https://doi.org/10.48009/1_iis_2010_384-391

SPELLING AND GRAMMATICAL ERRORS IN ELECTRONIC MEETINGS

Mina Park, Northern State University, mina.park@northern.edu
Milam Aiken, University of Mississippi, maiken@bus.olemiss.edu
Tobin Lindblom, Northern State University, tobin.lindblom@northern.edu
Mahesh Vanjani, Texas Southern University, vanjanim@tsu.edu

ABSTRACT

Participants in electronic meetings are often fairly informal with their typing and make spelling and grammatical mistakes, perhaps realizing that such errors are not viewed as important in such free-flow, rapid-paced discussions. Although most researchers, group members, and meeting facilitators have noted these errors, no study has been conducted on the types of errors made or their correlations with measures of meeting productivity. Results of an experiment involving five groups of 10 students each show that the generated comments contained relatively few misspellings but several minor grammatical errors. Further, those who wrote more comments made more errors, but the sentence complexity and members' satisfaction with the system were not significantly correlated with errors.

Keywords: Electronic Meetings, Electronic Meeting Systems, EMS, Information and Communication Technologies, Virtual Collaboration

INTRODUCTION

The problems with normal, verbal meetings are well known. The average, traditional meeting has no written agenda and the goal is accomplished only 50% of the time [29]. In addition, 25% of the participants feel they waste time on irrelevant issues, 33% feel pressured to advocate opinions publicly though they privately disagree with them, and 33% feel they have minimal influence on the meeting. Unproductive meetings are also a waste of scarce resources. In the early 1990s, over 11 million formal meetings were held each day in Fortune 500 companies with an approximate meeting cost of about $1,000 per hour on average [36]. The number of meetings and costs are even greater today.

Electronic meeting technology was developed in the 1980s to overcome the limitations of verbal, face-to-face meetings. Even though organizations can save from 23% to 95% in some cases by using these systems [2, 17], their use has not become wide-spread because of unfamiliarity, cost of the hardware and software, general reluctance to stray from familiar processes, autocratic power structures, and other factors [28, 44].

Nevertheless, research on the various group processes involved in electronic meetings continues. Many factors have been investigated including the effect of group size [47], task equivocality [15], and even the effect of facilitation [21, 46]. But very little study has been conducted on how participants actually contribute comments during the meeting. For example, electronic meeting spelling and grammatical errors have been noted in several studies [e.g., 23, 26, 30 34, 38, 48], but there has been little or no focus on these problems. What impact do these errors have on meeting productivity? Do they affect media richness [35] or participant anonymity [20]?

LITERATURE REVIEW

Electronic Meeting Systems

Electronic meeting systems (EMS), otherwise known as group support systems (GSS) or group decision support systems (GDSS) have been investigated over the past 20 years as a means of improving the effectiveness and efficiency of meetings. Through the special characteristics typically provided by these systems (anonymity, parallel communication, and automatic record keeping), several benefits arise, including:

1. **Decreasing production blocking:** The systems make both sending and receiving information easier. Even though typing is slower than speaking, the act of many people typing at once is more productive than many speaking one at a time [5]. Further, group members are able to skim through previous comments on the computer screen whenever they choose.

2. **Decreasing evaluation apprehension:** Because comments are typically anonymous in an electronic meeting, participants can contribute freely without fear of others criticizing their comments [1, 27].
3. **Increasing participation:** Less evaluation apprehension and parallel communication allows

shy or reticent group members to participate more [6, 49].

4. **Increasing comments and/or decreasing meeting time:** Less evaluation apprehension and production blocking and more participation can lead to more ideas or decrease the amount of time needed for the equivalent number of comments [45]. For example, IBM has reported that the technology has saved 56% of the time normally spent in meetings [37], and Boeing has reported that the systems have reduced meeting time by 71% and overall project time by up to 91% [8].

5. **Increasing meeting satisfaction:** Because there is more participation and less meeting time, group members are often more satisfied with the meeting process [9, 11, 14, 22].

Typing Errors

Even though poor spelling and grammar are usually not so bad that a sentence cannot be understood, errors can leave a bad impression and cast doubt on the quality of the idea conveyed [4, 18]. In addition, misspelled words confuse and distract readers, possibly slowing down the reading process [42].

The vast majority of electronic meeting transcripts contain at least a few errors, and it is normal for most people to make typing mistakes, even when trying to be accurate. For example, in one study [40], four people typed 121 given words at a normal speed while being as accurate as possible and misspelled 5.75 words (4.75%) with a low of 4 spelling errors and a high of 9. In another study [33], an analysis of 924 essays written by 15-year-olds with a mean length of 184 words each showed 4,218 misspellings, an error rate of 2.48%. Other studies have shown spelling error rates ranging from 1% to 7.4% [24, 32].

Detailed analyses of spelling errors shows a variety of causes. One study [13] found that about 80% of typing errors are caused by the transposition of two adjacent letters, one extra letter, one missing letter, or one wrong letter, and a second study [41] showed similar results (see Table 1). After these, the next most common errors were two extra letters, two missing letters, or two letters transposed around a third (such as "prodecure" instead of "procedure").

Table 1: Types and Frequencies of Typical Spelling Errors [41]

	Government Printing Office Transcript	Webster's 7th Collegiate Dictionary
Transposition of letters	4 (2.6%)	47 (13.1%)
One extra letter	29 (18.7%)	73 (20.3%)
One missing letter	49 (31.6%)	124 (34.4%)
One wrong letter	62 (40.0%)	97 (26.9%)
Total	144 (92.9%)	341 (94.7%)

Similarly, typists make grammatical errors, especially with email and instant messaging [50]. Although ordinary transcripts might contain 1.1% grammatical errors [10], in a study of 22 students typing email messages, narrative sentences averaged 16.18 words and contained 0.381 grammatical errors (2.53%), informative sentences averaged 17.1 words with 0.489 grammatical errors, persuasive sentences averaged 17.43 words with 0.60 errors (3.44%), and expressive sentences averaged 17.65 words with 0.614 errors (3.48%) [31]. The number of grammatical errors was higher in the email that was intended to have a higher degree of audience interaction. In a final study [43], students typing comments in an electronic meeting achieved grammatical and spelling accuracy of about 94%. Thus, there might be less concern with typing accuracy when using various forms of electronic communication because of its relatively informal nature [7].

THE EXPERIMENT

In order to determine the frequency and types of spelling and grammatical errors made in an electronic meeting, we conducted an experiment.

Subjects

This study was conducted with 50 business undergraduate students, and each received extra credit toward their class grade. Participants were randomly assigned into one of five electronic meeting groups, with each group composed of 10 members, a size deemed sufficient to achieve the benefits of the electronic meeting technology [52].

Task

The groups were asked to generate ideas about how to solve the parking problem on campus, a task assigned in many studies before [e.g., 16, 19]. Participants in each group were given 10 minutes of discussion time, an amount considered sufficient for this problem [51]. In addition, the participants were highly familiar with the topic and had a considerable stake in its solution, both important for a choice of topic [25].

Treatments and Measures

Table 2: Examples of Spelling and Grammatical Errors from the Meeting Transcripts
(errors shown in **bold** & corrections shown at right)

Comments	Spelling error	Grammatical errors		
		Minor	Medium	Major
"…close to a specific area of campus to make walking **convinient**."	"convenient"			
"The parking **garge** must be centrally located..."	"garage"			
"**the** parking garage sounds like it would work the **best**"		"The" "best."		
"…adding more parking. **maybe** a parking garage of some type."		"Maybe"		
"…they have no problem dumping that money into **a** athletics program!"			"an"	
"… is **know** for its beautiful campus, including its trees and undeveloped **land**"		"land."	"known"	
"**if** we had **atleast** 5 extra…"		"If"		"at least"
"**it** may be dumb but **alot** of schools do it…"		"It"		"a lot"

A locally developed group support system implementing gallery writing [3] was used during the sessions in order to record the subjects' ideas. After the group meeting, participants were asked to complete a questionnaire (see Appendix 1) based on their experiment, and the recorded comments were evaluated for topic relevancy. In addition, each of the participant's comments was measured for complexity using the Kincaid readability and Kincaid grade level functions in Microsoft Word [12, 39]. Using these functions, a higher readability score and a lower grade level indicate easier text.

Spelling errors were determined based on Standard English dictionary spelling rules. Grammatical errors were categorized into minor, medium, and major, and Table 2 provides examples. Minor errors included misuse of punctuation and capitalization, such as not beginning the first word of a sentence with a capital letter. Medium grammar errors included improper verb tense, e.g. "she go" instead of "she goes," and major grammatical mistakes included incorrect word order, for example.

Experimental Results

As indicated in Table 3 and in general agreement with prior studies of similar student groups discussing this problem for this amount of time, participants were satisfied with the meeting technology and the comments. They believed comments were relatively anonymous, had little evaluation apprehension, and believed most of the others in their groups were participating.

Table 3: Summary Results
(Scale: 1 = least, 7 = most)

Variable:	N = 50	
	Mean	Std. dev.
Satisfaction with the system	6.02*	1.11
Satisfaction with the comments	6.00*	0.91
Comment anonymity	6.73*	0.57
Evaluation apprehension	1.65*	0.90
Perceived participation	6.41*	0.70

(* Significantly different from Likert scale neutral value of 4.00 at $\alpha = 0.05$)

Table 4 shows that on average, each of the participants was able to generate one comment every two minutes, of which 76% were relevant to the

problem of parking. The average sentence complexity was moderate (7th grade reading level), and very few spelling errors were made, because of the education level of the students and because they might have chosen words they were confident of spelling. Several minor grammatical errors were made (one student made 42 mistakes), but there were very few medium or major errors, indicating that students might believe poor punctuation and capitalization are not important in such an electronic discussion. In total, there were 10.2 spelling and grammatical errors per person, a word error rate of 8.9% that is slightly above the 6% rate reported by Rebman, et al. (2003) [43] in another electronic meeting.

Table 4: Comment Statistics per Person

Variable:	N=50			
	Mean	Std. dev.	Min	Max
Total comments	5.08	2.98	1	15
Relevant comments	3.86	2.06	1	9
Total words	114.36	68.40	4	287
Kincaid readability	71.33	11.76	40.9	95.65
Kincaid grade level	7.17	3.10	1.5	20.02
Spelling errors	.72	1.03	0	5
Minor grammatical errors	8.46	8.09	0	42
Medium grammatical errors	.76	1.33	0	6
Major grammatical errors	.26	.53	0	2

The summary of correlation analyses in Table 5 shows that those who were satisfied with the system also were satisfied with the comments, tended to believe there was more participation, and made fewer spelling errors. In addition, those who wrote more comments tended to write more words per comment, but they also made more minor and medium grammatical errors. Those who made minor grammatical errors also tended to make medium and major errors, and the perception of an increase in participation by the group was significantly correlated with fewer major errors.

Table 5: Summary of Significant Correlations

Variable 1	Variable 2	Correlation	p-value
Satisfaction w/ system	Satisfaction w/ comments	0.453	0.001
Satisfaction w/ system	Perception of participation	-0.298	0.037
Satisfaction w/ comments	Perception of participation	0.486	< 0.001
Perception of participation	Major grammatical errors	-0.295	0.039
Total number of comments	Relevant number of comments	0.851	< 0.001
Total number of comments	Words per comment	0.613	< 0.001
Total number of comments	Minor grammatical errors	0.572	< 0.001
Total number of comments	Medium grammatical errors	0.571	< 0.001
Relevant comments	Words per comment	0.566	< 0.001
Relevant comments	Minor grammatical errors	0.323	0.022
Words per comment	Minor grammatical errors	0.487	< 0.001
Words per comment	Medium grammatical errors	0.562	< 0.001
Kincaid readability	Kincaid grade level	-0.866	< 0.001
Minor grammatical errors	Medium grammatical errors	0.648	< 0.001
Minor grammatical errors	Major grammatical errors	0.364	0.009
Medium grammatical errors	Major grammatical errors	0.410	0.003

CONCLUSION

The informality and anonymity in an electronic meeting might tend to lower standards for grammar and spelling, but this often is not a major problem as

group members could be expecting typing errors. In this study, five groups of 10 students each in electronic meetings had a spelling and grammatical word error rate of 8.9%, but most of the errors were minor (e.g., missing punctuation and a lack of capitalization). Based upon the students' high ratings for meeting and comment satisfaction and the number of comments generated, it appears that these errors had little or no detrimental effect on meeting productivity or media richness. Further, the errors did not seem to negatively affect participant anonymity as the rating for evaluation apprehension was very low.

Other factors that could affect spelling and grammatical errors should be investigated in the future. For example, increased time pressure (reducing the amount of time for the meetings) might lead to more errors as participants become less concerned about minor grammatical problems. Also, the education level of the participants, the seriousness and formality of the discussion topic, and the presence or absence of automatic spelling and grammar checkers could influence the number and types of errors.

REFERENCES

1. Aiken, M., Rebman, C., & Vanjani, M. (2007). Comment generation with three electronic brainwriting techniques. *Academy of Information and Management Sciences*, 10(1), 11-30.

2. Aiken, M., Sudderth, T,. & Motiwalla, L. (1997). A group support system cost-benefit analysis. *International Business Schools Computing Quarterly*, 9(1), Spring, 1-6.

3. Aiken, M. & Vanjani, M. (1996). Idea generation with electronic poolwriting and gallery writing. *International Journal of Information and Management Sciences*, 7(2), 1-9.

4. Aiken, M. & Vanjani, M. (2005). Typographical errors and consumer trust in electronic commerce. *Business Research Yearbook*, 12(1), 494-498.

5. Aiken, M. & Wong, Z. (2003). The effect of group size on electronic idea generation. *International Journal of Human Resources Development and Management*, 3(3), 265-274.

6. Beauvois, M. (1995). E-Talk: Attitudes and motivation in computer-assisted classroom discussion. *Computers and the Humanities*, 28(3), 177-190.

7. Bloch, J. (2002). Student/teacher interaction via email: the social context of Internet discourse. *Journal of Second Language Writing*, 11(2), 117-134.

8. Boeing (1991). TeamFocus Technology Evaluation Report. Boeing Computer Services - Professional Services Organization TeamFocus Group, The Boeing Company.

9. Bordia, P. (1997). Face-to-face versus computer-mediated communication: A synthesis of the experimental literature. *Journal of Business Communication*, 34(1), 99-120.

10. Chedru, F. & Geschwind, N. (1972). Writing disturbances in acute confusional states. *Neuropsychologia* 10, 343-353.

11. Chidambaram, L. (1996). Relational development in computer-supported groups. *MIS Quarterly*, 20(2), 143-165.

12. Croft, D. & Petersen, M. (2002). An evaluation of the quality and contents of asthma education on the World Wide Web, *Chest* (American College of Chest Physicians), 121, 1301-1307.

13. Damerau, F. (1964). A technique for computer detection and correction of spelling errors. *Communications of the ACM*, 7(3), 171-176.

14. Davey, A. & Olson, D. (1998). Multiple criteria decision making models in group decision support. *Group Decision and Negotiation*, 7(1), 55-75

15. Dennis, A. & Kinney, S. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information Systems Research*, 9(3), 256-274.

16. Dennis, A. & Valacich, J. (1993). Computer brainstorms: More heads are better than one. *Journal of Applied Psychology*, 78(4), 531-537.

17. Dennis, A., Valacich, J., & Nunamaker, J. (1990). An experimental investigation of small, medium, and large groups in an electronic meeting environment. *IEEE Transactions on Systems, Man and Cybernetics*, 20(5), 1049-1057.

18. Figueredo, L. & Varnhagen, C. (2005). Didn't you run the spell checker? Effects of type of spelling error and use of a spell checker on perceptions of the author. *Reading Psychology*, 26(4-5), 441 – 458.

19. Gallupe, R., Dennis, A., Cooper, W., Valacich, J., Bastianutti, L., & Nunamaker, J. (1992). Electronic brainstorming and group size. *Academy of Management Journal*, 35(2), 350-369.

20. Gavisha, B. & Gerdes, J. (1998). Anonymous mechanisms in group decision support systems communication. Decision Support Systems, 23(4), 297-328.

21. George, J., Dennis, A., & Nunamaker, J. (1992). An experimental investigation of facilitation in an EMS decision room. *Group Decision and Negotiation*, 1(1), 57-70.

22. Gray, P., & Mandviwalla, M. (1999). New directions for GDSS. *Group Decision and Negotiation*, 8(1), 77-83.

23. Grohowski, R., McGoff, C., Vogel, D., Martz, B., & Nunamaker, J. (1990). Implementing electronic meeting systems at IBM: Lessons learned and success factors. *MIS Quarterly*, 14(4), 369-383.

24. Grudin, J. (1983). Error patterns in novice and skilled transcription typing. In W. Cooper (ed.) *Cognitive Aspects of Skilled Typewriting*, 121-142. New York: Springer-Verlag.

25. Gu, L., Aiken, M., & Wang, J. (2007). Topic effects on process gains and losses in an electronic meeting. *Information Resources Management Journal*, 20(4), 1-11.

26. Helquist, J., Santanen, E., & Kruse, J. (2007). Participant-driven GSS: Quality of brainstorming and allocation of participant resources. *40th Annual Hawaii International Conference on System Sciences*, January 03 - 06, Kona, Hawaii.

27. Jessup, L., Connolly, T. & Galegher, J. (1990). The effects of anonymity on GDSS group process with an idea generating task. *MIS Quarterly*, 14(3), 313-321.

28. Kim, D., Kim, B., Aiken, M., & Park, S. (2006). The influence of individual, task, organizational support, and subject norm factors on the adoption of groupware. *Academy of Information and Management Sciences*, 9(2), 93-110.

29. LaPlante, A. (1993). 90s Style Brainstorming, *Forbes ASAP*, 152(10), October 25, 41-61.

30. Lee, J., Kim, J., Kim, S., & Park, H. (2002). An intelligent idea categorizer for electronic meeting systems. *Journal of Group Decision and Negotiation*, 11(5), 363–378.

31. Li, Y. (2000). Linguistic characteristics of ESL writing in task-based e-mail activities. *System*, 28(2), 229-245.

32. Mattson, M. & Baars, B. (1992). Error-minimizing mechanisms: Boosting or editing? In R. Rieber (ed.) *Experimental Slips and Human Error*, 263-285, New York: Springer.

33. Mitton, R. (1996). *English spelling and the computer*. London: Birkbeck.

34. Munter, M. (1998). Meeting technology: From low-tech to high-tech. *Business Communication Quarterly*, 61(2), 80-87.

35. Ngwenyama, Ojelanki K., & Lee, Allen S. (1997). Communication richness in electronic mail: Critical social theory and the contextuality of meaning. *MIS Quarterly*, 21(2), 145-167.

36. Nunamaker, J., Briggs, R., Mittleman, D., Vogel, D., & Balthazard, P. (1997). Lessons from a dozen years of group support systems research: A discussion of lab and field findings. *Journal of Management Information Systems*, 13(3), 163-207.

37. Nunamaker, J., Vogel, D., Heminger, A., & Martz, B. (1989). Experiences at IBM with group support systems: A field study. *Decision Support Systems*, 5(2), 183–196.

38. Orwig, R., Chen, H., & Nunamaker, J. (1997). A graphical, self-organizing approach to classifying electronic meeting output. *Journal of the American Society for Information Science*, 48(2), 157-170.

39. Paasche-Orlow, M., Taylor, H. & Brancati, F. (2003). Readability standards for informed-consent forms as compared with actual readability. *The New England Journal of Medicine*, 348(8), 721-726.

40. Park, S. (2008). Speech recognition faster more accurate than typing. Retrieved November 15, 2008 from http://www.voicescene.com/article-53.html

41. Peterson, J. (1986). A note on undetected typing errors. *Communications of the ACM*, 29(7), 633-637.

42. Pynte, J., Kennedy, A., & Ducrot, S. (2004). The influence of parafoveal typographical errors on eye movements in reading. *European Journal of Cognitive Psychology*, 16(1/2), 178-202.

43. Rebman, C., Aiken, M., & Cegielski, C. (2003). Speech recognition in the human-computer interface. *Information and Management*, 40(6), 509-519.

44. Serida-Nishimura, J. & McKnight, D. (1997). Understanding GSS use by executive groups. *Proceedings of the 1997 ACM SIGCPR Conference on Computer Personnel Research*, 93 – 96.

45. Shepherd, M., Briggs, R., Reinig, B., Yen, J., & Nunamaker, J. (1996). Invoking social comparison to improve electronic brainstorming: Beyond anonymity. *Journal of Management Information Systems*, 12(3), 155-170.

46. Sosik, J., Avolio, B., & Kahai, S. (1997). Effects of leadership style and anonymity on group potency and effectiveness in a group decision support system environment. *Journal of Applied Psychology*, 82(1), 89-103.

47. Valacich, J., Dennis, A., & Nunamaker, J. (1992). Group size and anonymity effects on computer-mediated idea generation. *Small Group Research*, 23(1), 49-73.

48. de Vreede, G. & Mgaya, R. (2001). Supporting higher education through electronic meeting support in Tanzania. *Proceedings of the 34th Annual Hawaii International on System Sciences Conference*, January 3-6, Kona, Hawaii.

49. Warschauer, M. (1995). Comparing face-to-face and electronic discussion in the second language classroom. *CALICO Journal*, 13(2), 7-26.

50. Wertheimer, D. (2002). 99.9% of proper grammar is obsolete. *Digital Web Magazine*. Retrieved December 8, 2009 from http://www.digital-web.com/articles/999_of_proper_grammar_is_obsolete/

51. Wong, Z. & Aiken, M. (2006). The effects of time on computer-mediated communication group meetings: An exploratory study using an evaluation task. *International Journal of Information Systems and Change Management*, 1(2), 138-158.

52. Wong, Z. & Aiken, M. (2003). The effect of group size on electronic idea generation. *International Journal of Human Resources Development and Management*, 3(3), 265-274.

APPENDIX 1:
POST-SESSION QUESTIONNAIRE

1. Do you believe the comments were anonymous?

1	2	3	4	5	6	7
Not Anonymous			Neutral			Very Anonymous

2. How do you feel about the computer system used to discuss this problem?

1	2	3	4	5	6	7
Very Dissatisfied			Neutral			Very Satisfied

3. How do you feel about the comments your group submitted?

1	2	3	4	5	6	7
Very Dissatisfied			Neutral			Very Satisfied

4. What was the level of participation in your group?

1	2	3	4	5	6	7
Very Dissatisfied			Neutral			Very Satisfied

5. I was afraid others would criticize my comments.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree