

# The importance of coordination devices in text-based, task-oriented conversations

**Jeff Hancock**

Department of Psychology  
Dalhousie University  
Halifax, NS, Canada, B3H 4J1  
jhancock@is2.dal.ca

## ABSTRACT

The present experiment compared the effects of two different interfaces on text-based, computer-mediated communication occurring in real time. In one condition, dyads attempted to solve a figure-matching task while using a WYSIWIS interface in which messages are transmitted character by character. In the other condition, dyads used a standard IRC (Internet Relay Chat) interface in which messages are composed privately and then sent as a message unit. Comparison of the two conditions revealed superior task performance in the IRC condition and more frequent use of verbal turn coordination devices in the WYSIWIS condition. The results are interpreted as evidence for the importance of turn coordination devices in text-based CMC.

## Keywords

Computer-mediated communication, cooperative work, coordination devices, common ground

## INTRODUCTION

Coordination activity has been recognized as an important factor in the collaborative process of human communication. Clark [1] and his colleagues have developed a model of language use that has focused on the coordination between the participants in carrying out a conversation. Central to Clark's model is the concept of common ground, which is comprised of the mutual beliefs, presuppositions and assumptions held by each participant. The collaborative emergence of common ground is described as a process of grounding, in which participants coordinate their activities to reach the mutual assumption that each utterance has been sufficiently comprehended by everyone for current purposes.

Previous research [2,3,4] has examined how text-based communicative environments can affect grounding and the construction of common ground. In real-time text-based communication, many signals normally employed to coordinate the speaker's action with the listener's attention, including eye-gaze, gestures and non-linguistic behaviors, are absent. Other important cues for

coordinating turn allocation, such as pauses, can be distorted relative to face to face (FtF) interaction.

In recent research concerned with turn coordination during text-based CMC exchanges, Hancock and Dunham [2] observed that an explicit turn-signal incorporated into a WYSIWIS interface improved dyadic performance on a cooperative figure matching task and modified the dialogue of participants. Participants communicating without an explicit turn-signal available employed more verbal coordination devices (e.g., "Hold on a sec") during their conversations. These verbal coordination devices appeared to influence performance on the task, as evidenced by an inverse relationship observed between coordination devices and errors on the task.

The data reported by Hancock and Dunham [2] have several implications for two popular interfaces frequently employed to mediate Internet chat groups. In the typical IRC (Internet Relay Chat) interface, messages are composed in a private textbox and posted to a public messaging area when the speaker presses the return key. Because the message is sent as a delimited unit, the return key inherently functions as a turn signal indicating message completion. Alternatively, as the label implies, WYSIWIS (What You See Is What I see) applications transmit messages simultaneously to both the speaker and addressee's terminals on a character by character basis. The absence of an explicit turn-signal indicating when a message has been completed should undermine the emergence of a turn-structure. One implication of the data reported by Hancock and Dunham [2] is that the inherent turn signal in IRC interfaces should improve performance on cooperative problem-solving tasks and reduce the tendency for participants to employ explicit verbal coordination devices.

The present research examines this possibility by comparing task outcome and dialogue characteristics emerging in WYSIWIS and IRC based interfaces using tasks and procedures essentially the same as those employed by Hancock and Dunham [2].

## METHODS AND PROCEDURE

Forty dyads, comprised of unacquainted partners, collaborated in solving a figure-matching problem, based on a task developed by Schober & Clark [5]. Participants

were randomly assigned to either a WYSIWIS or IRC based synchronous text-based communicative environment. In both conditions, participants exchanged typewritten messages in real time using ICQ (Beta 1.113). In the WYSIWIS condition, participants employed the "Horizontal" option and the speaker's messages were continually streamed onto the addressee's monitor. In the IRC condition, participants employed the "IRC style" option, and the speaker's messages were transmitted to the partner's screen only after pressing the enter key.

In each dyad, one participant, designated the Director, described a series of 12 tangrams to their partner, the Matcher. Their task was to correctly match as many tangrams (see Figure 1) as possible. The task outcome provided an objective index of the degree to which the dyad had successfully grounded their communication and constructed a veridical common ground [5].

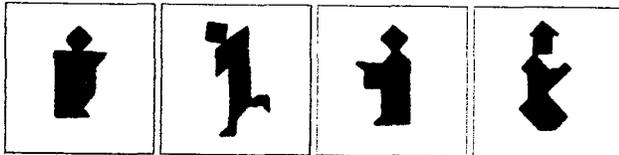


Figure 1. Examples of tangrams the Director and Matcher attempted to identify and match.

## RESULTS

The present data revealed, as predicted, that dyads in the IRC condition were more accurate on the tangram task (86.7% correct; SE=2.2) than dyads in the WYSIWIS condition (76.3% correct; SE=4.37),  $t(38) = 2.94$ ,  $p < .05$ .

In addition, discourse analysis of the transcripts revealed that a smaller proportion of dyads in the IRC condition employed ad hoc verbal coordination devices (5 of 20) than dyads in the WYSIWIS condition (13 of 20),  $\chi^2(1) = 6.65$ ,  $p = .01$ .

The number of words exchanged did not vary across the two conditions (for the IRC condition,  $M = 806$ ,  $SE = 67$ ; for the WYSIWIS condition,  $M = 961$ ,  $SE = 115$ ), nor did the time to complete the task (for the IRC condition,  $M = 45.1$ ,  $SE = 4.35$ ; for the WYSIWIS condition,  $M = 36.2$ ,  $SE = 4.35$ ). Furthermore, neither of these measures was significantly correlated with tangram performance, suggesting that neither word nor speed accuracy trade-off was a critical factor in the present data.

## DISCUSSION

The present experiment compared characteristics of task-oriented, text-based conversations mediated by IRC and WYSIWIS applications. As predicted, the data suggest that unfamiliar partners communicating in an IRC based communicative environment were more successful in constructing a veridical common ground, as indexed by greater accuracy on the tangram-matching task.

Furthermore, participants in the IRC condition used explicit verbal coordination devices less frequently than participants in the WYSIWIS condition, suggesting that

the inherent turn structure in the IRC environment assisted in coordinating their communicative activities.

The present data are consistent with Clark's [1] assumption that communicative environments that disrupt the grounding of lower level communicative activities (e.g., coordinating turn allocation) may also disrupt the grounding of higher level communicative activities (e.g., constructing common ground). In addition, the ad hoc verbal coordination devices employed by dyads in the WYSIWIS condition demonstrate human versatility in adapting to constraints imposed by mediated communication.

Although the present data are consistent with previously discussed data on the role of coordination devices in text-based exchanges [2], it is also important to note that the two interfaces compared in the present study also differ on another potentially important dimension. In the IRC condition, messages were composed in private, allowing participants to alter a message before sending it. In the WYSIWIS condition, however, messages were composed in public, allowing the addressee to view the construction of the utterance, in addition to the final product. The question that arises is whether exposure to the process of message composition can also explain some of the variance in task performance and differences in dialogue observed in this study.

Finally, it should be noted that no direct attempt was made to measure participants' preferences for one or the other communicative environment. Although one might suspect that the need to employ additional verbal signals to regulate turn allocation would be a less desirable communicative environment, this remains an open question that needs to be explored in additional research.

## ACKNOWLEDGMENTS

This work is based on a Master thesis submitted to Dalhousie University, September, 1998. The research was supported by grants from the Social Sciences and Humanities Research Council of Canada awarded to Dr. Philip J. Dunham.

## REFERENCES

1. Clark, H.H. *Using Language*. CUP: Cambridge, 1996.
2. Hancock, J.T. & Dunham, P.J. Communication in impoverished social environments: The role of coordination devices (submitted, 1998).
3. McCarthy, J.C., Miles, V.C. & Monk, A.F. An experimental study of common ground in text-based communication. *Proceedings of CHI '91*, ACM Press, 209-215.
4. McCarthy, J.C., Monk, A.F. Measuring the quality of computer-mediated communication. *Behaviour & Information technology* 13, 2 (1994), 311-319.
5. Schober, M.F. & Clark, H.H. Understanding by Addressees and Overhearers. *Cognitive Psychology* 21, 212-232.