywords:

Emotional expression, work group socialization, simulation, group performance

Introduction

By means of experiments with a computational model that simulates reactions to emotional expression, we show that although positive emotional display accelerates a work group socialization process, it can have a negative effect on work group performance. The agent-based computational model is based on longitudinal ethnographic data about the dynamics of intra-group behaviour and work group performance obtained from observing an organizational group in the service sector.

Background

Organizational socialization has attracted much research attention recently, as workers in some sectors feel less loyalty to their job, temporary work becomes more common and frequent organizational restructuring occurs more frequently (Moreland and Levine 2000). Moreland and Levine argue that better socialization can enhance work productivity and decrease the turnover rate. The most recently formed work group socialization theory focuses on three psychological processes: evaluation, commitment and role transition (Moreland et al. 2001). When a new group forms, one of the first concerns of all members is to know something about each other. When a newcomer enters an established group, the old members want to gather as much information as they can about him/her, and vice versa. Evaluation involves the newcomer as well as the established group members assessing one another's worthiness in relation to the other individual's personal needs and the group's achievement as a whole. Based on constant interactions, each individual develops commitment to the others. In this way, the relational ties between individuals can be strengthened or weakened over time. When the level of commitment reaches a certain threshold, a role transition occurs. The newcomer's membership switches from out-group to in-group. They start experiencing similar group culture and norms, hence collective behaviours. The process is described as self-categorization theory by Hogg and Terry (2000).

Through the socialization process, the group reform, newcomers and established members adapt to the new environment and culture, individuals coordinate with each other to achieve the group goals. Depends on the group types, its goal can be products, service, decisions or performs. However, whether the work group is existed within a larger organisation or not, outsiders evaluate group as a whole entity, rather than counted the out-

comes down to the individuals who are in the group. Hence, group's ability to function to meet its customers' need is crucial to the group performance (Staw and Cummings 1998).

One way to measure the group performance is the productivity. Gedye (1979) defines productivity as the ratio of goods or services produced or offered, to given resources, such as material cost, labour cost or capital assets. In this study, we compare group's productivity based on same resources, but in different time periods. Therefore, we measure the amount of group tasks that have been done within constant time interval as the simulation runs. The group tasks here refer to any piece of work that group members have to do in order to complete the goal successfully.

Individuals in the group could work on some tasks independently, as well as jointly with one another. Hackman's (1987) group process framework illustrates group process actually as interaction process. It is the social interactions among group members. In this model, we investigate two major elements that have influence on group members' interactions. One is group demography, the other is emotional expressions.

Any visible or salient demographic characteristics can use for categorising individuals in certain situation, no matter they are relevant to their work tasks or not (Staw and Cummings 1998). Tsui et al. (1992) note that certain demographic attributes such as race, sex and age are more visible and likely to be salient under most circumstances. There are some researches supports that peoples who have similar demographic attributes affect their social integration (Hoffman 1985; McPherson et al. 2001; Ward et al. 1985).

Emotions or affect arising during social interactions have some bearing on the perceptions of workplace relationships (Rafaeli and Sutton 1989). Two kinds of emotion are often distinguished. One is emotion as an internal process of the individual: it is what you feel. The other is 'emotional expression': what others see of you through facial expression, gesture, etc. Morris and Keltner's (2000) recent research draws attention on emotional expressions social functions. They focus on the relations and future behaviours between emotions 'sender' and 'receiver'. It also traces some insights on how emotions occur in response to particular problems in social relations, and it has positive effects in changing relational problems. In our work, we are interested in what effect emotional expression has for the dy-

namics of interpersonal behaviour in work groups, particularly for groups that have recent newcomers.

Case study and methods

An agent-based computational model has built upon the above theoretical assumptions as well as detailed empirical data. A service team work-group was studied by means of participant observation for a period of 30 weeks. Observations were taken for around four to five hours each time, two or three times a week on a part-time basis. The service team members were employed part-time. Extensive fieldnotes were coded and analyzed by the first author, who participated in the work group as one of the team members.

Since researchers drew much attention on the area of emotions in organisations in the early nineties, service sectors have always been the main research focus. The possible reasons for this might be that; there are front-line services, which link the organisations and the market environment. The quality of the frontline services directly affects the organisations' profit and image.

We chose the lending service work group in the library as the case. In order to develop the model as generic as possible for customer service sector, we evaluate the case with the following requirements:

- It has all three attributes of work groups (Hackman 1990: 4), which includes:
 - 'Real groups': This means groups that are intact social systems, complete with boundaries, interdependence among members, and differentiated member roles (Alderfer 1977, cited in Hackman 1990). The library work group has its own structure and relations, clearly differentiated with other group. Its members have their roles based on tasks.
 - Has 'one or more tasks to perform': the outcome that the group produce can be 'identified as its product, such as service, decision, [etc., and it should possibly be able to] measure and evaluate the product'. The product of the library group is service. To provide this service, all the members are required perform either individual or collective tasks.
 - 'Operate in an organizational context': That is this social system 'belongs to a larger social system in which the group operates'. The

group in the library has a few layers of hierarchies; it belongs to the public service team in the library, which is a division of the university library. In addition, University library is under the management of the University.

- It falls into the service sections group, precisely, customer service group. It has a frontline service, which opens to the public. Although customer service satisfaction is evaluated every year using survey that is not our main concern. What we focus on most is that behind the frontline, to deliver the service, how the tasks performance is affected by other factors, including emotional expressions.
- To compromise from various types of customer service organisations. The work group in the library has some general characteristics in the sector. For instance, compare with the catering customer service, the library work group's tasks are mainly manual work, it has its rush hours as well. The organisation it belongs to is a non-profit organisation, which could also reflect some insights from those non-profit organisational groups, such as government public service group, charity group, etc.

Based on the field work data, a computational model was developed. It simulates the gradual socialization of newcomers into the team and is formulated as an agent-based model (Gilbert and Troitzsch 2005) in which the agents represent workers and tasks.

Model design

This agent-based simulation aims to investigate the effects of emotional expression on work group performance and socialization process. We design the model to reproduce reality in the virtual environment, expecting to have similar results compared to the empirical data collected from the field.

The baseline model was as simple as number of people work on number of tasks. Then step by step, we add attributes to the agents, and apply more behaviour rules according to the observational data:

- People were different in their age, gender, race, personality, etc. It also showed that people with similar characteristics attract each other. Therefore, computer agents (workers) were given different characteristics and they build up their initial attraction based on their demographic characteristics.

- In any of the work practice, there are various tasks. All the tasks have priority levels. For instance, in our case, sorting the book trolleys in order has higher priority than shelving short loan books; serving customers has the highest priority among all the other tasks. Based on these, the tasks in the simulation model are designed to have priority levels from 0-9. Priority level 9 represents frontline service; priority 8 means sorting book trolleys, and so on. They were also assigned to certain spatial areas in the simulation world according to the priority level.
- To represent the newcomers and existing members of the group in the simulation world, colours are used to distinguish them.
- The time for newcomers to become the established group members are defined to certain time steps, which represents the official probation time of newcomers in the organisation.
- There are also turnovers in the work group. However, there will be new agents replace the agents who leave the group.
- Tasks have completion time, it set to be constant. In the real field, although tasks completion time varies, they reappear many times. It is hard to tell the completion time difference among the tasks.
- Same time period is given to represent the work shift. After each shift, the group performance is measured by counting the number of completed tasks by the whole group.
- When there are fewer tasks and also the tasks have low priorities, workers become 'free riders'.
- Emotional expressions are divided into two categories: extreme and moderate. In the simulation model, agents are also assigned to different emotional states. For instance, agents who work on task that priority level 9 (frontline service) can only show positive emotions. Agents who display happiness attract other agents to join and stay with it for a while; while who display anger decrease the attraction level to others.
- Agents build up their own network. Social relations between one another can be strong or weak. These network ties are represented as commitment value in the simulation model, which constantly updated over time by agents interactions and emotional displays.

Initially, a group of agents representing workers are introduced in the centre of the virtual environment, with a maximum of ten tasks scattered in ten geographically which are divided areas according to the task completion priority level. The goal of the worker agent is to accomplish the maximum number of the tasks (based on some criterion) in a given time interval. Random tasks reappear after a set time on condition of not ex-

ceeding the maximum number. This keeps the simulation work in repeated cycles. Individual as well as group performances are measured by the total number of completed tasks at each time interval.

During the initialization stage, the worker agents evaluate each other by their demographic characteristics, including age, gender, race, and aggression level. This is supported by the fact that people tend to get attracted to and establish social network connections with others who are similar to themselves (McPherson et al. 2001). Based on this initial evaluation, they initialize a 'commitment' matrix that represents the agent's perception of its social network ties within the group. Every worker agent has a tendency to move towards the other worker agent with whom it has the highest commitment value. Furthermore, the commitment values are updated every time the worker agents meet together or accomplish a common task.

The commitment values are also influenced by the emotional expressions of the workers through workers' interactions. Two types of emotional expressions are included in the model: extreme (i.e., happy, sad and angry) and moderate (i.e., moderately positive or negative emotions). When there is a worker express certain emotions, other worker agents make decision on their own behaviour based on the expressed emotion and their commitment ties among them. When a new worker agent's commitment value reaches a certain threshold, it is considered to be socialized into the group. The model design is also described in figure 1.

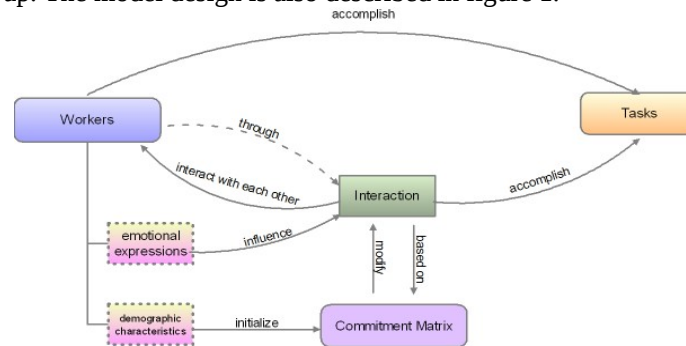


Fig. 1. Simulation model design

Experiments and results

We performed a number of simulation runs to examine how the group performance and group commitment differ with workers' different emotional displays. The assumptions made here are that the workgroup has no hierarchy level, seeking information from other agents are not the current agents' goal and the agents' behaviour changes are not influenced by other factors except emotions. Figure 2 illustrates our model process. For the experiments, we have manipulated the experiments with workers' display positive emotional expressions only, which include the states happy and moderate positive emotions. For each experiment, we take the mean value of every set of data that exported from the simulation run.

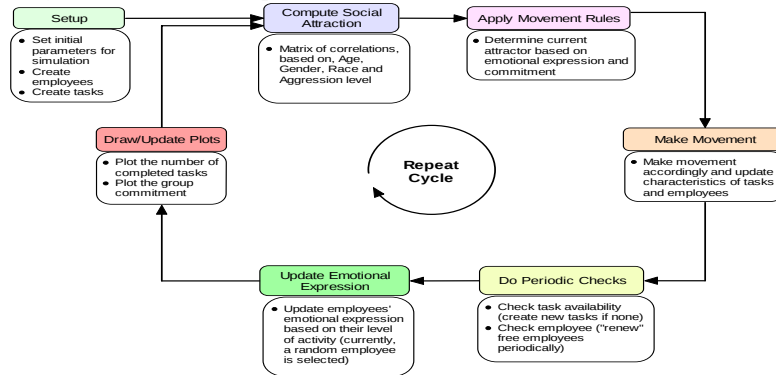
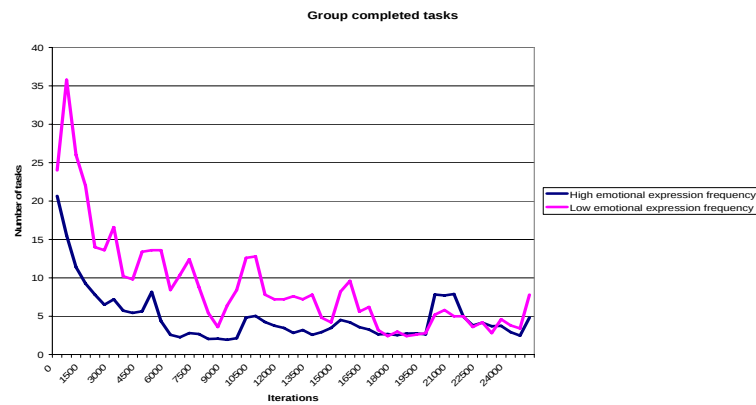
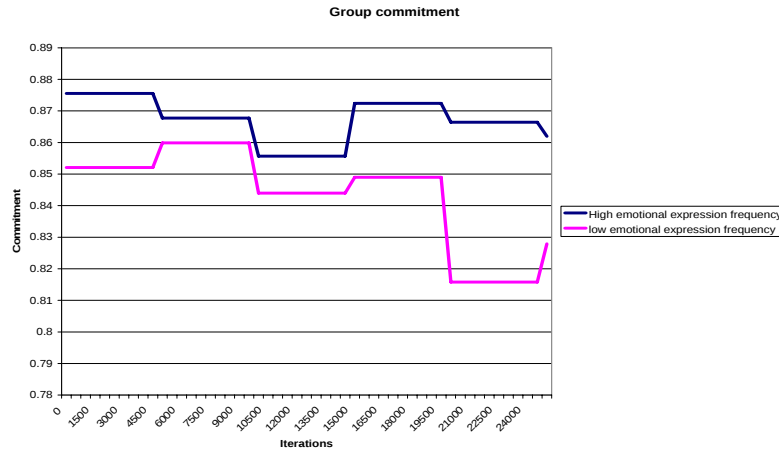


Fig. 2. Process of the simulation model

Experiment 1: Emotional display frequency – high vs. low



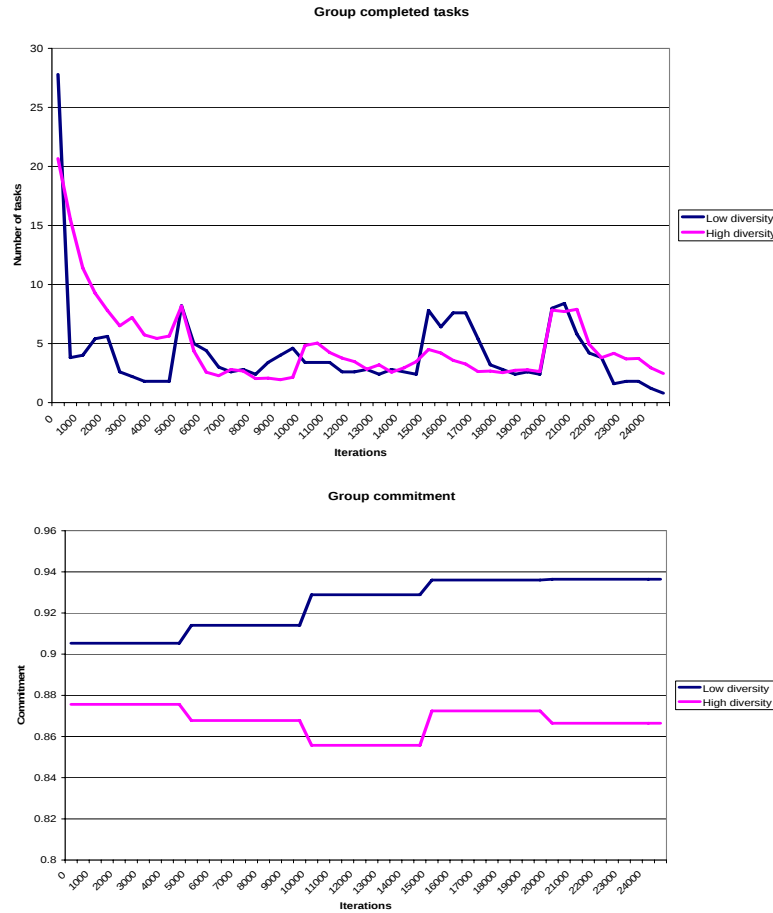
The above graph shows the group completed tasks after 25000 iterations. The general trend of the graph is declining. However, in detail, the total numbers of group completed tasks are jumping up and down. Before the new employees join the group (every 5000 time steps), the group completed tasks drops dramatically. This is because most of the agents have developed high commitment value towards others; they have reacted to other's positive emotions. Agents left the tasks they suppose to do, but interacting with others. It bounces back for a while until the next cycle of new employees join in the group. Every time, when there are new agents join the group, the simulation recalculates their initial commitment matrix. Compare high with low emotional expression frequency, we can see that the whole group is generally perform better with low emotional expression frequency, with higher number of tasks been done.



This graph is generated from the same simulation runs. The commitment value is affected by the new employees join in frequency, which is every 5000 time steps. If we compare the commitment graph with the group completed task graph, we can see that the group completed tasks rise when the group commitment drop down. In the simulation model, the agents' initial commitment value is based on calculating the matrix of each others demographic characteristics. Those characteristics are generated by the random number generator in the computer program. Therefore, if the newcomers who join the group happen to have the similar random number, the commitment value will be higher. Hence affect the group commitment value, which calculated on the average of every group members' commitment value with each other. In general, group with high emotional display frequency has higher group commitment value.

Experiment 2: Group diversity – high vs. low

In the second experiment, we modify the agents' demographic attributes. Clear differences have shown in the following two graphs. Group with high diversity approved to have lower group commitment value, but better group performance; while group with low diversity tend to have higher group commitment value, but lower productivity.



Plots of group performance and group commitment showed that positive emotional display increased the commitment value, which help fasten the socialization process. However, the group performance went down, as agents interacted with each other more often and fewer tasks were accom-

plished. The main patterns of the simulation results are similar to the results we gained from the empirical work.

Conclusion and future work

In this paper, we have shown that the use of ethnographic method in combination of social simulation can be used to study the factors which influence socialization processes, to obtain a better understanding of the effect of emotional expressions on the work group socialization process.

However, the model is developed as a case-based model. The social phenomenon investigated in this model maybe limited to one specific workgroup. The project aims to construct a computational model that applies to various organizational groups in service sectors. Hence, the challenge remains on how to move forward from the case-based model to typification (Boero and Squazzoni 2005). The future work will consider extending model to a generalized model of service group by obtaining empirical data from other groups to compare with the current model. "All one can do is to gradually increase one's confidence in a model by testing it against observation in more and more ways" (Gilbert 2005b: 6).

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