# Shop Together, Search Together: Collaborative E-commerce

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## Abstract
We present research on the development of a collaborative searching system for ecommerce shopping, based on domain specific requirements of retail shopping. We describe the design rationale for the system development and inclusion of collaborative search features, including search, chat, clipboard, product suggestions, shared views, and shopping cart. Our research goal is to understand whether collaborative searching tools are useful in supporting actual collaborative shopping tasks. In addition to describing the system development, we report findings from some preliminary user study. The findings highlight that collaborative search systems for domain specific areas such as online shopping can support collaborative searching, shared views, and group communication to aid in the completion of collaborative tasks.

## Author Keywords
Collaborative search; Information seeking process; ecommerce searching; information searching; searching for products; shopping search.

## Introduction
Information searching is increasingly being recognized as a collaborative activity [9, 12, 15], in certain

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|---|---|
| **Web searching** | Submission of a key-phrase as a query to a search engine |
| **Collaborative searching** | Two or more people engaged in and working together in the same search task |
| **Online shopping** | Buying goods or service via the Internet or Web |
| **Collaborative e-commerce** | Two or more people engaged in and working together in the same shopping task |

**Table 1**. Definition of Key Constructs

contextual situations. Individuals routinely seek help from other others online in order to assist in addressing collaborative tasks [6, 12]. However, most widely used searching tools, techniques, systems, and paradigms are still designed for single users. Although there are an increasing number of collaborative searching models [13] and systems [1, 3, 14], few of the collaborative systems have gained wide adoption.

One potential reason for this is that collaborative search has primarily been visualized as a generalized task, resulting in collaborative search systems developed for generic instead of domain-specific collaborative efforts. There has been limited work in understanding the collaborative nature of the underlying domain specific task and then developing collaborative searching systems specifically for that domain [7, 11]. This is the motivational foundation for this research.

In the present research, we develop and evaluate a collaborative web searching system for the ecommerce domain, specifically for online retail shopping. The collaborative system features are based on an analysis of online retail shopping task attributes, specifically product types. Our user study shows that collaborative searching systems can assist in certain shopping situations, specifically online retail shopping where the shopper desires the opinions and input of others [5].

## Research Objectives

We believe that identifying and developing systems that specifically support these inherently collaborative tasks is the key to wider adoption of collaborative searching tools. Although there has been considerable research effort invested in defining collaborative search [13] and developing a variety of collaborative searching systems [3, 7, 11], most of these models and systems have taken a broad and generic view of collaborative searching, ignoring potentially domain dependent characteristics that are critical to the design and adoption of collaborative searching systems. Therefore, we believe that developing systems for specific domains could be beneficial for the future direction of collaborative searching system development activities.

In this regard, we have developed a collaborative search system that allows multiple individuals to work together (either synchronously or asynchronously) to accomplish an online, collaborative retail shopping task. Although possessing some similar collaborative features as other systems from prior work [3, 7, 11], our research focus was specifically within the online retail shopping domain.

## System Development

The central attribute of online retail shopping is the nature of the retail product, which relates directly to the underlying shopping task. Consumer products can be classified into three categories based on the nature of the information concerning those products: *search products*, *experience products*, and *credence products* [10]. Search product are ones where the consumer can easily evaluate the characteristics prior to purchase. Experience products are ones where the consumer cannot easily determine the products' characteristics prior to purchase but can determine these characteristics upon purchase, consumption, or use of the products. Credence products are ones where the consumer cannot easily determine the products' quality even after purchase, consumption, or use of the products.

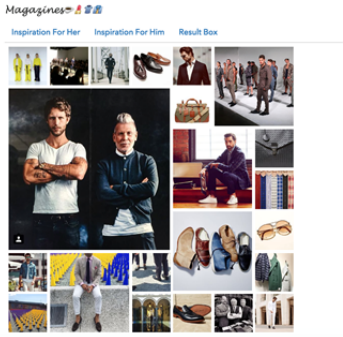


**Figure 1.** Screenshot of Magazine "Inspiration For Him"

MAGAZINES

The magazine is an embedded gallery that allows users to browse and look for product inspirations. When the user browses the magazine, they can change pages or click on images to see the product details, including item names, brands and description (see figure 2). The magazine tab, "Inspiration For Her", is based on a Shopstyle Instagram account targeted at young females, and "Inspiration For Him" is a Giltman (http://www.gilt.com) Instagram account focused on men. The embedded gallery is implemented via Instush (http://www.instush.com/).

For our research, we focus on experience products, because they are often the focus of collaborative searching and retail shopping tasks. Search products (e.g., printer cartridges) would not generally be considered a collaborative shopping task because the price and quality can easily be determined. Credence products (e.g., health care) often require expert or third-party expertise. However, experience products fit nicely with the concept of collaborative searching, because the advice and assistance of others can reduce the uncertainty concerning the product, by viewing searching for these products as a learning endeavor [4, 8]. We also hypothesize that experience goods can be situational or contextual dependent. For example, a piece of clothing can be inherently an experience product and additionally the appropriateness of the clothing can be tied to an event, reinforcing the search nature of the product.

This view of the online retail shopping information needs based on product types is supported by prior work highlighting that collaborative searching tools typically offer two types of affordances that separate them from individual searching systems [2, 7]: (a) *awareness features*: sharing of queries, and comments among those collaborating, and (b) *division of labor features*: ability to manually divide results, links, etc. among those collaborating.

Based on this concept of search goods and collaborative affordances, we developed a collaborative search system to support online retailing shopping. The

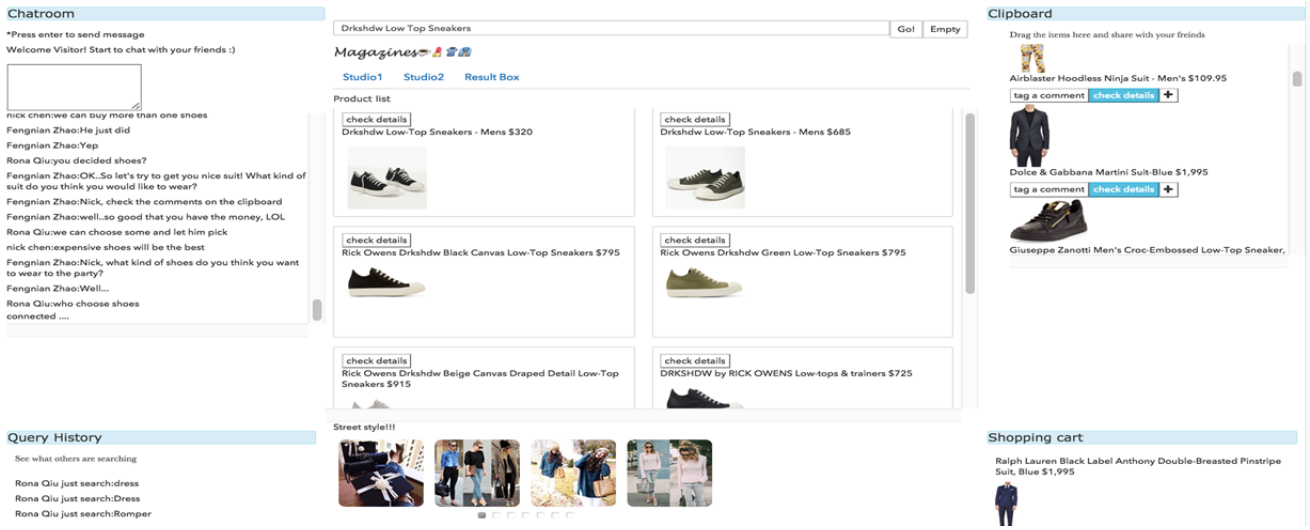


**Figure 2.** Screenshot of user interface showing collaborative components of search section, chatroom, clipboard, query history, shopping cart, and magazine.

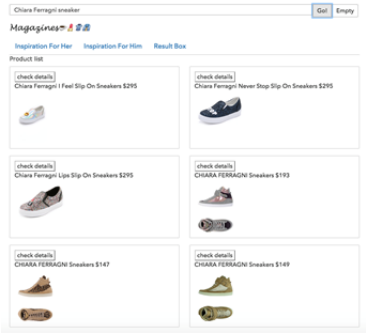


**Figure 3**. Search result with search terms "Chiara Ferragni sneaker"

The search box is where the user can type terms to query for products. A 'check details' button forwards the user to a complete item description page (see figure 3).

Each item in the results listing has a 'draggable' and droppable' attribute so that the user can drag the item to clipboard (figure 4) and share to other users, while they are browsing.

The empty button clears the search box and product list, when restarting a search.

system allows multiple users to conduct web search retrieval independently, while also interacting with others collaborating on the shopping task. The system front-end is built on HTML, CSS, and JavaScript. The back-end is Django and SQLite.

*User Interface*

The user interface (figure 1) has two main sections, one focused on the individual and one on the collaboration. The individual section is composed of a search box and a 'magazine' section (figure 2). The collaboration section includes a chatroom, query history, clipboard, and shopping cart.

*Search Section*

The search box is where the user can type terms to query for products. Each item in the list of matched results contains name, brand, price, and picture of the product (figure 3).

*Collaboration Section*

There are several features in the collaboration section.

**Query History**: Query history is the component showing what other members collaborating on the shopping task are searching. This feature allows users awareness of what direction others are taking, can be a source of additional query terms, and provide early insights into product perceptions.

**Chatroom**: This is the main communication tool of the system (figure 1). It contains the input box for new posts and also a message archive for historical reference.

**Clipboard**: Clipboard is an interface component container with real-time features for users to drag items that they want to share with other members collaborating (figure 4).

**Shopping Cart**: When a user clicks the add button in the Clipboard, the item is placed in the shopping cart (figure 1).

*Product database*

The products are pulled from ShopStyle (http://www.shopstyle.com/), a popular online retail providing product recommendations. The system fetches data and presents product details to the users as results.

## User study and Evaluation

STUDY DESIGN

We are in the process of conducting a full user study. However, we present preliminary results from one group of users. We wanted to use a retail shopping domain that was complex enough to require collaboration but was also understandable and relatable to the study participants. We did not impose any time constraints on our participants' shopping process. This approach provided ample time for our participants to explore and become familiar with system features, while also allowing us to understand the use of the system during the collaborative shopping activity. The study included a pre-scenario questionnaire, a brief overview of the collaborative shopping system, and a post scenario interview. We use a qualitative methodological analysis for this phase of the user study.

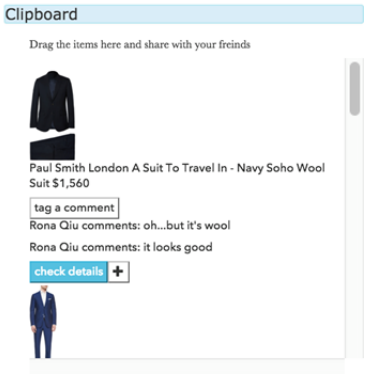


**Figure 4**. Screenshot of Clipboard

There are three synchronous features in clipboard:

- **Sharing**: allows item sharing.
- **Tagging**: allows users to leave short feedback on shared items and seeds for further discussion.
- **Adding**: allows for direct adding of the item to the shopping cart if users settle on an item.

PARTICIPANTS

We recruited one group of three college-age females who were frequent online retailer shoppers and were also familiar with each other.

SHOPPING SCENARIO

We designed a searching scenario that was complex and nuanced enough to encourage and facilitate collaborative. Our decision was based on two pilot user studies, where we observed that, if the shopping task was too straightforward, it resulted in individualized searching behavior rather than collaboration. We also determined in these pilots and from prior work on collaborative searching [9, 12] that the collaboration must have a focal point or person to provide some structure to the collaboration. In our study, we refer to this person as 'group member A'. The shopping scenario employed for this user study was:

*You (group member A) are going to an outdoor party for all undergraduates in your department, as a chance to meet the professors, instructors and new friends. You want have to a splendid new outfit for this party. The party will be in the daytime, and the weather will be sunny and dry, with a temperature of about 29°C (84°F). The invitation letter specifies that you have to wear "business casual". You're not sure what to get; it could be a romper or a dress, and you want the input of your friends (group member B and C, neither of who have attended this kind of party before themselves). You want the suit to be classy, to reflect your good taste. You want it to be flattering but also appropriate for your age. You also want it to reflect your own unique personality of being an extrovert. So, you want to impress. You don't know what you want at the moment; you will know it when you see it. While you are shopping for your suit, you also need to purchase accessories such as purse, earrings and shoes that will perfectly match your suit. However, if you find a great scarf or shoes, it might influence what suit you get. So, you began the online shopping trip with an ill-defined goal: something classy, flattering, impressive, and unusual. Other interests, blouse, scarf, and shoes, also would be nice but are not the main goal for the online shopping trip.*

## Results

The user study ran for two hours and thirteen minutes, including the introduction, pre- and post-participant questions, scenario understanding, system tutorials, searching session, and interview. The specific online shopping session engagement was forty minutes.

During the online shopping session, the three shoppers used a total of ten unique keyterms during searching and reviewed or browsed 400 items. There were thirteen items selected and added to the clipboard (see figure 4), with an eventual four of these items added to the shopping cart.

From our post-session interview, there were several comments made concerning the nature of the collaborative search process and the interaction of shoppers using the collaborative shopping system.

**Experience Product**: It was clear that the focus on an experience product within a particular context influenced the collaborative searching process. Participants stated:

> A; "At the beginning, the idea was not really clear, just a big picture, ... style, details, not

clear, but after seeing the pictures and adapting the magazine, (not really using magazine, just take a look at it ) it became clear gradually"

B: " At first, I was concerned about possible disagreement and worried that we would not find a unique one. There were a bunch of dresses to choice from."

**Awareness**: The aspect of awareness as a need affordance of collaborative searching in the ecommerce domain was also apparent, both in the overall goal of the task and as well as with details. We've noticed that the keyterms they used while searching were different from the words used when they were discussing in chatroom. While asked the question "Do you think your friends got your idea clearly?", participants answered:

A; "Yes, communication is great. Flattering dress equals a sexy dress. No misunderstanding."

The awareness is not only conveyed by text, but also by images. As noted in reactions to the images in the clipboard:

C: "I was concerned about the items. I just started browsing the items after other people began to drag the items, as I was looking for accessories."

**Visual Clues**: As interesting aspect of the domain-specific nature of ecommerce collaboration with retail products was the importance of the images. The opinions and searching direction was adjusted according to what they saw during the collaborating process.

A: "Then, I found that other people did not like the golden bracelet, so I had to browse another bracelet."

B: "I was in charge of shoes, but I picked one black dress! Obviously! It's classic, and can match everything."

C: "But the dress is so ugly‼‼ Check the details!!! OMG"

## Conclusion

Our research is based on the premise that collaborative search tools could be more effective if they were domain targeted. We developed a collaborative search system for online retail shopping, leveraging prior work concerning product information types and affordances of collaborative search tools. We evaluated our system using participants engaged in an actual collaborative shopping task. These findings confirm our initial premise and will be used to refine the system. We plan to conduct a broader user evaluation using both qualitative and quantitative methods.

For the future work, we will focus on reciprocation from collaboration among participants in the same group. We want to discover how the searching direction is changed by discussions based on the previous collaborating results. We are also interested in how labor division works during the entire collaborative searching process, especially at the beginning of the task and the stage of making purchase decision.

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