# Understanding the Challenges of Online Group Chat for Productive Discourse at Scale

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**ABSTRACT**

Group chat allows multiple people in a remote setup to collaborate. As there can be many participants in a single chat conversation, it may be difficult for members of a group to keep up and stay grounded during the long stream of conversation generated by the participants. We conducted a need-finding study where we asked participants to work on various collaborative tasks in real-time chat software to learn about issues and behavioral patterns in a group chat conversation at a scale of five to ten people. We present the challenges in keeping up with messages, wasting effort due to a lack of cotemporality, and how challenges vary with the nature of collaborative tasks. We suggest a few design interventions that can address these challenges in chat software through temporal and spatial design changes.

**CCS CONCEPTS**

• **Human-centered computing** → **Empirical studies in collaborative and social computing**.

**KEYWORDS**

online group chat; IRC; instant messenger

**INTRODUCTION**

Having started from bare-bones Internet Relay Chat (IRC), chat systems now allow productive collaboration and idea exchanges in a remote setup at lower communication costs [2, 8]. Group chat applications (e.g., Slack, Discord, Facebook Messenger) have entered into daily use for purposes ranging from work and study to socialization and entertainment, and we have seen growth in their functionality, utility, and popularity in the last decade alone, especially in terms of information interchange [1]. Naturally, the scale of chat rooms has also grown, from one-to-one communication in the early days

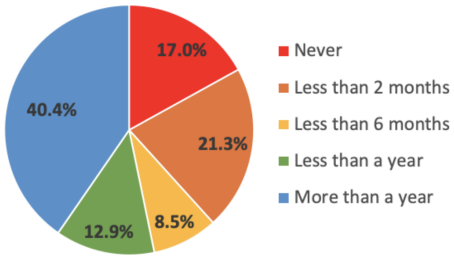


**Figure 1: Participants' use of Slack.**

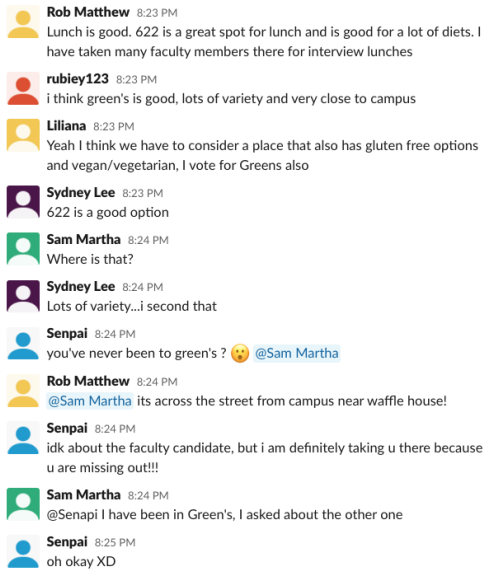


**Figure 2: A screenshot from the study, showing a chat snippet from a group of 10 participants. The chat covers multiple topics (two restaurants; namely, Greens and 622 North) in a single thread, producing confusion.**

to modern rooms with hundreds of active users. We can find tens of people communicating in one channel for work-related purposes [4, 6].

In such settings, conversations involving coordination, discussion, or decision-making can be more challenging than if they were held in person [12]. In order to keep track of the conversation, participants have to parse, review, and comprehend textual messages coming from many people. Indeed, researchers have found that the textual modality of a chat room becomes undesirable in real-time communication for a group as the size of the group increases [7, 9, 11]. While the textual modality is not without benefits, such as reversibility and revisibility, these challenges cannot be attributed only to a lack of verbal and nonverbal communication [3]. The goal of this work is to understand the challenges presented by chat-based communication when there are many people in a group chat with a collaborative context. In this paper, we present preliminary results from the study that can inform the design of a chat application to facilitate communication at scale.

## METHOD

We conducted a remote user study where we asked participants to work on various collaborative tasks, simulating the collaborative context of a group discussion. We recruited participants from our (i.e., the authors') university mailing lists. We asked them to participate in four different tasks in a Slack channel: an initial ice-breaker, and then three discussions in which the participants arranged to eat out, planned a trip, and debated a controversial topic (see Figure 2). We collected data (an aliased chat history and a screen recording of each session from the moderator's screen) from six sessions — three larger groups (9, 10, and 13 participants) and three smaller groups (three groups of 5 participants each). After the session, the participants filled out a survey asking about their general group chat experiences (Fig. 1) and the study they had just participated in. We then reviewed and annotated the data, and we coded and categorized the survey responses using grounded theory [5].

## RESULTS

### Keeping up with multiple threads of conversation

One consistent challenge that we observed, and that participants mentioned, was keeping track of multiple threads of conversation during the study. While a lack of team dynamics in this task environment may have been a factor in the lack of a clear leader or coordinator, the linear design of the chat application made it difficult to discern multiple topics interleaved in a single thread. In typical, in-person, verbal communication, only one topic is discussed at a time. There is only one person speaking at any given time, and each utterance tends to be related to the previous one. These interleaved topics contributed additional valid and relevant points to the discussion. They are thus not inherently digressions, and participants need to track these topics. In contrast, Figure 1 shows a case where a participant's question was ambiguous and created confusion. This was partially a product of

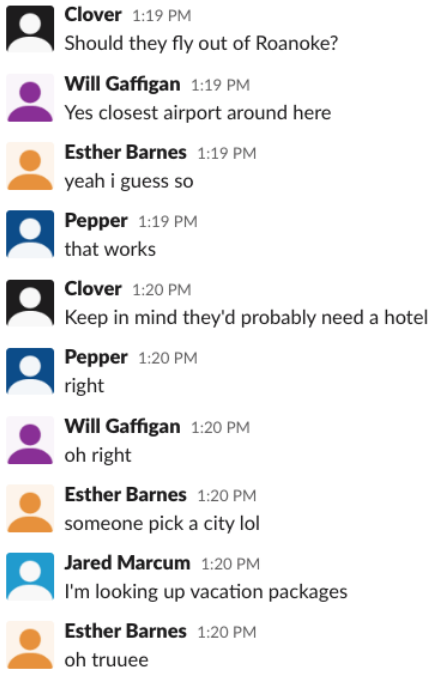


**Figure 3: A snippet from a group chat with 5 participants, depicting participants responding redundantly to a message.**

the participant's use of a demonstrative pronoun ("Where is *that*?"), and partially a product of the fact that two restaurants were suggested and under discussion simultaneously.

The survey responses also confirmed that the participants found it challenging to keep track of messages. Participants agreed or strongly agreed that they *"often read older messages as I couldn't keep up with messages arriving super quickly"* (76.5%).The majority confirmed that they had created smaller groups with people from larger groups "because larger groups were just way too active" (85.1%). This approach would have reduced the severity of the challenge, particularly in one-on-one communication. This is likely a reason for respondents' preference for smaller group chats.

### Wasted efforts, unspoken thoughts, and unheard voices,

In the group chat sessions, a great deal of effort was wasted, as redundant messages and thoughts were repeated. The scale of group chat naturally produces redundant messages that would likely have been simple confirmations in verbal communication. However, we were able to observe incidents where people reacted individually and redundantly with different delays. An example of a redundant acknowledgment is shown in Figure 3.

Such redundant messages can be attributed to limited cotemporality — that is, being able to receive information as soon as other group members produce it. Instead, messages do not appear until they are submitted by pressing the Return key. From the survey results, we found that the majority of the respondents agreed or strongly agreed that they typed redundant messages because they *"didn't know someone else was going to type something similar ahead of me"* (76.6%). While this was observed, the amount of effort wasted may be more significant if we take into account messages that were typed, but never sent. A majority of the participants (85.0%) agreed or strongly agreed that they did not enter some messages because someone else said something similar. These kinds of redundant messages do not contribute much to the discussion, serving mostly to push other messages off the screen more quickly. Furthermore, it seemed that many people were unable to say what they intended to say. Specifically, 78.7% of the participants indicated that they refrained from saying something to avoid digression (61.7%) or to avoid contributing to an already excessive volume of messages (40.4%); this ultimately led some participants to feel unheard and ignored (12.8%). Meanwhile, some participants mentioned waiting for someone to finish typing, as a strategy to make the collaboration go smoothly.

### Challenges vary by task type

We found that different kinds of challenges emerge depending on the nature of the collaboration. For example, such tasks as decision-making or scheduling often involve collecting responses from participants. It was difficult for participants to keep track of how many people agreed or disagreed with an idea (see Figure 4). For such tasks, collecting responses (voting) and freezing the results to keep track of the discussion would be helpful. Similarly, for collaborative work that can be coordinated to allow

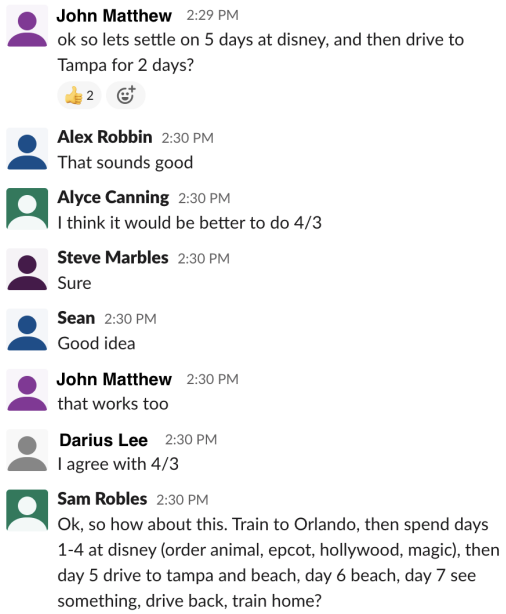


**Figure 4: A snippet depicting how difficult it was to keep track of how many people agree or disagree with the ideas**

participants to work in parallel (e.g., planning a trip), participants experienced difficulty in staying aware of what others were working on and keeping track of discussion items. In this case, having a shared agenda alongside the thread of communication would help to enhance awareness. For a deeper discussion on a subject, presenting a personal thought requires relatively lengthy articulation, and this is possible when participants wait and listen for others to finish their thoughts. Newer messages with a different, disconnected idea can interrupt another user's coherent story presented in multiple sequential messages. 83.0% of the study participants had experience with Slack, which inidicates their awareness of voting and message threading as shown in Fig 1. Our study data reveals that limited number of participants actually used these features. This demonstrates the potential tension between providing various design features and hurting usability by adding too many features. It also shows the need for simple but versatile design solutions to support the various needs of fluent group chats.

## ALTERNATIVE DESIGNS FOR EFFECTIVE GROUP COMMUNICATION

Based on the challenges presented above, we are currently developing design interventions. We present one temporal approach and one spatial approach below. **(Live Keystrokes)** The first design goal is to investigate the impact of realizing cotemporality in a chat application by making chat messages appear in real time for all participants as they are typed. This work draws an idea from a previous work that was tested in a one-on-one setting, but not in a group setting [10]. We believe that this feature can naturally prompt people to wait effectively and reduce wasted effort, bringing chat communication closer to verbal communication in efficiency. **(Multi-threaded Chat)** While modern chat software supports single-level threading (replying to a specific message), this seems insufficient to support multiple ongoing, real-time conversations. Therefore, we are in the process of testing a multi-threaded conversation design that mimcs in-person communication, where people can have small group conversations in parallel. We believe that this would help organize multiple conversations, allow digression, and help users keep track of their agenda while minimizing thread lengths.

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