
Using Language-Retrieved Pictures to Support Intercultural Brainstorming

Hao-Chuan Wang

Department of Information Science
Cornell University
Ithaca, NY 14850, USA
haochuan@cs.cornell.edu

Abstract

Group brainstorming is a commonly practiced technique to enhance creative outcomes. Cultural differences in knowledge and perspectives are valuable sources for diversity essential to creative outcomes, while cultural discrepancy in communication and language may impede idea sharing. My dissertation research aims to reconcile the tension between the benefits and obstacles of intercultural brainstorming. The design approach is to augment conversational brainstorming with language-retrieved pictures. Pictures may provide rich stimulation and mediate concepts in a relatively language-independent manner, which may complement the still imperfect machine translation, and make intercultural and multi-lingual idea sharing more feasible.

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Keywords

Intercultural collaboration, group brainstorming, computer-mediated communication, creativity support

ACM Classification Keywords

H5.3 Group and Organization Interface: Computer-supported cooperative work

General Terms

Design, Experimentation, Human Factors

Research Situation

I am a third year Ph.D. student in the Department of Information Science at Cornell University. The department brings together cross-disciplinary faculty and students to conduct research at the intersection of information technologies and social sciences. I have progressed to my candidacy stage, and expect to complete my dissertation in 2011.

Academically, I identify myself both as a behavioral scientist and a computer scientist. As a behavioral researcher, I draw psychological theories and methods to study computer-mediated communication (CMC), intercultural collaboration and group creativity. As a system builder, I apply computational techniques to design tools to support complex social and cognitive

tasks such as group brainstorming. Ideas from the two aspects cross-fertilize. Behavioral studies and system design are closely integrated in my research.

My dissertation aims to address issues around supporting intercultural workgroups to generate ideas. The increasing popularity of using CMC to perform teamwork across national and cultural boundaries raises theoretical and design questions regarding how cultures affect computer-mediated brainstorming, and how to support this intercultural collaboration process. I propose to use *language-retrieved pictures* (i.e., pictures triggered by, and relevant to, conversational content) to provide rich visual stimuli that make verbal brainstorming more stimulating. Completed studies showed the usefulness of the approach in intracultural [5] and intercultural groups [6]. As a next step, I propose to integrate this approach and machine translation to allow international group members using their native languages to express ideas. Pictures may mediate concepts in a language-independent manner and thus may make it easier to share ideas across language boundaries.

By attending the CHI 2011 doctoral consortium, I expect to gain feedback from the HCI community on this proposal, and also on general issues around cultures, languages and creativity in the context of HCI.

Context and Motivation

Generating ideas is an integral component to work in many domains. Creativity is difficult; limits in individuals' knowledge, perspective, experiences and overall cognitive resources make idea generation a challenging task.

In theory, overhearing other people's ideas may help to expand people's vision and imagination, allowing group members to synthesize new ideas that they cannot think of individually [3]. Ideas generated in groups also serve as stimuli to sustain group brainstorming. A close observation of the process suggests that ensuring the abundance and diversity of stimuli is important. When ideas contributed by group members are too few or too similar, the possibility for people to think of unique ideas may decrease due to low stimulation. Consequently, the group may fall into a vicious circle of cliché, generating only variations on the same ideas.

Intercultural groups consisting of individuals with multicultural backgrounds have the potential to brainstorm better. Cultural differences in knowledge and cognitive styles [4] may become a useful resource to improve the diversity of ideas and stimuli available in groups, and help to achieve better creative outcomes. However, the communicative barriers between different cultures could also be large. Non-fluency in using a second language to express ideas and withholding ideas due to heterogeneous social norms could be common. The social and language gaps between cultures raise needs to understand intercultural brainstorming and to identify ways of supporting the process.

Background

Group brainstorming involves both the social process of idea sharing and the cognitive process of idea generation. Group brainstorming may benefit idea generation if socially exchanged ideas are sufficiently different from individuals' own ideas, because they may stimulate out-of-box thinking and prevent people from converging to a narrow set of thoughts [3]. Productive ideation requires diverse stimuli, but such diversity may

not be available because social interactions may raise negative side effects, such as making individuals to withhold ideas due to peer evaluation pressure [3].

Early electronic brainstorming systems attempted to reduce evaluation apprehension and other social side effects by displaying ideas anonymously with circulating sheets or public displays [1]. The approach enhances productivity at the cost of conversational interactivity, which is important to the social aspects of workgroups, such as interpersonal coordination and relationship building [2]. The design also did not take cultural and language differences into consideration.

Statement of Thesis

It is crucial to identify designs that may support intercultural brainstorming given the increasing popularity of international collaboration. Cultural diversity in knowledge may contribute to creative outcomes, but cultural differences in social norms and languages may block idea sharing. How to reconcile the tension between the benefits and difficulties of intercultural work poses challenges both to design and theory. The dissertation aims to contribute to the understanding of computer-mediated intercultural brainstorming and to identify ways of support.

Research Goals and Methods

To support intercultural brainstorming, I identify multiple design issues and constraints. Because interactivity is required for certain beneficial social processes, can we use conversations to achieve natural but also effective idea sharing? Because expressing sophisticated ideas in a second language is difficult, is there a way for international group members to express ideas in different native languages?

I propose to address the needs and requirements with language-retrieved pictures, an interaction technique that augments ongoing conversations by presenting extra pictorial stimuli retrieved based on the language content [5]. As a communication channel, pictures are with unique properties. One observation is that language may convey ideas with semantically precise propositions. Pictures, on the other hand, may provide a richer visual context to trigger culturally diverse perceptions and interpretations [4]. Presenting language-retrieved pictures to people thus may strengthen the stimulating utility of the original verbal ideas to elicit cultural diversity in concepts for enhancing productivity and originality of ideas. I propose to examine the effects of pictures on intercultural teamwork through experimental studies.

Dissertation Status

I have prototyped the design proposal of using language-retrieved pictures to augment conversational brainstorming as a tool called IdeaExpander [5]. Figure 1 shows both a screenshot and the high-level architecture of IdeaExpander, which retrieves and presents pictures relevant to ongoing online chats.

One recent experimental study shows that IdeaExpander helped intercultural groups to generate more and more diverse ideas than the condition of receiving no stimuli [6]. IdeaExpander-mediated intercultural brainstorming helped to obtain the greatest diversity of ideas than either having multicultural group composition or using IdeaExpander alone.

The next step is to understand the effects of using pictures to cross language boundaries, and enable people to express ideas in their native languages. To

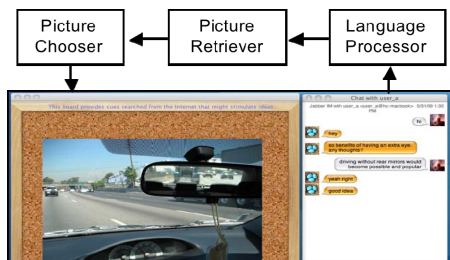


figure 1. IdeaExpander monitors the group conversation (right) and selects pictures to display to the group (left).

prototype this, I propose to combine IdeaExpander with machine translation tools, like Google Translation or the Language Grid toolbox (<http://langrid.nict.go.jp/>). In this cross-lingual version of IdeaExpander, ideas shared to the chatroom will be processed in two ways. First, contributed ideas will be translated by machine translation. So people speaking a different language will see translated ideas. Second, the system will use the inputs to retrieve relevant pictures as visual stimuli. Searching pictures with multilingual queries is related to the technical topic of cross-lingual information retrieval. A simple prototyping technique is to index pictures with multilingual tags.

I will conduct an experimental study to examine of effects of IdeaExpander on machine translation-mediated brainstorming. In the study, participants from two different cultures (American and Chinese) will brainstorm in dyads by talking either in a common language (English) or in their native languages (English or Chinese) that will then be translated by machine translation. Each dyad will work on two sessions, one with IdeaExpander and one without. The experimental design will verify whether poor machine translation impedes brainstorming, and if so, whether IdeaExpander helps to improve the performance. I will also examine the pattern of language use to understand how the injection of pictures influences the ways people talk to collaborate and share ideas.

Expected Contributions

My dissertation research proposes an integrated body of behavioral and system design work for computer-mediated intercultural brainstorming. The work will contribute to the current understanding of CMC, intercultural collaboration and group creativity to the

HCI community. It also demonstrates using theoretical and empirical understanding of human behaviors and cognition to shape the design of artifacts for supporting complex cultural, social and cognitive processes.

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