

## TOPIC EFFECTS ON MULTILINGUAL ELECTRONIC MEETING COMPREHENSION

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### ABSTRACT

*Multilingual electronic meetings have been used for over two decades, and several studies have investigated their effects on participant comprehension. However, none has studied how the choice of topic influences understanding of the discussion. In this study, ten groups of five Mandarin and five English-speaking students each exchanged opinions about five different topics chosen to obtain a wide variation in measures of solution multiplicity, participant knowledge, intrinsic interest, importance, ambiguity, self-efficacy, difficulty, and boundary fitness. The results showed that only perceptions of topic ambiguity were significantly correlated with comprehension of the multilingual discussion.*

**Keywords:** Topic Effects, Comprehension, Multilingual, and Electronic Meetings

### INTRODUCTION

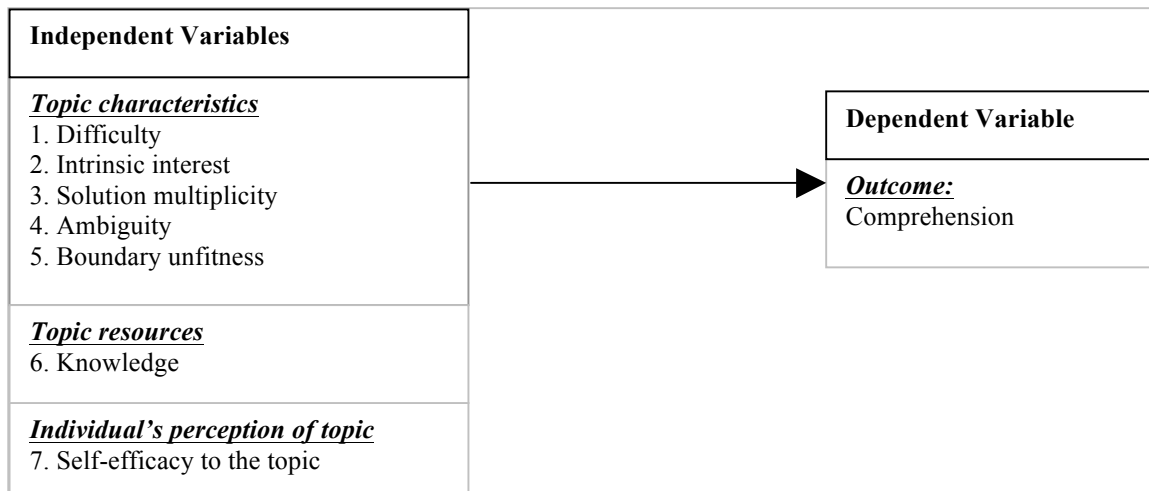
With the trend toward more political, economic, and academic exchanges around the world, there is a growing need for multilingual meetings [22]. Multinational meetings are becoming more common as organizations operate more frequently around the world. In today's global business environment, communication across widely distributed, multinational workforces is a significant challenge. Although English has become the de facto language of business in many countries, when given a preference, most people prefer their native language to communicate most effectively. With many employees spending 20% to 80% of their work hours in meetings, the logistical challenges of communicating globally through interpreters can decrease productivity within multinational companies. Because of this, many companies choose to arrange interpreters for critical business discussions, but human interpreters are expensive and are, typically, not available without prior planning, which inhibits their use for a large percentage of multilingual deliberations. Budgetary constraints can also prevent many companies from providing the interpreters necessary for meetings. However, translation and interpretation costs are high, and oral meetings can be relatively unproductive because of the need for participants to take turns speaking in a non-anonymous environment [17]. Multilingual, electronic meeting systems offer a cost-effective and readily available alternative to human interpreters. While not providing as much accuracy, multilingual electronic meeting systems with automatic machine translation could be used in many of these discussions to alleviate costs and increase productivity [1, 19]

Previous research has shown that poor results in meetings can be attributed to a number of factors, and the choice of the discussion topic can be a major influence [21]. In electronic meetings, this choice can affect flaming [9, 26] group member involvement [13], and the number of relevant comments generated [2]. This last finding is especially important in multilingual electronic meetings because irrelevant comments often have more slang, acronyms, and mistakes, resulting in poorer translation quality and less participant comprehension [3, 4]. Thus, uninteresting or non-important subjects might influence understanding of the discussion. The purpose of this paper is to study how understanding of meeting comments can be affected by several psychological variables from group productivity theory including solution multiplicity, participant knowledge, intrinsic interest, importance, ambiguity, self-efficacy, difficulty, and boundary fitness. The paper concludes with implications for practice and suggestions for future research.

## RESEARCH MODEL AND HYPOTHESES

### Research Model:

The research model of this paper is displayed in Figure 1. Five topic characteristics, participants' knowledge of the material, and participants' self-efficacy act as independent variables and self-perceived discussion comprehension is the dependent variable. These variables along with associated hypotheses are discussed in the following section.



**Figure 1:** Research Model of Topic Effects on Multilingual Electronic Meetings

### Topic Characteristics

#### 1. Difficulty

Topic or task difficulty can adversely affect a group's interaction by increasing the amount of time to solve a problem or reducing their ability to reach a solution [20, 23]. If a task requires a large amount of effort, group members in an anonymous, electronic meeting might be more likely to *free ride* because their lack of contribution cannot be easily traced back to them [12]. Rather than working on the difficult task, instead, they might choose to exchange off-topic ideas just to pass the time [7]. However, as mentioned, irrelevant comments often contain text that cannot be translated well, resulting in poor comprehension. Therefore, the first hypothesis of our study is:

H<sub>1</sub>: Topic difficulty is associated with less group member comprehension.

#### 2. Intrinsic Interest

Intrinsic interest is the degree to which the discussion is interesting, motivating, or attractive to the group members. If the discussion is interesting, group members might be more likely to contribute more relevant ideas [2, 15], and as previously stated, relevant ideas are more likely to be translated accurately than off-topic comments. Thus, the second hypothesis is:

H<sub>2</sub>: Topic intrinsic interest is associated with more group member comprehension.

#### 3. Solution Multiplicity

Solution multiplicity is the degree to which there exists more than one correct solution to a problem [32] and this, in turn, can result in a more complex or difficult task [11]. For example, controversial topics could be considered to have multiple 'best' alternatives, but these can also result in more flaming, and thus, irrelevant comments [27]. The third hypothesis is:

H<sub>3</sub>: Topic solution multiplicity is associated with less group member comprehension.

#### 4. Ambiguity

Ambiguity is defined as “the potential for multiple interpretations of a symbol or message” [24]. When group members are unclear about what a topic means or what the goal of the meeting is, they might generate diverse, inconsistent, and irrelevant comments. More irrelevant comments, in turn, will result in less comprehension. Hypothesis 4 is:

H<sub>4</sub>: Topic ambiguity is associated with less group member comprehension.

#### 5. Boundary Unfitness

Boundary control of a topic (i.e., limiting the range of possible comments to a central theme) is crucial to the effectiveness of group communication and interaction [25]. Feelings of privacy might also be affected if a meeting participant believes the boundary is unfit, or, the group member might feel that the topic is inappropriate. Therefore, if the boundary is unfit, group members are probably more likely to generate irrelevant comments. The fifth hypothesis is:

H<sub>5</sub>: Topic boundary unfitness is associated with less group member comprehension.

### Topic Knowledge

An individual’s perception of information has effects on the outcomes of tasks [31], and participants with more knowledge about a topic are more likely to make accurate judgments [28]. Further, group members’ perceived expertise increases both their participation in the meeting and their willingness to share their unique knowledge [29]. Thus, the more topic knowledge an individual has, the more likely he or she will generate relevant comments [2]. Hypothesis 6 is:

H<sub>6</sub>: Topic knowledge is associated with more group member comprehension.

### Self-Efficacy

Self-efficacy is a belief in one’s capability to affect an outcome for a defined task [18]. In an electronic meeting, self-efficacy is a participant’s belief that his or her opinion matters to the discussion. This will, in turn, likely result in more relevant comments being generated. The final hypothesis is:

H<sub>7</sub>: Self efficacy is associated with more group member comprehension.

## METHODOLOGY

### Subjects

Subjects consisted of 100 undergraduate business students from a university in the northeastern region of the United States, and each participated for extra credit toward their class grades. The subjects were assigned randomly to 10 groups of 10 participants each because prior research has indicated this is above the minimum size needed for an efficient and effective electronic meeting [8,16]. In each group, 5 were Americans who spoke English fluently and did not speak Mandarin, and 5 were Chinese who could not speak English fluently but could speak Mandarin. The meeting duration was set for 15 minutes, a time previously determined to be adequate for the tasks assigned [30].

### Task

Each of the ten groups used an electronic gallery writing program (described below) in a face-to-face environment to generate ideas on one of five topics, each selected to obtain a variety of possible responses on the topic, knowledge, self-efficacy, and other measures:

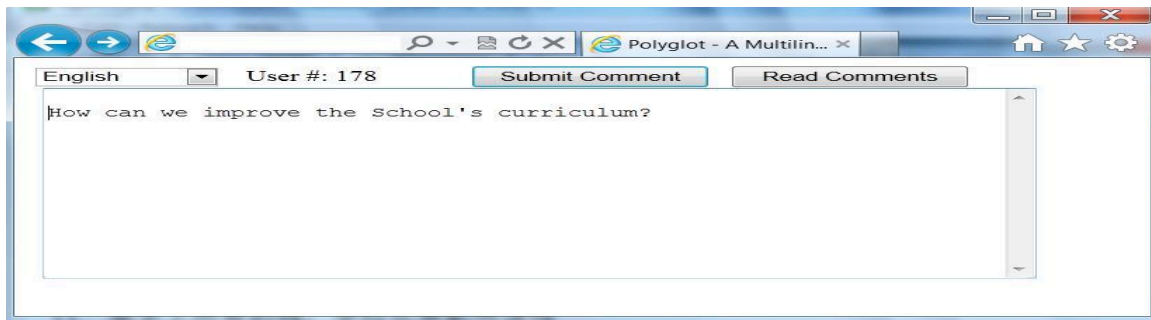
1. What kind of candy should be in the vending machines?
2. How can the parking problem on campus be solved?
3. What are the advantages and disadvantages of having two thumbs on each hand?
4. What is the best football team in the NFL, and why?
5. What are the advantages and disadvantages of having knees that bend forward instead of backward?

Thus, two groups discussed each of the five topics. Upon the completion of each meeting, group members completed the questionnaire shown in Appendix 1 with items modified from prior studies [10, 14, 18, 29].

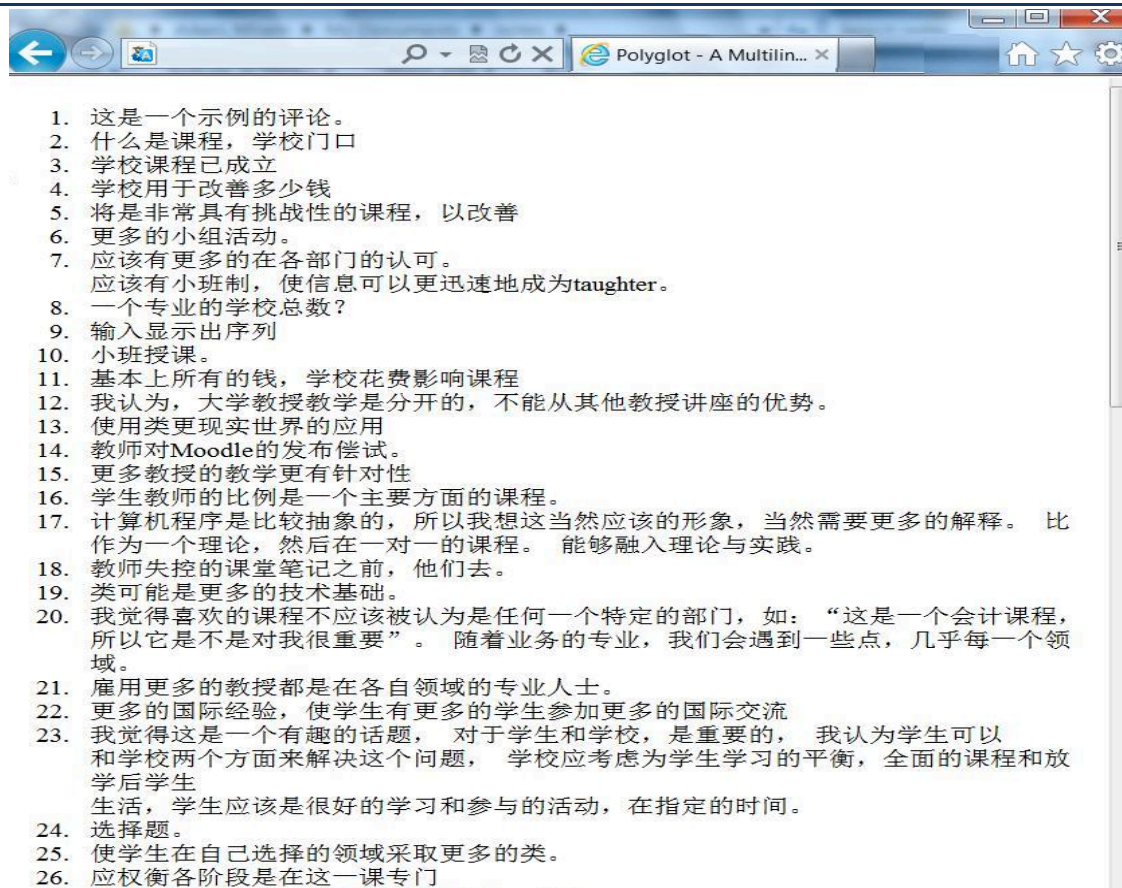
### Experimental Software

This experiment used a Web-based multilingual electronic meeting tool called *Polyglot* [5]. Although any of 57 different languages could have been chosen, for this study, we selected Mandarin Chinese and English. With the system, participants could write comments anonymously and simultaneously while viewing all other comments generated by the meeting participants, thus implementing the gallery writing technique [6].

As shown in Figure 2, the user interface is simple and intuitive. Each group member selected English or Mandarin in the drop-down box in the upper-left corner and then typed a comment in the textbox below. In the example figure, the discussion topic is how to improve the student's school curriculum (not one of the topics in the study). When done, the user simply clicked the 'Submit Comment' button. He or she could continue submitting comments, or, at any point, click the 'Read Comments' button to see another screen with the current group transcript shown in the selected language (Figure 3). The Chinese participants used the *NJStar* word processor software that allowed them to enter 'Chinese simplified' characters with the standard pinyin encoding scheme. The Chinese characters were then copied and pasted into the *Polyglot* Web page.



**Figure 2:** *Polyglot* Comment Submission Screen



**Figure 3:** *Polyglot* Group Comment Viewing Screen (All Comments Translated to Chinese)

At the beginning of the meeting, subjects were told the purpose of the study, and that what they wrote was anonymous. The subjects were encouraged to write as many comments as possible, and the subjects were instructed on how to use the electronic meeting software.

## RESULTS

### Descriptive Statistics

Table 1 provides means and standard deviations of the independent and dependent variables in the study. Group members were neutral in their opinions on most of the independent variables except for intrinsic interest (they tended to think the assigned topic was interesting), solution multiplicity (the topic had several solutions), ambiguity (the topic was clear), and boundary fitness (the topic was appropriate and privacy would not be lost).

**Table 1:** Descriptive Statistics of the Study Variables

Variable	Mean	Std Deviation
Comprehension	78.33%	.215
Difficulty	4.23	1.52
Intrinsic interest	4.67*	1.42
Solution multiplicity	5.43*	1.12
Ambiguity	3.21*	1.54
Knowledge	3.97	1.52
Self-efficacy	4.45	1.11

Boundary fitness	2.14*	1.21
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\* Significantly different from neutral value of 4

### Correlation Analysis

The correlation matrix shown in Table 2 indicates that there are high correlations among topic difficulty, intrinsic interest, and ambiguity. Excluding topic difficulty, the regression analysis on discussion comprehension is shown in Table 3. Ambiguity was significantly associated with less comprehension. Self-efficacy was associated with more comprehension, but the significance was a little higher than the threshold of 0.05. Boundary fitness was associated with less comprehension, but also nearly missed the significance critical value. Therefore, we reject Hypotheses 1, 2, 3, 5, 6, and 7.

**Table 2:** Correlation Statistics of the Study Variables

	Comprehension	Difficulty	Intrinsic interest	Solution multiplicity	Ambiguity	Knowledge	Self-efficacy	Boundary Fitness
Comprehension	1.00							
Difficulty	-0.25	1.00						
Intrinsic Interest	-0.13	<b>0.46</b>	1.00					
Solution multiplicity	-0.09	0.01	0.23	1.00				
Ambiguity	-0.29	<b>0.40</b>	0.13	0.16	1.00			
Knowledge	0.08	-0.07	0.23	-0.10	-0.36	1.00		
Self-Efficacy	0.12	0.16	0.15	-0.07	0.15	0.08	1.00	
Boundary Fitness	-0.25	0.16	0.10	-0.12	0.27	0.04	0.06	1.00

**Table 3:** Regression Statistics of the Study Variables (Removing Topic Difficulty)

Dependent Variable: Comprehension	Standardized Coefficients		t	Sig.
	Beta			
(Constant)			5.897	.000
Solution-Multiplicity	-.037		-.366	.715
Knowledge	.000		.002	.998
Intrinsic Interest	-.097		-.924	.358
Ambiguity	-.255		-2.257	.026
Self-efficacy	.188		1.892	.062
Boundary-Fitness	-.192		-1.885	.063



## CONCLUSIONS

### Summary

This paper explores how the choice of topic affects multilingual electronic meeting comprehension using 100 students typing Mandarin Chinese or English comments. Of the seven independent variables studied (topic difficulty, intrinsic interest, solution multiplicity, ambiguity, knowledge, self-efficacy, and boundary fitness), only topic ambiguity appeared to be significantly correlated with participant understanding of the discussion. That is, if the topic of the meeting was not clear, any confusion over the meaning of a particular comment translation could have been magnified.

### Limitations

One limitation of the study is the choice of topics used in the experiment. Although the topics discussed in the electronic meetings were developed with the intention of providing a large degree of variability in group member perceptions of difficulty, interest, solution multiplicity, ambiguity, knowledge, self-efficacy, and boundary fitness), based upon the descriptive statistics, this goal might not have been achieved, as most evaluation means were near neutral.

A second limitation is the choice of languages: Mandarin Chinese and English. Group members using other language combinations might have experienced more or less comprehension of the translations, as the software's performance is not constant among all possible pairs.

A third limitation is the measure of comprehension. The study used a self-perceived measure, but this could be highly subjective. Other measures such as a test following the meeting to determine how much group members actually retained to memory might be more valid.

### Future Research

Future research should examine other topic, language, group, and personal variables that could impact comprehension of a multilingual discussion. For example, how does the number of languages, type of languages with reference to contextual dependence, group size, or time pressure to complete the meeting affect the performance?

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#### APPENDIX 1: QUESTIONNAIRE

For each question:

1	2	3	4	5	6	7
Disagree		Neutral				Strongly Agree



**Difficulty**

1. Much effort is required to solve this.
2. The topic is difficult.

**Intrinsic interest**

1. The topic is important.
2. The topic is meaningful.
3. The topic is attractive.
4. The topic is involving.
5. The topic is interesting.

**Solution multiplicity**

1. There are many different solutions.
2. There are diverse solutions.
3. The topic has several solutions.
4. The topic has more than one solution.

**Ambiguity**

1. I don't understand the topic. I need more information.
2. The topic is ambiguous.
3. The topic is unclear.
4. The topic is vague.

**Knowledge**

1. I know much about this topic.
2. I have knowledge of this topic.
3. I am familiar with this topic.

**Self-efficacy**

1. I can influence the outcome of this topic.
2. My opinion is important.
3. My ideas can influence other people.
4. I can persuade other people to agree with me.

**Boundary unfitness**

1. I will lose my privacy when I discuss this topic.
2. It is inappropriate to talk about this topic publicly.

How much of the text in the meeting did you understand? (0 - 100%)