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A group decision support system for the Asian Pacific rim

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ABSTRACT

The vast majority of research on Group Decision Support Systems (GDSSs) has been conducted on American groups using English. However, other nationalities using other languages may also benefit from this new technology. The GDSS developed at the University of Mississippi supports over a dozen languages including Japanese, Chinese, Korean, Russian, and Malay which are particularly relevant to organizations on the Asian Pacific rim. Three pilot studies of Japanese, Chinese, and Malaysian students using the GDSS demonstrate that these groups can benefit from the technology.

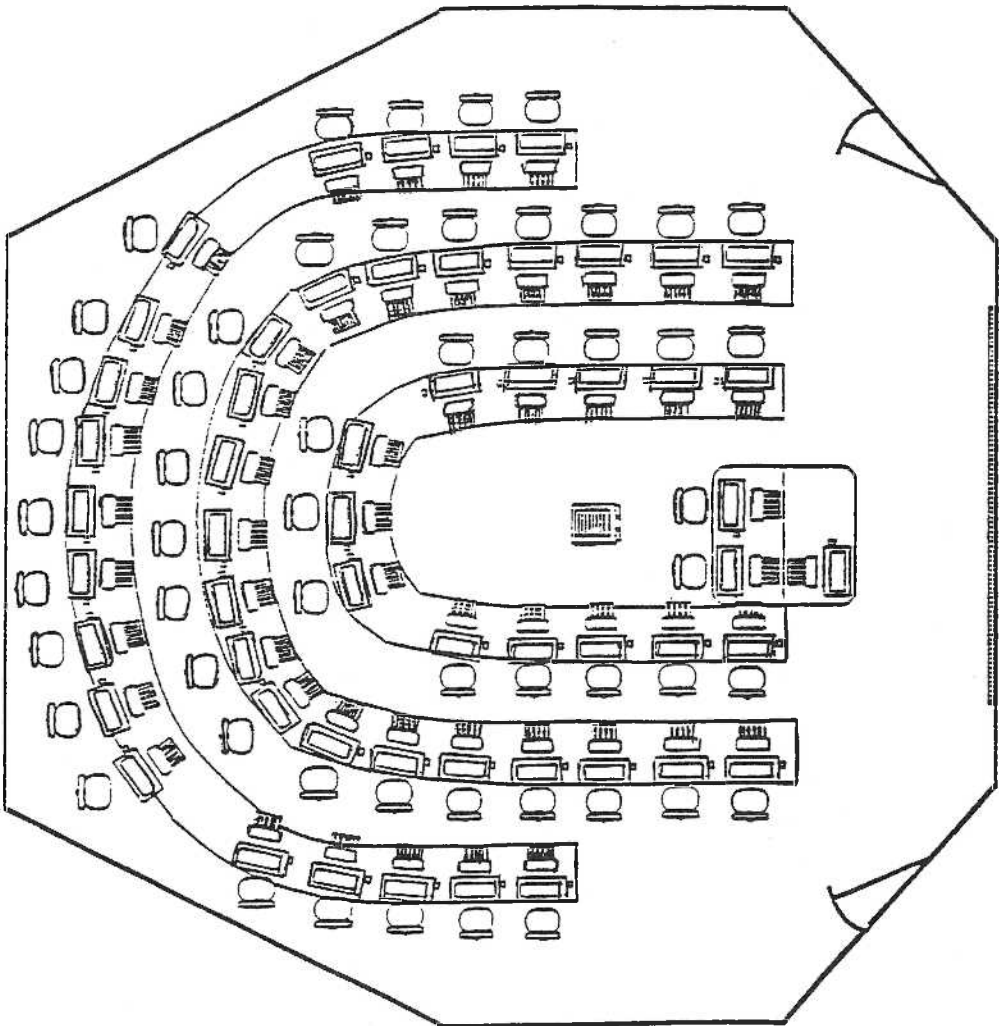
INTRODUCTION

One of the most common business activities is the group meeting. Recently, Group Decision Support Systems (GDSSs) have been used successfully to improve meeting efficiency and effectiveness (Dennis, et al., 1988). Group Decision Support Systems are now recognized as a cornerstone to organizational communication processes (Kraemer & King, 1988; Nunamaker, et al., 1991). However, most GDSS research, to date, has been based upon groups using English as the language of communication, and these systems have been designed to be used primarily in American organizations. Although the English language is used for business interactions in many locations throughout the world, other businessmen using other languages may also benefit from these GDSSs (Forgas & Bond, 1985; Hofstede, 1980; Hofstede & Bond, 1988; Krone, et al., 1992). The purpose of this paper is to demonstrate the use of GDSSs to support group meetings using languages other than English. A GDSS developed at the University of Mississippi supports Chinese, Japanese, Korean, Russian, and any language using the Roman alphabet (e.g., English, Spanish, German, Malay, Tagalog, etc. — including diacritical marks). The languages supported by this newly-developed GDSS are spoken by a large percentage of the people on the Asian Pacific rim. Preliminary results from pilot studies of Malaysian, Japanese, and Chinese groups using the system in their native languages show that these groups can enjoy the same benefits derived by American groups.

GROUP DECISION SUPPORT SYSTEMS

A Group Decision Support System can be defined as a computer-based system which supports collaborative group work (Dennis, et al., 1988). For example, these systems are often used for generating possible solutions to a business problem, business plans, or new product specifications. These systems are generally useful in any meeting in which group members must exchange ideas and preferences. The systems are frequently used in a face-to-face environment such as the one depicted on Figure 1. The GDSS Decision Room shown in this figure is equipped with 55 microcomputers in a local area network. The room also has a large-screen display and a control terminal at the front where the meeting leader or facilitator guides the meeting.

Figure 1. The GDSS Decision Room



A typical GDSS meeting usually starts with a brainstorming session in which ideas are generated, shared, and stored. In the brainstorming session, each meeting participant exchanges comments with the group (Nunamaker, et al., 1991). At any time, the group members can review comments that have been sent and stored by the computer network in a public file.

There are several important advantages that a GDSS can offer to participants in group meetings (Nunamaker, et al., 1991):

1. **More participation:** A GDSS allows group members to exchange comments anonymously. In a traditional oral meeting, "evaluation apprehension" occurs when group members tend to withhold their opinions due to the fear of being criticized by the others. However, in a GDSS meeting group members are free to exchange comments since through a computerized communication channel a person's identity may be kept confidential. Participants in a GDSS meeting report significantly less "evaluation apprehension" than do members in a non-automated meeting (Gallupe, et al., 1992). Another distinctive characteristic of a GDSS is its ability to transmit messages concurrently. Often in an oral meeting, "production blocking" occurs when participants are interrupted by others when they are speaking or thinking. However, in a GDSS meeting, group members can "speak" in parallel, thus largely reducing production blocking (Gallupe, et al., 1992). Together, anonymity and parallel communication tend to increase group member participation.

2. **Better Meeting Effectiveness and Efficiency:** In an oral meeting, group members have to remember comments (rather than thinking of new ones) until they have a chance to speak. As a result, some often forget what has been said before, and some may not be able to process the information quickly enough to understand what was said. In a GDSS meeting, comments can be recorded automatically, and the automated log of the discussion can support the development of an organizational memory.

As a result of these advantages, a GDSS can allow groups to generate more ideas of better quality, bring more satisfaction to the individuals, and improve the quality and effectiveness of the group decision making process (Dennis, et al., 1988; Nunamaker, et al., 1991).

NON-ENGLISH GROUP DECISION SUPPORT SYSTEMS

The vast majority of research to date on Group Decision Support Systems has been conducted using American groups using English. For example, in the survey of these systems conducted by Kraemer & King (1988), no non-American system or study was listed. The literature contains a few references to systems being used outside of the United States (including Canada, Mexico, Norway, Germany, and Switzerland), but it is not clear whether or not these systems are using a language other than English (Lewe & Kremar, 1991; Nunamaker, et al., 1991; Vickers, 1992). Therefore, we believe that the development of a Group Decision Support System which supports over a dozen languages may be a unique and important innovation for the support of groups throughout the world. This system may be especially useful for meetings in many countries along the Asian Pacific rim because of an increased emphasis on the preservation of "face" (Brunner & Wang, 1988; Yum, 1988; Zhang, 1988).

Figure 2. A Partial Transcript of the Meeting in Japanese

かかれないの ちゅうしゃじょうもんだいを かいけつするには、だいがくとうきょくが
はなれたばしょにちゅうしゃじょうをつくり、ばすのさーびすをおこなう
スクールバスをつくるとよい
どのようなもんだいがおこっているのかしりません
でも、ちゅうしゃするスペースはじゅうぶんにあるとおもいますが、、
すべてのせいとをりょうにすませ、あるかす。
だいがくとうきょくが あたらしくちゅうしゃじょうをもうけるべきである。
げんざいむだにりょうされているくうかんをみなおすべきである。
におけるちゅうしゃじょうもんだい

Figure 3. A Partial Transcript of the Meeting in Chinese

1. 增加位置
2. 建立體停車場
3. 明白以 color標示各種 parking zone.
4. 建地下停車場
5. 管制停車數量
6. Union 之 parking lot 應加大
7. 設立立停車場
8. 開發更多停車位
9. 增加停車費用
10. 在 DORM.的地下建立停車場，增加位置。
11. 設立 shuttle service
12. 我同意 shuttle bus service.
13. 請更具体說如何增加停車位？
14. 限制領照人數
15. 夕陽伴我歸，車子不知 Park 那裡！
16. union 應改為 15 minutes parking
17. 嚴懲亂停車者
18. 開發更多校地

Figure 4. A Sample Malaysian Student's GDSS Screen in Malay

5. Bina lebih tempat letak kereta.
 6. Pakcik dan makcik semua, apakah pendapat kamu tentang perkara yang dibicarakan ini hari? sila suarakan pendapat kamu.
 7. Ini tempat letak kereta di kampus sangat bodoh sistemnya.
 8. Denda lebih banyak.
 9. Tak boleh meletak kereta di mana-mana, jadi susah bagi susah bagi saya jalan jauh sebab sejuk cuaca.
 10. Kita punya tempat letak kereta faculty terlalu banyak. Jadi macammmana nak solve ini problem. Eh beri commmentalah.
- 11:13:28

Figure 5. A Partial Transcript of the Meeting in Korean

1. 대학교가 더 많은 주차장을 캠퍼스 주위에 마련해야 합니다.
2. 대학교가 캠퍼스와 도시주변의 교통을 제공할 버스 시스템을 갖춰야 합니다.
3. 보통 주차장 옆에 30 분 주차장을 설치할 필요가 있습니다.
4. 유료 주차빌딩이 주차문제의 한 해결이 될 수 있습니다.
5. 학생들에게 자전거와 오토바이의 사용을 권장하는 것이 해결책의 한가지입니다.
6. 기숙사와 가족아파트를 캠퍼스내에 확충하라.
7. 버스 시스템과 함께, 허용된 차들외의 다른 차들의 출입을 금지하는, 카드로 작동하는 자동문을 가질 필요가 있습니다.
8. 각 주차장에 명백한 표지판이 필요합니다.
9. 캠퍼스 주위의, 통학자들을 위한 넓은 주차장이 이 문제 해결에 도움을 줄 수 있을 것입니다.

Figure 6. A Partial Transcript of the Meeting in Russian

1. Хочу оранжевый продукт.
2. Который размер?
3. Который час?
4. Хочу хорошо автомобиль.
5. У вас есть хорошо информация!

A Group Decision Support System which supports over a dozen languages has been developed at the University of Mississippi. Five of the languages supported by the system are particularly relevant to the Asian Pacific rim:

1. **Japanese:** Figure 2 contains a partial transcript of a discussion by six Japanese students using the GDSS on possible solutions to the parking problem at the University of Mississippi.

2. **Chinese:** Figure 3 contains a partial transcript of a discussion by 16 Chinese students also on the parking problem. This figure shows how English words may be incorporated into the text in cases where a good equivalent does not exist or the students are more comfortable with the English wording. The Japanese, Korean, and Russian versions are also able to incorporate English or other languages which use the Roman alphabet.

3. **Malay:** Figure 4 contains a partial transcript of a discussion by nine Malaysian students on the parking problem. This version of the GDSS supports any language using the Roman alphabet including English, Spanish, Vietnamese, Tagalog, etc. Diacritical and accent marks are also supported (indeed, they are essential to many of these languages).

4. **Korean:** Figure 5 contains a partial transcript of a discussion by Korean students on the parking problem.

5. **Russian:** Figure 6 contains a partial transcript of an informal discussion in Russian on product development.

Group Decision Support Systems allow group members to exchange comments and preferences anonymously and simultaneously. Anonymity may be especially important for discussions involving Chinese, Japanese, and many other Asian peoples because of their need to preserve "face," the role of women and older people in their societies, and an emphasis on group consensus (as in the case with Japanese people) (Harris & Moran, 1991; Hui & Triandis, 1986;

Miller, et al., 1987). For example, in Chinese and Japanese societies, comments from women or younger people are given less importance than comments from men or older people (McBrien, 1978). Because a GDSS allows groups to communicate with anonymity, individuals may find it difficult to judge where a comment originated and will likely give it equal weight with the other comments. This anonymity may also deflect criticism of an idea from the originator to the actual idea itself, preserving the originator's "face" and increasing group consensus (Bond, et al., 1985).

STUDIES OF ASIAN GDSS GROUPS

Numerous studies have demonstrated the benefits of Group Decision Support Systems for American groups using English, but no such studies exist for Asian groups using their native languages. The studies cited here may be the first to explore the use of this new meeting technology for these groups.

Three pilot studies were conducted on Malaysian, Chinese, and Japanese groups. The primary limitation of these studies was their small sample size dictated by the scarcity of these students at the University of Mississippi. However, preliminary results show that these groups are able to enjoy the same benefits of GDSS use that American students have reported in other studies. In these three studies, students used the GDSS with their native languages and discussed possible solutions to the parking problem at the University. After the discussion using the GDSS, the subjects completed a questionnaire. The subjects were asked to rate on a Likert scale their perceived evaluation apprehension (how afraid they were about others' criticism of their comments), production blocking (how difficult it was to communicate using the system), and satisfaction using the system (these variables were also used in the experiment conducted by Gallupe, et al., 1992).

A Study of Malaysian and American GDSS Use

A study with three groups of volunteer undergraduate students was conducted to determine if there were significant differences among Malaysian and American students using Malay and English to brainstorm with the GDSS. Half of a group of nineteen Malaysian students discussed the parking problem on campus in Malay while the other half of the group discussed the problem in English. The groups then switched languages and discussed methods to improve tourism in Mississippi. A group of nine American students also discussed the parking problem in English.

The dependent variables in the pilot study were the group members' self-assessed ratings on production blocking, evaluation apprehension, and satisfaction, each measured on a Likert scale from 1 (very severe production blocking or very severe evaluation apprehension or very dissatisfied) to 5 (no production blocking or no evaluation apprehension or very satisfied). Thus, a higher rating was perceived as a favorable result and a lower rating was perceived as an unfavorable result. These attitudinal measures have been used in many studies of GDSS (see Gallupe, et al., 1992 for example).

Table 1 shows the groups' ratings of production blocking, evaluation apprehension, and satisfaction. All of the groups had very high ratings with low standard deviations for all of the three dependent measures.

Table 1. Malaysian/American Experimental Statistics

(Likert Scale of 1 = unfavorable to 5 = favorable)

Group	Dependent Measures (Mean/Std. Dev.)		
	Production Blocking	Evaluation Apprehension	Satisfaction
Americans Using English	4.22 0.66	4.78 0.44	4.56 0.73
Malaysians Using English	4.44 0.85	4.56 0.62	4.22 0.73
Malaysians Using Malay	4.26 0.93	4.90 0.32	4.26 0.87

An analysis of variance using the General Linear Model provided with the Statistical Analysis System (which accommodates unequal cell sizes) was performed to determine if there were significant differences between the American group using English and the Malaysian group using English. The results indicate that there was no significant difference reported on the rating of production blocking ($F_{(1,25)} = 0.46$, $p = 0.5025$), evaluation apprehension ($F_{(1,25)} = 0.93$, $p = 0.3451$), and satisfaction ($F_{(1,25)} = 1.25$, $p = 0.2742$).

Another analysis of variance was performed to compare the dependent measures between Malaysians using Malay and Malaysians using English and found that there were generally no significant differences between the two groups. The Malaysian group using Malay reported less evaluation apprehension ($F_{(1,35)} = 4.52$, $p = 0.0406$), but both groups had very little evaluation apprehension on average.

A Study of Japanese GDSS Use

A study of a small group of six Japanese students ranging in age from 23 to 33 (an average age of 27) was conducted. Two of the group were females and four were males. Most of the group did not have much computer experience, and none of the group had used a GDSS before. Again, the dependent variables of the experiment were production blocking, evaluation apprehension, and overall satisfaction with the system using the same Likert scale of 1 to 5. The subjects used the system to discuss two problems for 15 minutes each, one in Japanese and the other in English, respectively. In the first meeting, the group discussed the parking problem on campus in Japanese; in the second meeting, the group discussed in English how international students can make friends on campus.

Table 2. Japanese Students Using Japanese and English

(Likert Scale of 1 = unfavorable to 5 = favorable)

Group	Dependent Measures (Mean/Std. Dev.)		
	Production Blocking	Evaluation Apprehension	Satisfaction
Using Japanese	3.00 1.09	3.66 1.03	3.00 0.63
Using English	4.50 0.54	4.33 0.51	4.50 0.83

Table 2 shows the group's ratings of production blocking, evaluation apprehension, and satisfaction. The meeting in English had very high ratings with very low standard deviations for all of the three dependent measures. However, the meeting in Japanese had moderate ratings on all three measures with relatively high standard deviations.

An analysis of variance was performed to determine if there were significant differences between the group using Japanese and the group using English. The results indicate that there was no significant difference reported on the rating of evaluation apprehension ($F_{(1,10)} = 2.00$, $p = 0.1877$). However, the meeting in Japanese had significantly lower production blocking ($F_{(1,10)} = 9.00$, $p = 0.0133$) and satisfaction ($F_{(1,10)} = 12.27$, $p = 0.0057$).

The subjects also were asked a series of questions about the meeting using seven-point scales. The subjects preferred communicating in Japanese rather than in English in general (Mean: 6.00, Std. Dev.: 1.55) and when using a GDSS (Mean: 5.17, Std. Dev.: 1.47) (using a scale 1 = English to 7 = Japanese). The subjects preferred a transcript at the end of meetings (Mean: 5.83, Std. Dev.: 1.60) (using a scale of 1 = no transcript to 7 = transcript) which would also favor the use of a GDSS because a transcript is difficult to obtain from an oral meeting. Finally, the subjects thought a GDSS supporting the Japanese language was a good idea (Mean: 5.5, Std. Dev.: 0.83) (Using a scale of 1 = very bad idea to 7 = very good idea).

A Study of Chinese GDSS Use

A study of 16 Chinese students ranging in age from 22 to 35 (an average age of 27.2) was conducted. Most of the group had computer experience, but few had used a GDSS before. Again, the dependent variables of the experiment were production blocking, evaluation apprehension, and overall satisfaction with the system using a Likert scale of 1 to 5. The subjects used the system to discuss two problems for 15 minutes each, one in Chinese and the other in English, respectively. In the first meeting, the group discussed the parking problem on campus in Chinese; in the second meeting, the group discussed in English how international students can make friends on Campus.

Table 3. Chinese Students Using Chinese and English

(Likert Scale of 1 = unfavorable to 5 = favorable)

Group	Dependent Measures (Mean/Std. Dev.)		
	Production Blocking	Evaluation Apprehension	Satisfaction
Using Chinese	3.88 1.26	3.81 1.52	3.88 1.15
Using English	4.06 0.93	4.38 0.81	4.00 1.15

Table 3 shows the group's ratings of production blocking, evaluation apprehension, and satisfaction. Subjects reported high (favorable) ratings for all of the three dependent measures when using Chinese and when using English. A paired difference-of-means T-test was conducted to compare ratings given by the group when using English and Chinese. No significant difference was reported for production blocking ($T = -0.82$, $p = 0.42$), evaluation apprehension ($T = -1.26$, $p = 0.23$), or satisfaction ($T = -0.46$, $p = 0.65$). The subjects preferred communicating in Chinese rather than in English in general (Mean: 1.81, Std. Dev.: 1.47), but preferred English when using a GDSS (Mean: 4.25, Std. Dev.: 1.34) (using a scale 1 = Chinese to 5 = English).

DISCUSSION

Three pilot studies were conducted on Malaysian, Chinese, and Japanese groups. The primary limitation of these studies was their small sample size dictated by the scarcity of these students at the University of Mississippi. However, preliminary results show that these groups are able to enjoy the same benefits of GDSS use that American students have reported in other studies (cf. Gallupe, et al., 1992). In these three studies, students used the GDSS with their native languages and with English to discuss possible solutions to problems. After the discussions using the GDSS, the subjects completed a questionnaire.

Although the results were somewhat mixed, there does appear to be evidence that Malaysians, Japanese, and Chinese can benefit from the use of a GDSS in meetings. The Malaysian and Chinese subjects reported little evaluation apprehension and production blocking and high satisfaction when using their native languages and when using English. The Japanese subjects reported significantly higher production blocking and significantly lower satisfaction when using Japanese than when using English. These lower ratings may result from the difficulty in using the Japanese editor on the system. All of the Japanese subjects had never used the editor before, whereas they were all familiar with typing in English. Also, more time was needed to exchange comments with the Japanese GDSS (special font files had to be loaded each time) than with the English GDSS. Although the Japanese did not report significantly lower evaluation apprehension when using Japanese, the lower mean may result from the fact that the speech pattern of Japanese women, even in the written form, sometimes can be recognized by other Japanese group members.

The Japanese subjects preferred using Japanese in general and in GDSS meetings. The Chinese preferred Chinese in general but preferred English when using a GDSS. Businessmen in Japan and China may not be as likely to know English as well as students studying in the United States and therefore would probably prefer their native languages even more. Further, it is probably preferable if people can communicate in their native language. Rosch and Segler (1987) indicated that many Japanese, especially from senior management, tend to refuse to speak English in some situations. For multinational businesses, the use of an English GDSS or a GDSS supporting another language will be contingent upon how well the group members can use either language.

Further studies are planned with larger group sizes to replicate these findings.

CONCLUSION

This paper has reported on the development of a Group Decision Support System (a new technology for the automated support of groups) which enables Japanese, Chinese, Korean, Russian, and many other peoples of the Asian Pacific rim to improve the productivity of meetings. Results from three pilot studies of Japanese, Chinese, and Malaysian students show that people of these countries using their native languages may also benefit from the technology as has been done by studies of American groups using English.

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