A cross-cultural investigation of the goal-attainment-likelihood construct and its effect on satisfaction with technology supported collaboration

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Abstract[1]

Collaboration technologies often provide benefits to teams working together to achieve a common goal. Such technologies may be abandoned, however, if users are dissatisfied with the work practices that they support. Goal attainment has been identified as a key antecedent to satisfaction with technology supported collaboration. We examine the theoretical relationship between perceived changes in the likelihood of goal attainment and satisfaction with technology supported collaboration (operationalized as satisfaction with meeting processes and outcomes). Because culture may influence the values and perceptions of team members, we tested the model in two cultures (the Netherlands and the United States) using a questionnaire translated into both English and Dutch to collect data from government and industry teams working on real problems in their organizations. Implications of the model for information systems managers, including the management of cross-cultural teams, are discussed.

1. Introduction

When used effectively, collaboration technologies often provide benefits to groups working together to achieve a common goal. The simultaneous and anonymous communication afforded by a group support system may improve efficiency and encourage more open and honest communication [19]. Voice and video conferencing, shared documents, and online workspaces help geographically displaced teams work together over a distance [20]. Although technology supported collaboration has been shown to improve team performance in many instances [12], it may nonetheless be abandoned if users feel dissatisfied [1, 5, 6]. Therefore, an understanding of satisfaction will likely be useful to researchers and practitioners seeking to incorporate technology into an organization's collaborative work practices.

It is now commonplace for teams to include members from diverse cultures. Yet, cultural differences can impede productivity when norms and expectations differ substantially among team members [2]. Communication processes in teams include social cues and mechanisms that may differ from culture to culture [18]. For example, one of the dimensions along which national cultures vary is power distance [14]. Power distance is defined as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally [14]." Individuals from cultures with a relatively low power distance may be less likely to follow an organization hierarchy when seeking information than would individuals from high power distance cultures. Blanning and Reinig [3] report, for example, some reluctance among Hong Kong executives to embrace the anonymity feature of GSS in the workplace because the executives thought it was important to know the CEO's position on a given issue. Experiences with executives from the US, the Netherlands, Germany, Tanzania, and South Africa, however, show that anonymity has been widely valued in the workplace as a means to foster open communication [23-25]. This illustrates how culture may influence the acceptance, adoption, and use of various types of technology supported collaboration.

Researches have addressed the role of culture in collaboration research from a number of perspectives. One approach is to examine the

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cultural differences in norms and expectations and seek ways to actively manage and leverage those differences. This approach could examine how differences of culture correlate with interpretations of and acceptance of collaborative work practices. Another approach is to theorize about human cognition and then to explore how culture can shape and otherwise influence the cognitive process. This approach would involve first building a theoretical model based on assumptions about human cognition and then exploring how culture can shape the inputs and outputs of cognitive mechanisms. We undertake such an approach in the present paper. In the next section, we advance a theoretical proposition to help explain variations in satisfaction with technology supported collaboration. We then discuss how culture influences the instantiations of the constructs in the model. If the logic of the theory holds, its predictions should manifest in all cultures, even if the constructs instantiate differently. We therefore test the model in two cultures (the Netherlands and the United States) using a questionnaire translated into both English and Dutch to collect data from government and industry teams working on real problems in their organizations. We discuss our findings and propose directions for further research.

2. Theory

In order for a team to successfully adopt a collaboration technology, team members must believe that the technology will serve their individual and group goals. Goals are described by Locke and Latham [16] as "something that a person wants to achieve (p. 2)" or "desired end states (p. 2)." The setting of explicit work goals has been shown to affect work performance [16]. Goals serve to direct efforts towards goal-relevant activities and help avoid activities not relevant to goals [17]. Further, when people hold goals that they value highly, they are more likely to pursue them with greater energy and persistence [17]. In the context of technology supported collaboration, Nunamaker et al. [20] identify the need for individual goals to be aligned with team goals in order to motivate virtual team members to meet deadlines and otherwise contributed effectively.

Researchers have identified goal attainment as a useful theoretical predictor of satisfaction with technology supported collaboration. Reinig [21, 22] operationalized goal attainment as the similarity between an individual's preference and a group's final decision on a rank order task. This measure, called relative individual goal attainment [8], significantly correlated with satisfaction with meeting outcome. That is, participants whose individual goals were accommodated by the collaboration effort reported higher levels of satisfaction than individuals whose preferences were not accommodated by the collaboration. In a related study, Briggs et al. [6] showed that perceived net goal attainment, defined as "… the degree to which one perceives that some object of satisfaction either advances or hinders the attainment of one's salient individual goals. (p. 588)", correlated significantly with both satisfaction with meeting outcome and satisfaction with meeting process. Thus, individuals who perceived the collaboration process and outcome as advancing their goals expressed greater satisfaction than those who did not perceive the collaboration process as advancing their goals.

The above studies are founded on Locke and Latham's [15, 16] goal-setting theory, which posits that the mind automatically and subconsciously evaluates actions, objects, and events to determine whether individual goals are being advanced or thwarted. Goals differ substantially in their value to the individual and, all else being equal, higher value goals have a greater capacity for eliciting higher levels of affective arousal than do lower value goals. When goals are advanced, the affective arousal is labeled as satisfaction and when goals are thwarted the affective arousal is labeled as dissatisfaction.

2.1 Likelihood of Goal Attainment

An important aspect of goal setting theory is that many goals, including organizational goals that require meaningful collaboration, can only be accomplished through persistent, repeated efforts over long periods of times. For example, the goal of publishing research findings can require collaboration among research collaborators over a period of years. Other examples include designing an information system, building a strategic plan, and bringing a new product to market. For these larger, real-life goals, success or failure is seldom realized in a single collaboration effort and the probability or likelihood of success is fluid throughout the

duration of the project, sometimes increasing and decreasing along the way.

Goal setting theory suggests that with each collaboration effort, the activity will be automatically and subconsciously evaluated in terms of whether it helped or hindered the possibility of ultimately achieving the goal. Even if a goal has not yet been attained or thwarted, if a collaborative effort is perceived as increasing the likelihood that goals may be attained, satisfaction should manifest. If a collaborative effort is is perceived as decreasing the likelihood that goals will be attained, dissatisfaction should manifest. A positive change in likelihood-of-goal attainment should engender a positive satisfaction response; a negative change in likelihood should engender a dissatisfaction response. The level of affective arousal for a given change in likelihood-of-goal-attainment is dependent on the value an individual ascribes to the goal.

The theoretical relationship between likelihood of goal attainment (LGA) and affective arousal is depicted in Figure 1. The x-axis represents the relative change in perceived likelihood of goal attainment. In the present context, the goal would be the purpose of the collaboration effort. The y-axis is denoted as affective arousal and intersects the x-axis at a point representing zero change in likelihood. In such an event (i.e., zero change in likelihood), all else being equal, no affective arousal and consequently neither satisfaction nor dissatisfaction would manifest. If a positive change in LGA were to occur, then affective arousal would manifest in the form of satisfaction. If a negative change in LGA were to occur, then affective arousal would manifest in the form of dissatisfaction. Note that the magnitude of satisfaction or dissatisfaction would be greater for higher value goals than lower value goals. Although these relationships are shown as lines for simplicity, we do not assume that these relationships would necessarily be linear.

2.2 Hypotheses

Researchers studying satisfaction with technology supported collaboration have measured both satisfaction with the collaboration process (SP) and satisfaction with the collaboration outcome (SO) [e.g., 6, 11, 22]. We test the relationship between LGA and these two objects of satisfaction with the following hypotheses:

Hypothesis 1: Individuals who score higher on a change in likelihood-of-goal-attainment scale will tend to score higher on a satisfaction-with-meeting-outcome scale.

Hypothesis 2: Individuals who score higher on a change in likelihood-of-goal-attainment scale will tend to score higher on a satisfaction-with-meeting-process scale.

Two observational studies were conducted to test these hypotheses in two different cultures. The methodology for these studies is presented in the following section.

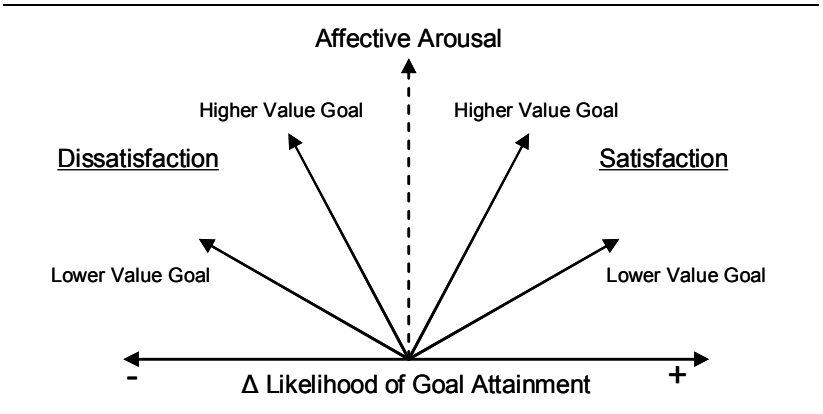

Figure 1. Theoretical link between change in likelihood-of-goal-attainment and satisfaction assuming a goal value remains constant.

3. Methodology

In order to conduct this research we needed to identify two distinct cultures in which we could collect data such that: a) in each culture, we had direct access to collaborative teams from a variety of organizations working on real-life problems and b) the teams in both cultures were using similar collaborative tools. The first requirement was necessary to allow us to collect survey data in the field and the second ensured that any differences of outcome we observed were based on differences of cultures and not simply differences of technological interventions. From previous research projects, the authors had in place a network of professional facilitators and managers with sufficient number for data collection in the Netherlands and the United States. Thus, we conducted two studies simultaneously in the Netherlands and the United States to test our hypotheses. The purpose was to determine whether the relationships proposed by the theory were supported across multiple cultures with real organizational teams working on workplace tasks while receiving similar technological support for their collaboration.

3.1 Measures

To collect field data, we constructed an instrument to measure LGA, SP and SO as well as demographic data. For the SP and SO constructs, we used the items published by Briggs et al. [5]. To verify the equivalence of the instruments, we reverse translated both versions in English (Appendix A) and Dutch by native speakers of both languages. The results were deemed to be equivalent by speakers of both languages.

The Dutch language items were validated previously [5] but the English items had not yet been validated. We developed four additional items to measure LGA. These items were initially written in English and were then translated to Dutch and subsequently reverse translated by a professional translator back to English. The original and reverse translated items were deemed consistent by native speakers of both languages. The English version of the four LGA items (using a 7-point scale, 1 = much less, 7 = much more) is presented here:

1. The meeting made it (less/more) likely that I would attain something I want.
2. Because of the meeting, I am (less/more) likely to succeed on something I care about.
3. I am (less/more) likely to attain my goals because of this meeting.
4. Due to this meeting I am (less/more) likely to get what I want.

Although more scale items might have been preferable for statistical purposes, we kept the instrument short so that it could be used quickly and easily among working professionals in the field. We note from prior experience that real organizational teams are less willing to complete questionnaires than are participants in lab studies. We have found that shorter questionnaires are viewed as less bothersome by the participants in the field.

3.2 Participants

We collected data from business and government groups in both the Netherlands and the United States. All of the groups were meeting to solve complex organizational problems and all received support from a professional facilitator and used a group support system. None of the authors were involved in facilitating any of the groups, nor in administering the questionnaire after any of the meetings. There were 180 Dutch participants from 13 groups. The average age of the Dutch participants was 39.8 years (s=10.2) and their average work experience was 16.6 years (s=9.9). There were 187 US participants from 15 groups. The average age of the US participants was 39.7 years (s=13.3) and their average work experience was 18.8 years (s=12.8). The following section presents a statistical analysis of this data.

4. Results

Prior to hypothesis testing, the instrument was first tested for reliability and construct validity. Reliability is the extent to which items in a scale measure the same construct. Validity is the extent to which the items correctly represent the construct they are intended to measure [10]. Reliability is often established by measures such as Cronbach's alpha [9] and validity is often established by using factor

analysis to examine convergent and discriminant validity [10]. Because of sample size considerations, principle components analysis (PCA) was deemed appropriate for tests of convergent and discriminate validity.

The validation included 14 items (4 LGA, 5 SP, 5 SO). One rule-of-thumb for PCA sample size is 10 observations per item, which was satisfied by both samples[2]. The factor analysis of the Netherlands data set was supportive of a three factor model in which items intended to measure the same construct loaded heaviest on a single factor (Table 1a). The SO items, for example, all loaded at least .80 on factor 1 and no greater than .38 on any other factor. Further, no other item in the data set loaded greater than .42 on factor 1 indicating both convergent and discriminant validity. The Cronbach's α measure ranged from .89 to .94 for the three constructs, indicating acceptable inter-item reliability.

The factor analysis of the US data set (Table 1b) was also supportive of a three factor model in which items intended to measure the same construct loaded heaviest on a single factor. The SO items, for example, all loaded at least .77 on factor 2 and no greater than .43 on any other factor. Further, no other item in the data set loaded greater than .41 on factor 2 indicating both convergent and discriminant validity. The loading of item SP2 gives some cause for concern because it was relatively lower than the other items at .67. Although the loading is acceptable, the item needs to be examined further as additional data is collected. The Cronbach's α measure ranged from .94 to .97 for the three constructs, indicating acceptable inter-item reliability. Thus, there was sufficient evidence to conclude that the instrument was valid and appropriate for use in hypothesis testing.

4.1 Hypotheses Results

The mean response for each set of items (i.e., LGA, SP, SO) was used to test the hypotheses. Both H1 and H2 were supported with the Netherlands data. There was a significant positive correlation between LGA and SO ($r=.424$, $p<.001$) and a significant positive correlation between LGA and SP ($r=.318$, $p<.001$). However, the effect size for these correlations were moderate, with LGA explaining 18.0 percent of the variance in SO and 10.1 percent of the variance in SP. H1 and H2 were also supported with the US data. There was a significant positive correlation between LGA and SO ($r=.684$, $p<.001$) and a significant positive correlation between LGA and SP ($r=.609$, $p<.001$). The effect sizes for these correlations with the US data was stronger than with the Dutch data, with LGA explaining 46.8 percent of the variance in SO and 37.1 percent of the variance in SP.

Table 1a. Principle Components Analysis and Cronbach's α using data from the Netherlands

Item	Factor 1	Factor 2	Factor 3	Cronbach's α
LGA1	.299	.094	**.746**	.893
LGA2	.173	.094	**.862**	
LGA3	.157	.121	**.893**	
LGA4	.068	.135	**.827**	
SP1	.285	**.807**	.105	.892
SP2	.417	**.732**	.212	
SP3	.093	**.782**	.139	
SP4	.322	**.771**	.077	
SP5	.281	**.822**	.059	
SO1	**.870**	.190	.054	.943
SO2	**.828**	.335	.199	
SO3	**.808**	.379	.246	
SO4	**.801**	.354	.278	
SO5	**.811**	.239	.237	

Note: Principle components analysis used varimax rotation. Eigenvalues: 3.99, 3.59, 3.10. Likelihood of goal attainment (LGA) items are LGA1 to LGA4, satisfaction with meeting process (SP) items are SP1 to SP5, and satisfaction with meeting outcome (SO) items are SO1 to SO5. Boldface indicates the heaviest factor loading for an item.

5. Discussion

The theoretical model of satisfaction with technology supported collaboration advanced in this paper is about the human mind and, as such, should hold regardless of the culture in which a particular mind exists. In support of this assertion, we have shown support for the model

[2] A confirmatory factor analysis using structural equation modeling would generally be preferred in this instance because it would provide instrument validation [4] as well as path coefficients for regression of the latent constructs SO and SP on another latent construct LGA [7]. However, the sample size was not large enough to justify this analysis.

in two distinct cultures. That is, likelihood of goal attainment (LGA) was a significant predictor of satisfaction with technology supported collaboration (operationalized as satisfaction with meeting outcome and process) for groups and participants from both the Netherlands and the United States.

Table 1b. Principle Components Analysis and Cronbach's α using data from the United States

Item	Factor 1	Factor 2	Factor 3	Cronbach's α
LGA1	.287	.250	**.803**	.938
LGA2	.232	.279	**.847**	
LGA3	.273	.294	**.837**	
LGA4	.162	.297	**.866**	
SP1	**.843**	.345	.221	.950
SP2	**.674**	.412	.385	
SP3	**.807**	.335	.302	
SP4	**.863**	.276	.220	
SP5	**.821**	.405	.197	
SO1	.426	**.779**	.280	.967
SO2	.419	**.809**	.300	
SO3	.349	**.798**	.344	
SO4	.331	**.778**	.407	
SO5	.429	**.768**	.356	

Note: Principle components analysis used varimax rotation. Eigenvalues: 4.24, 4.05, 3.77. Likelihood of goal attainment (LGA) items are LGA1 to LGA4, satisfaction with meeting process (SP) items are SP1 to SP5, and satisfaction with meeting outcome (SO) items are SO1 to SO5. Boldface indicates the heaviest factor loading for an item.

The inputs of the theoretical model (Figure 1) provide useful perspectives for examining the influence of culture on satisfaction with technology supported collaboration. First, LGA is a latent, perceptual construct that may be influenced by culture. It is possible, for example, that culture influences what users perceive as suitable progress when working on a large project. Members of one culture might view incremental progress more favorably than others. Second, culture undoubtedly influences the value that people ascribe to goals. Team goals in general may be more valued in one culture than another. In such a situation, even if two cultures viewed equivalent changes in LGA, differing levels of satisfaction could manifest (Figure 1).

5.1 Implications for practitioners

There are a number of implications from this research to information systems managers. When considering questions of user satisfaction, IS/IT managers should consider not only the degree to which users can achieve their goals with a system, but also the extent to which the systems, and the work practices in which they are embedded, affect users' perceptions of the likelihood that goals will be attained. The LGA measures could be included with other goal attainment measures [e.g., 6, 22] when working on large projects.

Large projects often involve a series of meetings and collaboration efforts over extended periods of time. It may be useful then for practitioners to call attention to incremental progress as it occurs. Such attention may include a statement of how a collaboration effort increases the likelihood for project success and this may in turn help to foster satisfaction throughout a long, arduous work process.

Managers are also likely to be faced with managing collaboration efforts for teams with members from diverse cultural backgrounds [2, 13, 20]. Because culture is likely to influence the value people ascribe to goals (even shared goals), and that goal value appears to influence satisfaction levels, managers should be aware that members of multi-cultural teams could have differing satisfaction responses to similar circumstances. Managers may find it useful to use goal definition and goal valuation as criteria in determining team member selection and team reward structures.

6. Conclusion

We proposed a theoretical relationship between changes in likelihood of goal attainment and satisfaction with technology supported collaborative work. The model was validated with field data collected in the Netherlands and the United States and cultural implications were discussed. Our approach in this paper was to examine the cultural differences and collaborative work through the lens of a cognitive model of how the mind works. We believe this is a complementary approach to studies that measure and document normative differences between cultures. In addition, we offer a new instrument to measure likelihood of goal attainment and validate the items in two

languages. We also provide the first English validation of the instrument proposed by Briggs et al. [5] to measure satisfaction with meeting process and satisfaction with meeting outcome. We hope that researchers will find these contributions useful in future work on the satisfaction response in particular and technology supported collaboration in general.

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Appendix.

Meeting satisfaction items from Briggs et al. [5].

Satisfaction with meeting process (SP)

I feel satisfied with the way in which today's meeting was conducted.

I feel good about today's meeting process.

I liked the way the meeting progressed today.

I feel satisfied with the procedures used in today's meeting.

I feel satisfied about the way we carried out the activities in today's meeting.

Satisfaction with meeting outcome (SO)

I liked the outcome of today's meeting.

I feel satisfied with the things we achieved in today's meeting.

When the meeting was over, I felt satisfied with the results.

Our accomplishments today give me a feeling of satisfaction.

I am happy with the results of today's meeting.

All items use the following seven point Likert scale: 1=strongly disagree, 4=neutral, 7=strongly agree.