MICROBLOG SEARCH AND WORD CLOUDS:

AN EXAMINATION OF THE IMPACT OF WORD CLOUDS UPON USER

SATISFACTION DURING FOCUSED MICROBLOG SEARCHES

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ABSTRACT

MICROBLOG SEARCH AND WORD CLOUDS:

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Increases in the usage of microblogging services have increased interest in microblog searches. Word clouds could be added to microblog search results to produce measurable effects on the microblog search experience. Research was carried out to test whether word clouds improve the user satisfaction of using a microblog search engine when searching for microblogs focused on a particular topic. Research participants completed simulated search tasks in which half the participants were shown word clouds with their search results. Following the search simulations participants completed a survey focused on analyzing user satisfaction related to the exercises performed. The findings of the research were largely statistically insignificant but may indicate that participants felt neutral or slightly positive satisfaction with their search simulation tasks regardless of the presence of word clouds. The implications of this research suggest further study is required to understand the effects of including word clouds alongside microblog search results.

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1 Introduction

User satisfaction with microblog search engines is not currently understood. The question of whether the current type of search offered by microblog search engines satisfy computer users who are searching for microblogs focused on particular topics remains to be addressed. Furthermore, it should be determined whether user satisfaction of performing a focused microblog search can be improved by the addition of authors' word clouds presented alongside posts returned during microblog searches.

Determining the above matters could have major implications for the design of future microblogging search technologies. Better understanding the effects of adding word cloud visualizations to microblog search results might help determine if and how word clouds should be incorporated into current and future microblog search technology.

User satisfaction with current microblog search tools has yet to be measured. It also remains to be determined whether computer users are satisfied when trying to locate focused microblogs. Word clouds may be able to summarize the content of microblogs in a way that improves computer users' satisfaction when attempting to find focused microblogs using a microblog search engine. Much remains unknown about microblogs and cloud visualizations. This has left many aspects of microblogging and word cloud usage to be examined in a more detailed and comprehensive way.

Here it will be argued that the additional functionality provided by adding word clouds alongside microblogging search results will result in an observed improvement in user satisfaction with

attempts to find microblogs focused on particular topics, as compared to traditional representations of microblog search results that do not include word clouds.

This document describes the current literature that has led to researching the effects of the adding of word clouds to microblog search results in order to study user satisfaction. Then, the methodology of an experiment designed to test the hypothesis that the additional functionality of adding word clouds alongside microblog search results will result in an observed improvement in the satisfaction of users attempting to find focused microblogs will be discussed. The design and creation of a microblog search simulation tool used during the research experiment are then presented. The survey tools used to capture and analysis user satisfaction after the search simulation tasks are performed are then discussed. The results of this carried out experiment are then presented and analyzed. Finally, conclusions about the research conducted are discussed and suggestions for future work are made.

2 Literature review

I believe that the additional functionality of adding word clouds alongside microblog search results will result in an observed improvement in the satisfaction of users attempting to find microblogs focused on particular topics as compared to traditional representations of microblog search results that do not include word clouds.

This chapter examines background literature to discover the building blocks necessary for arriving at the above thesis statement and carrying out the research in order to prove or disprove the thesis statement. This chapter begins with an exploration into how user satisfaction can be defined and includes an examination of computer user satisfaction evaluation techniques. This chapter then describes online diaries known as blogs as well as their minimized implementation known as microblogs. Blog search characteristics are presented and the types of content shared via web logs are examined. The chapter finishes by exploring the information visualization techniques known as word clouds and tag clouds and why further study of the effects of word clouds on user satisfaction when performing focused microblog searches is valid.

2.1 Measuring Search Satisfaction

As of 2008, the percentage of internet users who use search engines on a daily basis has steadily risen to just fewer than one-half (49%) (Fallows, 2008). The number of users using a search engine on a typical day is rising closely to the rates of those 60% of users that use email on a daily basis. Internet search engine usage is now a fundamental part of the World Wide Web experience for the majority of internet users.

Due to the rising importance of online searching, World Wide Web searching technology and search engines have become a focus of research and publication. A major focus of this research has been investigating online search effectiveness (Alhalabi, Kubat, & Tapia, 2007; Vaughan, 2004; Xie, Wang, & Goh, 1998). The measure of online search service so far has focused on metrics such as "precision" and "recall". When these metrics are applied to the field of online search engines, precision can be defined as the proportion of retrieved documents that are relevant, while recall can be defined as the proportion of relevant documents that are retrieved (Hawking & Craswell, 2002). Recall can be difficult to measure because the meaningfulness of recall depends heavily upon the accuracy of the estimation of how many relevant documents there actual are (Hawking, Craswell, Bailey, & Griffihs, 2001). Precision and recall are just two possible measures of search engine performance that can be considered. It has been noted that there are a number of different way to address the topic of rating search engines beyond the established metrics of precision and recall (Alhalabi et al., 2007; Vaughan, 2004). While precision and recall can provide insight into the effectiveness of search in a quantifiable way they do not provide information about the perceived levels of satisfaction a user has while using a search service. Foreseeably, a search service could improve both precious and recall of a search service Haber 4 of 178

yet this may not translate into a better user experience and an increase in satisfaction for users performing web searches. To understand the effects of a search services on the user experience we must use other metrics beyond the established metrics of precious and recall. Satisfaction is one such metric that can be employed to better understand the user experience of search.

Satisfaction, "... in a given situation is the sum of one's feelings or attitudes toward a variety of factors affecting that situation" (Bailey & Pearson, 1983a). A number of attempts have been made to try and define satisfaction with information seeking. (Bruce, 1998) tried to define satisfaction with information seeking, noting that (Auster & Lawton, ; Bailey & Pearson, 1983a; Baroudi & Orlikowski, ; Hiltz & Johnson, 1989; Ives, Olson, & Baroudi, 1983; Murfin & Gugelchuk, 1987; Nath, 1989; Sandore, 1990) had also attempted to do so.

(Bruce, 1998) introduced an empirical study to measure the satisfaction of users when performing web searches but noted that satisfaction can be difficult to measure. Satisfaction during web searchers can be summary as:

... the composite of a user's material and emotional responses to information seeking context. An information user will experience material satisfaction as a result of factors associated with various features of an information system's performance. Emotional satisfaction, on the other hand deals with feelings of satisfaction based on various things like the user's requirements, expectations, goal determination, and task orientation. (Bruce, 1998)

(Bruce, 1998) adapted established magnitude estimation techniques, essentially subjective proportional judgments of sensations and stimuli, to determine levels of satisfaction of participants when performing web searchers. Bruce showed that frequent searchers were no more or less satisfied with search engines than infrequent searchers. Further, it was observed that the greater the expected success level going into an internet search task the greater the satisfaction with the information seeking task regardless of actual success (Bruce, 1998).

(Ives et al., 1983) examined and rated satisfaction tools currently discussed in the publish literature including the tools including (Bailey & Pearson, 1983b; Gallagher, 1974; Jenkins & Ricketts, 1979; Larcker & Lessig, 1980) . (Ives et al., 1983) notes that multiple-item user information satisfaction measures generally fall into two types. The first type focuses on the information system product and can be thought of as a focus on the content of the information system. The second type of measures covers organization support for developing and maintaining systems.

Gallagher developed a satisfaction questionnaire that requested that managers estimate the dollar value of a report and provided semantic differential adjectives on which the managers rated the reports. Gallagher concluded that both the estimate dollar value and the semantic differential measures had potential for analyzing satisfaction while acknowledging the correlation between the two measures was too low to conclude they were measure the same phenomenon (Ives et al., 1983). The work was limited by the fact that measures used focused only a product rather than quality of service (Gallagher, 1974).

Jenkins and Ricketts developed a twenty item measure of user satisfaction based on their research into user satisfaction. Eighteen of the twenty items were determined to be representative of five factors making up user satisfaction: input procedures, systems process report content, report form, report value (Jenkins & Ricketts, 1979). Additionally, Jenkins and

Rickets introduced two other items to measure overall user information satisfaction using a seven point semantic differential scale which used bipolar adjectives as the anchor points (Ives et al., 1983). Ives further notes that, " ... [a] factor analysis failed to substantiate the factor structure originally proposed". Ives notes that Jenkins and Ricketts were not thorough in their description of the procedure used to generate the original list of scored items and that their instrument, like that proposed by Gallagher, did not cover information systems service.

Larcker and Lessig also attempted to create a way to study user satisfaction. Larcker and Lessig created two three-item scales to measure perceived usefulness. The first scale was designed to measure perceived importance while the second scale was designed to measure perceived usableness. Ives determined that the original two dimensions developed by Lacker and Lessig, importance and usableness, "... are not empirically derived ... and may be ignoring additional dimensions of perceived usefulness, such as information accuracy or timeliness" (Larcker & Lessig, 1980). Ives notes that the reliabilities reported for the two scales are relatively low for applied research and that the Larcker and Lessig, "... interpret different measures of the same construct to be different measurement methods" (Ives et al., 1983).

(Bailey & Pearson, 1983a) identified 39 factors that they summed to determine the satisfaction of computer users in their attempt to develop a tool for measuring and analyzing computer user satisfaction. It should be noted that the authors of the study suggest it is reasonable to remove irrelevant factors and redefine the factors in situation specific situations were factors do not appear to be applicable. These thirty nine factors utilized a semantic differential technique much in the same way as Jenkins and Ricketts. Four adjective pairs were used to measure each factor along with a "satisfied-dissatisfied" adjective pair (see Figure 2.1).

19 Reliability of Output Information			
Consistent :-:-:-:-:-:-:-:-:-:-:-:-:-:-:-:-:-:-:-	Inconsistent		
Superior :-:-:-:-:-:	Inferior		
Sufficient :-:-:-:-:-:-: Satisfied :-:-:-:-:-:-:	Dissatisfied		

Figure 2.1 - An example of one factor of satisfaction introduced Bailey and Pearson (Bailey & Pearson, 1983a)

Bailey and Pearson had originally included a rating of the importance along with each of the thirty nine factors as a weighing factor for calculating overall satisfaction along with the adjective pair scoring system but, "... the weighted and unweighted scores were highly correlated making the additional information provided by the important rating unnecessary" (Ives et al., 1983).

Each satisfaction tool discussed so far has its limitations and strengths but of the satisfaction tools available lves identified only the Bailey and Pearson study as an important step towards the development of a valid user information satisfaction measure, stating that the survey question developed by Bailey and Pearson were reliable and valid measures of computer user satisfaction.

(Ives et al., 1983) noted that an information system which meets the needs of its user will reinforce satisfaction with that system. Ives also noted satisfaction of users, "... is a potentially measurable, and generally acceptable, surrogate for utility in decision making" and a measure of system success (Ives et al., 1983). If Ives statements are accept to be true, then a study making use of the Bailey and Pearson satisfaction measuring tool to measure computer user satisfaction with a blog or microblog search engine would provide a measure of the system success when performing such search tasks.

2.2 Blogs

A Web log, commonly known as blog, can be described as an open, interactive, and online diary. Blogs are frequently modified web pages which display dated entries of text, images, or other media listed in reverse chronological sequence (Herring, Scheidt, Bonus, & Wright, 2004). Bloggers, those that are using blogging platforms to write blogs, are also sharing information about their lives and daily activities, reporting news and knowledge such as URLS, and communicating with others (Herring et al., 2004).

According to the Pew Internet and American Life Project, as of 2008, 33 % of internet users, the equivalent of 25 % of all American adults, say they read blogs, while 11 % of American internet users do so on a typical day (Smith, 2008). 12 % of American internet users, representing 9 % of all American adults, say they currently maintain their own online journal or blog (Smith, 2008).

To understand what information users are looking for from blogs we can first looking at understanding what is being searched for more generally on the World Wide Web. Queries entered into traditional web search engines fall into three general categories: informational, navigational, and transactional (Broder, 2002). The information class of search can be described as the intent to acquire some information assumed to exist on one more web pages. The navigational class is the intent to reach a particular web site. The transactional class is the internet to perform some web-mediated activity (Broder, 2002).

It cannot however, simply be assumed that the same search activities are being performed during general internet searches and blog specific searchers. Online blogs searches typically Haber 9 of 178

differ from traditional web search queries (Mishne & de Rijke, 2006; Thelwall & Hasler, 2007). The majority of queries entered into blog specific search engine are informational, or rather looking to find information about a topic (Mishne & de Rijke, 2006). The majority of these queries are named entities such as well know names of products, companies, and people, or unknown names such as names of lesser known individuals or companies aimed at finding blogs and blog posts focused on a particular topic of concept (Mishne & de Rijke, 2006). It is possible that if blog searchers are typified by information searchers that other blogging type services might experience similar search activity.

Internet users searching for information from blogs are trying to locate blogs discussing specific topics or those which focus on specific theme(s). To meet this need for specialized information retrieval a number of search and discovery tools designed specifically to provide search results from blogs websites rather than non-blog websites have been created (Blogdigger¹, Blogpulse², and Technorati³) while other web search engines have developed blog specific search tools (Google⁴, Yahoo⁵, and AskJeeves⁶) (Mishne & de Rijke, 2006). It seems logical then to question if these searching sites and technologies are satisfying computer users performing blog searches.

Currently there exists limited research into blog search satisfaction. (Fujimura et al., 2006) found that the satisfaction ratio of search results by general web search was superior to that of blog

¹ http://www.blogdigger.com/

² http://www.blogpusle.com/

³ http://www.technorati.com/

⁴ http://www.google.com/

⁵ http://www.yahoo.com/

⁶ http://www.ask.com/

searches. However, in the same study the authors found that blog search may be superior to web search in topic, blogger, and reputation searches.

User satisfaction with the microblogging search engine provided by Twitter⁷, the world's most popular microblogging catalogue and search engine (Lenhart & Fox, 2009), is even more poorly understood than generalized blog search tool satisfaction. Blogs search queries, as mentioned above, focus on finding blogs based around specific concepts and themes and future research should be undertaken to understand if current search engines satisfy the needs of computer users when searching for blogs, and other variations of blog such as microblogs, focused on specific concepts and themes.

⁷ http://www.twitter.com/

2.3 Microblogging

Microblogs are a constricted form of blogging that lets bloggers write brief text updates, usually less than 140-200 characters in length (Gaonkar, Li, Choudhury, & Cox, 2008; Honeycutt & Herring, 2009; Java, Song, Finin, & Tseng, 2007a; Krishnamurthy, Gill, & Arlitt, 2008). An important characteristic of microblogging is its compatibility with 140 character text message limitations placed upon cellphone text messages. This allows users of the microblogging platform Twitter to send and received microblog posting updates directly to and from their cellphones via direct text messages. Twitter also allows posting of updates directly from the Twitter.com website and/or other web applications that make use of the Twitter application programming interface.

According to the Pew Internet & American Life Project, as of December 2008, 11% of online Americans said they had used Twitter, or Twitter like microblogging service, which allowed them to share updates about them or to see others updates. Further, 19 % of online American adults, or nearly one in five, between the age of 18 and 24 have used a microblogging service, as have 20 % of online American adults 25 to 34 (Lenhart & Fox, 2009). This figure is likely to increase as 46 % of online Americans 18 years of age or older use a social networking site like Facebook, which itself offers its own implementation of a microblogging type service in the form of its 420 character limited status update messages.

Microblog usage in the rest of world is less understood. Reports, like the one generated by PEW Internet, on practices of microblogging are not available with information about Canadian user usage. Currently the information provided by the Canadian Internet Project does not cover information related to microblogging activity (Zamaria & Fletcher, 2008) and other reports of Canadian usage of microblogging services are not established credible sources of information. The United States may perhaps be the biggest base of microblog posters and readers as far as current published research is concerned and this is perhaps why other organizations have not released accessible and detailed information about microblog usage in other areas of the word.

Microbloggers, those that write microblogs, are using microblogging platforms to communicate online about daily activities, have conversations with other microblog authors, sharing information and URIs⁸, and report news (Java, Song, Finin, & Tseng, 2007b). No research has been found that catalogues the reasons why users search microblog catalogues. However, it is known what computer users are searching for from blog content as discussed in section 2.2. Perhaps the similarities of blogs and microblogs, which currently both appear to be used to share information about daily lives and daily activities, reporting news and knowledge such as URLS, and communicating with others (Herring et al., 2004; Java, Song, Finin, & Tseng, 2007a) will share similarities in terms of what information users looking to gain from the respective services.

Differences between search results returned for blogs and microblogs should not be discounted. Traditional web searches performed through search engines like Google display the search results based upon a page ranking algorithm. Google for example, "... considers over a hundred factors in computing a PageRank and determining which documents are most relevant to a

⁸ (Uniform Resource Identifier) The address of an Internet resource. A URI is the unique name used to access the resource.

query, including the popularity of the page, the position and size of the search terms within the page, and the proximity of the search terms to one another on the page" (Krishan, 2009).

Microblogging search services provided by Twitter works differently than traditional web search services. On Twitter search results are returned not based on a page ranking algorithm but rather by displaying the microblog posts containing the search term presented in reverse chronological order of their creation date. That is to say, the specific post from most recent microblog containing the search term is displayed to the searching party first with successively less recent posting displayed below it. How the shift from page ranked results to chronically based results, used by the Twitter search service, affects the search expectations and purpose of microblog searchers is not understood at present. This shift to search results presented in reverse chronological order remains an important avenue for future research.

Table 2.1 below outlines the major difference between the default result display technique used during other types of search activities and microblog searches.

Web Search Categories	Default Result Display	Typical Focus of Users Using	
	Technique	the Search Service	
Generalized Web Search (eg.	Google Page Rank Results	Informational, navigational,	
Google)	Presented in Order of	and transactional information	
	Relevancy	searches	
Blog Search (eg. Google Blog	Google Page Rank Results	Informational and focused	
	Presented in Order of		

Search ⁹)	Relevancy	searches
Microblog Search (eg.	Reverse Chronological	Currently Unknown
Twitter)	Ordering of Search Results	

Table 2.1 - A comparison of search engine result display techniques

I anticipate that a typical search task for a user interacting with microblog search tool will be searching for microblogs that focus on a specific concept or theme much as is typical of blog searches. Further, I anticipate that the introduction of word clouds to microblogging search results will improve the satisfaction of users using the microblogging search tool as compared to those user that use a microblogging search tool that does not provide the additional functionality of word clouds alongside the presented search results.

⁹ http://blogsearch.google.com/

2.4 Cloud Visualization – Word Clouds and Tag Clouds

World clouds are an information visualization technique. The word cloud information visualization technique uses the frequency of a word appearance within a particular text to generate a plot of words where the sizes of the words shown are determined by the words frequency in the given text ((Hassan-Montero & Herrero-Solana, 2006; Ramsden & Bate, 2008; Rivadeneira, Gruen, Muller, & Millen, 2007)).

Tag clouds and word clouds are the two main varieties of the cloud visualization technique. When only summary words, or tag words, are used as the input text into the visualization technique the outcome is referred to as a tag cloud. When more than just summary words, or tag words, are used as the input text into the visualization technique the outcome is referred to as a word cloud. Tag clouds can be used to present a weighted summary of content displayed on blog pages and more generally on non-blog web sites to display trending web topics or frequent search terms. The cloud name suffix arises from the similarities in appearance between the shape of a real life cloud and generated word plot (see Figure 2.2).



Figure 2.2 - An example of a word cloud generated from the entire post content of a microblog

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Research focused on cloud visualizations has covered topics such as examining the effectiveness of various types of cloud construction, usefulness of clouds visualizations, the effects of cloud visualizations, and web navigation using clouds visualizations (Bateman, Gutwin, & Nacenta, 2008; Blythe, 2008; Fokker, Pouwelse, & Buntine, ; Hassan-Montero & Herrero-Solana, 2006; Hearst & Rosner, 2008; Koutrika, Zadeh, & Garcia-Molina, 2009; Kuo, Hentrich, Good, & Wilkinson, 2007; Lohmann, Ziegler, & Tetzlaff, 2009; Morrison, 2007; Ramsden & Bate, 2008; Rivadeneira et al., 2007; Schrammel, Leitner, & Tscheligi, 2009; Sinclair & Cardew-Hall, 2008). No previous research has been found that uses established satisfaction measuring tools to study the effect that word clouds have on user satisfaction while using web search services.

To make use of word clouds we must know more about the tools used to construct them. (Ramsden & Bate, 2008), when researching the incorporation of word clouds into a teaching environment and identified Wordle, an online application used to create word clouds, out of a set of four possible word cloud generators as an appropriate tool choice for creating word clouds. (Ramsden & Bate, 2008) compared characteristics of TagCrowd¹⁰, MakeCloud¹¹, ToCloud¹², and Wordle and recommended TagCrowd or Wordle as their first choices for cloud creation. MakeCloud and ToCloud were found to be lacking in options while Wordle allowed for settings such as the inclusion or removal of capitals, ignoring common words, and the ability to change font, colour, and direction of words in the cloud. TagCrowd allows for the use of phrases in the cloud while Wordle does not.

¹⁰ http://www.tagcrowd.com/

¹¹ http://www.makecloud.com/

¹² http://www.tocloud.com/

(Ramsden & Bate, 2008) identify several key features to consider when using word clouds including assumption that the frequency and the importance of a word are not one and the same, that word clouds do not necessarily portray the context of the words that make up the clouds, and finally that word clouds often fail to group similar words. This information should be kept in mind for future research attempting to understand how user search precision might be affected by the addition of word clouds in search engines.

(Blythe, 2008) examined whether a faceted catalogue along word clouds aid in the discovery process of academics searching through an academic catalogue. It was found that a faceted catalogue along with word clouds did indeed aid in the discovery process. However, Blythe noted that since test participants could move freely back and forth between the faceted catalogue and the information displayed by the words clouds that it was difficult to attribute new discoveries in the search process solely to the word cloud functionality. There still exists no consensus on the utility generated by the inclusion of word clouds in search situations.

Researchers have examined the composition of cloud visualizations more closely (Lohmann et al., 2009; Rivadeneira et al., 2007). (Lohmann et al., 2009) concluded that there is no single best way to arrange weighted terms in a cloud and that, "... the optimal solution depends strongly on the specific user goals and intentions of the designer". (Rivadeneira et al., 2007) noted several best practices for basic word cloud parameters. The key features related to size of words in the cloud and the layout of the words in a cloud. Font size has been found to have an effect on user recall of cloud words, as the Rivadeneria noted, "... people recall words with larger fonts" (Rivadeneira et al., 2007). Word layout in word clouds was also found to have no effect on word Haber 18 of 178

recognition. However, an effect of different word cloud layouts on impression formation was found by Rivadeneria. It makes sense then to be selective in the choice of the layouts options used to create the clouds. Rivadeneria concludes that the spatial layout technique is an appropriate choice of layout styles for the words that comprise word clouds and that the spatial word cloud layout offers a better choice than sequential layouts for increasing word comprehension (see figure 2.3).



Figure 2.3 - Types of cloud layouts. (a) Sequential – Alphabetical, (b) Sequential – Frequency, (c) Spatial, (d) List Frequency [image obtained from (Rivadeneira et al., 2007)]

(Berendt & Hanser, 2007) showed that some users use tags words as additional content rather

than metadata¹³ but it is not currently known if microblogs users would see the content of word

¹³ Metadata (sometimes metainformation) is data about data, of any sort in any media.

clouds added to their search results as additional search content, post content, and/or metadata. From what is known about blog tagging perhaps the addition of word clouds to microblog search results may be interpreted by microblog readers as useful additional content to the search process. Additional content alongside microblog search results could contribute to increases in user satisfaction levels when compared to users who were not provided this additional cloud content.

If more is currently know about how tags are interrupted by blog readers it should be asked why microblog offer a better choice for studying the effects of the addition of word clouds. Twitter does not currently allow microblog authors to tag their Twitter postings, perhaps due to the already shorten nature of the posts' content. Tagging blog posts is a feature offer by default by the popular Blogger¹⁴ and Tumblr¹⁵ blog creation software. Blog post tags allow authors to indicate key words related to the post being published. These tags can then be constructed into tag clouds that can be published on the blogs themselves. However, creating word clouds for blog would likely be a more time and computationally intensive activity then creating a tag cloud from a blog. To create word clouds from microblogs the traditional blog tags are unnecessary as small content of all posts of a microblog can be used as data input for the creation of word clouds.

Microblogs limited amount of content, typically 140 characters or less, allows for the unique opportunity to be able to relatively easily capture every single word written in the life time of

¹⁴ http://www.blogger.com/

¹⁵ http://www.tumblr.com/

microblog and turn that captured content into a word cloud. Currently, there is no software that is able to perform this task in real-time however web applications such as the one hosted on TweetStats.com¹⁶ allows word cloud to be created from Twitter microblogs in a relatively short amount of time, typically 1-5 minutes depending on the length of microblog being analyzed. To present word clouds in real time along with microblog search results is a much less extensive task then creating word clouds from entire blogs to be shown alongside blog search results. However, the effect on word and/or tag clouds presented along with blog search results would also be interesting area of future research.

The topic of blogging currently has more published literature written about it than the topic of microblogging but limitations exist to studying the effects of word clouds and blog search results that make studying word clouds and microblogging a better choice. Twitter is a dominate microblogging service in the field of microblogging. A blogging service as dominate as Twitter, in the field of blogging, does not exist for study. Further, there is no standard in blog tagging practices and thus blog authors' likely tag blog posts for various reasons. By studying microblogs instead of blogs and using the entire content of microblog to create word clouds a standardized and reproducible methodology of cloud creation can be utilized. As already noted, studying the effects of word clouds on microblogs is also preferred as generally the difference in content character count size from blog to microblogs makes creating word clouds far more time and computer intensive process.

¹⁶ http://www.tweetstats.com

If computer users are searching for Twitter microblogs then a likely search task they would be performing would be searching for microblogs that focus on a particular topic, or in other words performing informational searches. Measuring the effects of introducing word clouds alongside Twitter search results would be an interesting research project. This research focus could be narrowed further focused by studying the satisfaction level of computer users who performed microblogging search tasks with word clouds and user that perform the same tasks without word clouds. Studying user satisfaction, or is it can also be described sum of smaller factors, of microblog searchers would provide awareness of information on variety of small factors related to microblog searchers and provide insight into the user experience of microblog searching.

I anticipate that users who interact with a microblogging search tool that include word clouds will be more satisfied with their microblogging search experience as compared to those participants that do not have the added functionality of seeing word clouds alongside their search results.

The following chapter describes a data capture process performed in order to create a microblogging search simulation tool. The chapter describes the creation of the word clouds used within the search simulation tool and describes procedurally how the search simulation tool was used. The next chapter will also discuss the design of the satisfaction questions related to the search simulation.

3 Methodical Design

A research experiment was designed to test whether word clouds improve the user satisfaction of using a microblog search engine. Participants interacted with a simulated Twitter search tool with the ability to display microblog authors' word clouds. Approximately half of the participants in the study were provided with word clouds in addition to the regular microblog search results.

Data was collected to create the simulated Twitter search tool. Date collected was also used to create word clouds to augment the search simulation experience. This simulated search experience was incorporated into an online survey distributed to participants.

This chapter presents a description of the data captured in order to create the microblogging search simulation tool, the creation of word clouds used within the search simulation tool, it describes procedurally how the search simulation tool was used, and finally discusses the design of the satisfaction questions related to the search simulations performed.

3.1 Creating a Search Simulation

A set of data was created to simulate the search experience and data retrieved and displayed when a topical search of Twitter¹⁷, a microblogging website, was conducted. The conducted Twitter search simulation prompted participants to perform a microblog search in order to find microblogs focused on a particular theme, topic, or person. All the microblogs and microblogs postings collected for the simulation were taken from the microblogging catalogue Twitter.

The search simulation used an HTML template simulating the look and feel of a Twitter search page. Search results from Twitter searcher were saved statically into this template. These statically created HTML search results were used to ensure reliability and consistency in what was shown to participants in during search simulation tasks (please see Appendix a16 - a19 for depictions of search simulation).

Listed below a summa	ry of the information	created for the	experimental	procedure:
	ry of the information	ciculcu for the	experimental	procedure.

Number of Captured Search Terms	6
Number of Captured Search Pages Results on Twitter	6
Number of Word Clouds Created in Total	36
Number of Capture Microblogs	36

¹⁷ http://www.twitter.com/

Table 3.1 - Summary of Search Simulation Creation Data

Table 3.1 outlines the core components and the number of each component required to create the search simulation. The results of six search terms entered into the actual Twitter search page were recorded. The first six search results of each entered search term were used during the search simulation tasks. The six pages of captured search results, each containing six identified microblogs translated into thirty six identified microblogs for use in the search simulation. Each microblog identified had a word cloud created for it resulting in thirty six word clouds created in total, one for each of the thirty six microblogs identified for use in the search simulation.

Six top search terms of 2008 were selected for use in the creation of the search simulation. The purpose of preselecting search terms was done to create an unbiased way to arrive at search terms without having to perform additional amount of data collection and user information logging to capture realistic search terms. The six search terms chosen: Obama, Facebook, Green Party, Britney Spears, CBC, Palm Treo.

The selection of search terms used was chosen from a list of terms published by Google¹⁸ on their Canadian Zeitgeist 2008 page¹⁹. Google Zeitgeist aggregates billions of search queries that are entered into the Google search box to determine popular search terms. Google Zeitgeist Canada displays the categories of: Fastest Rising, Most Popular, Top Political Parties, Top Celebrities, Top New Sources, and Top Personal Electronics for searches initiated by Canadian during the year of 2008. The search terms Obama, Facebook, Green Party, Britney Spears, CBC, and Palm Treo represent the top search in each of the categories respectively.

¹⁸ http://www.google.com/

¹⁹ http://www.google.com/intl/en/press/zeitgeist2008/index.html

The identified search terms were entered manually into the search tool provided by Twitter. The search terms returned a list of individual microblogs posting in reverse chronological order of their time and date of posting that contained the searched for keyword. The first six results of this reverse chronological list were captured for us in the search simulation. Only six search results for each search word were displayed to simplify the selection task for the participants. During earlier testing of the search simulation tool test subjects had indicated more than six search results made the search simulation too complex and time consuming while less than four search results did not provide adequate number of choices for participants. Each search result displayed to study participants included at least a microblog post linking to one complete microblog.

The thirty six identified microblogs were saved locally along with data describing the creation data, the original URI, and a screen capture of the first page of the microblog (as depicted in Figure 3.1) from which the top six results for each search term originated.



Figure 3.1 - A portion of a screen capture used during the search simulation tasks
3.2 Word Cloud Creation

Word clouds were created for each of the captured thirty six identified microblogs. The process to create a word cloud from a Twitter microblog entails scrapping all the microblogs posts made to microblog, gathering a frequency count all the words used in the microblog, and then converting that word frequency count into the final word cloud visualization.

All posts from the thirty six microblog identified were captured. TweetStats²⁰, an online application capable of crawling a specific Twitter microblog and capturing all of the posts made during the life time of that Twitter blog, was used to analysis each of the thirty six microblogs and to capture the microblog posts contained in each microblog. TweetStats was set to remove any words with "@" before them and made not to count instances of words with "@" before them in the frequency count created. In Twitter "@" is a function call used to mark a reply to a username and deemed for the purposes of this study to not be a content word used in microblog posts. TweetStats also automatically removed common words, such as "a", "the", and "it" using a stop word list²¹ to remove certain words before the frequency count of words was created.

Figure 3.2 and Figure 3.3 depict the resulting information produced by TweetStats after a Twitter user name has been into TweetStats.

²⁰ http://tweetstats.com/

²¹ Stop words is the name given to words which are filtered out prior to, or after, processing of natural language data (text). The specific stop word list used by TweetStats, presented by permission of the creator of TweetStats, can be found at: http://dcortesi.com/tweetstats_stopwords.txt



Figure 3.2 - A screen capture of a portion of the statistics generated by TweetStats for the Twitter user 'jonathanhaber'



Figure 3.3 - A screen capture of a TweetStats frequency count feature displaying a word cloud of terms for the Twitter user 'jon_haber'

Figure 3.3, shows in the bottom right hand corner, a URI to export a frequency count of words used in a microblog to Wordle, an online application used to create customizable word clouds, while excluding all instances of words beginning with the "@" symbol from the frequency count. This option was used to focus the created word clouds strictly on content words rather than function calls.

To create a word cloud for each of the thirty six microblogs an online application called Wordle²² was feed the information captured by TweetStats. Wordle was configured to produce word clouds of a predetermined specific configuration for use in the search simulation.

To improve the readability of word clouds used in the search exercise the number of words presented in the cloud was reduced to just the top twelve words in each blogs frequency word count list. This increased the font size of the vast majority of words in the clouds created as to make them readable to survey participants at a computer screen resolution of 1024x768 or higher where the word clouds had a maximum width dimension of 225 pixels.

For the purpose of creating word clouds for our microblog search exercise several other customizations were used. As noted above, all words clouds created were limited to 12 words to reduce the amount of information displayed and make the final produced word clouds, of 225 pixels in height, readable. All words clouds were created in black and white to simplify their appearance and to avoid the variation between the colour calibration differences of the research participants' computer monitors. All word clouds created used the "coolvetica" font in order to produce clouds with clear and readable text. Finally all word clouds were created so that they displayed the words they contained in horizontal alignment to create more readable

²² http://www.wordle.net/

and simplified clouds (see Figure 3.4). Common English words were automatically removed from the captured word frequency lists by TweetStats in an attempt to focus the word frequency lists created to just content words. The word clouds created using these word frequency lists were thereby also absent of the common English word removed by TweetStats.



Figure 3.4 - A word cloud created in Wordle using a frequency list created by TweetStats

3.3 Search Simulation Design – Participants choosing a focused microblog using a microblog search simulation tool

A more detailed breakdown of the microblogging search simulation exercise from the online survey is described below:

- Participants began the search simulation by launching a new web browser window in which they were shown an HTML²³ document containing a top and a bottom frame. The new browser window was set to not display any menu bars or address bar. This was done to ensure a unified browser window look, feel, and size for all participants. The top frame contained instructions for performing the simulated search task. The bottom frame presented the simulated search tool. (please see Appendix a16 for a graphic representation of the search tool)
 - The top instructional frame asked participants to click on one of six URIs presented in the bottom frame of the browser window. Participants were informed that URI would take them to a list of Twitter results based on the search term they selected.
 - The bottom frame displayed a list of URIs with the titles: Obama, Facebook, Green Party, Britney Spears, CBC, and Palm Treo. The URIs linked to search results that had been previously collected for each search word. The list of URI was displayed in a randomized order to prevent participant selection bias.

²³ Hyper Text Markup Language

- Once a search word had been selected by the participant the top and bottom frame were reloaded into the browser window.
 - The top frame of the web browser window contained instructions to click the picture next to the microblog post in the bottom frame that the participant thought would lead to a microblog that best focused on the current search term. The top frame also contained an instruction for the participant to review the first page of postings contained in the microblog they ultimately selected. Participants were instructed to determine how well the microblog author's posts focused on the search term they had chosen in step 1.
 - The bottom frame of the web browser window contained a simulated Twitter search result page for the search term selected in step 1.

The simulate Twitter search result page was made to look as similar as possible to a real time Twitter search result page while allowing for a clear and readable output for all participants. All URIs on the page, except for those linking search results to a microblog, were removed in order to ensure that participants did not follow a URI that took them away from search simulation tool and to simplify the process for all participants. All additional features that were deemed irrelevant to the search results were removed. The time stamp on microblog search result posts were removed and order of the search results was randomized for each participant to help prevent selection bias.

Approximately half of the participants were randomly selected to see search results that contained word clouds of the microblogs linked to in the search result and while approximately half of the participants did not have word clouds displayed with their

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search results. The following images represent the difference between a real time Twitter search and the two simulated search experiences presented to research participants.



Figure 3.5 - A screen capture of a portion of a real time Twitter search for the term "obama"

		<u>.</u>	
Geog	Her	Share and discover what's happening right now, anywhere in the world.	
See what people	are saying about		
obama		Search	
	_	_	
Search R	esults for obama		
o_0	Jgean88 Dear liberals & borrow \$2trillion?l prom back!	& obama supporters,I was wondering,can I ise that me,and generations after me,will pay it	
Sendard	weeklystandard Iran Ha Obama's September de http://snipurl.com/rix8s	rdliners Consolidate Control: As President eadline for Iran to conduct negotiations on	

Figure 3.6 - A screen capture of a portion of the simulated Twitter search for the term "obama" without the inclusion of word clouds for each search result



Figure 3.7 - A screen capture of a portion of a the simulated Twitter search for the term "obama" with the inclusion of word clouds for each search result

Figure 3.5, 3.6, 3.7 show the differences in the look and features present in a real time Twitter search result, the simulated search tool without the inclusion of word clouds for each search result displayed, and the simulated search tool with the inclusion of a word cloud for each search result.

Pre-created search results were used instead of real time Twitter searchers to allow for uniform and consistent search results to be presented to participants. The creation of the word clouds for each microblog in real time would have been a slow process taking several minutes to perform. To reduce weight times and ensure uniformity of the word clouds displayed to participants, each word cloud used during search simulation exercise was created in advance of the actual search simulations being performed by study participants (please see Appendix a17 and a18 for a depiction of the search tool with and without word clouds).

- 3. Once the participant has chosen a microblog from the list of microblogs displayed in the search results the bottom frame of the web browser window was reloaded with a screen capture of the microblog they had chosen. The instructions in the top frame of the web browser window remained unchanged from the previous step. The screen capture of the microblog shown to participants consisted of only the latest page of microblog postings made to microblog the participant had selected. A non-real-time screen shot of the microblog was used to produce a consistent display of the microblogs to study participants and to remove any clickable functionality from the microblogs themselves (please see Appendix a19 for a graphic representation of one screen capture used during the actual experiment procedure).
- 4. Participants were informed by the instructions of the top frame of the browser window to manually close the microblogging search simulation browser window after having examined the microblog postings on the blog they selected and determining in their opinion how well the microblog they selected focused on the search term chosen by them in step number one of the search simulation task.

3.4 Design of Post Search Exercise Questions

Following the microblogging search simulation exercise participants were asked to answer questions relating to the search exercise. The post search exercise question were broken down into five distinct categories: demographic and usage questions, generalized Bailey/Pearson satisfaction questions, generalized Likert²⁴ scale questions, a word cloud specific Bailey/Pearson satisfaction question, and word cloud specific Likert scale questions.

The demographic questions were designed to capture information about the types of participants taking part in the research study. Information captured included: gender, age, location, occupation, and education background. Additionally, in the usage question section participants were asked about their computer, blogging, and microblogging experience and were asked specifically about how often they current do or do not use Twitter. All participants were asked to answer questions in the demographic section of the online survey.

The generalized satisfaction questions sections were designed to capture the level of satisfaction participants felt using the search simulation tool. All the questions in this section originated from the paper, Development of a Tool for Measuring and Analyzing Computer User Satisfaction (Bailey & Pearson, 1983b). Bailey's original survey tool was made up of a list of survey questions designed to look at both satisfaction with respect to a software product and its support. The thesis statement of our research does not encompass the support aspect of an online microblogging tool and as such all the original Bailey survey questions relating to support were removed from the generalized satisfaction questions section of our research study.

²⁴ Likert questions ask respondents to specify their level of agreement to a statement.

Additionally, other Bailey/Pearson survey questions were removed due to a lack of relevance to the thesis statement of this research project or their lack of relevance to the search simulation exercise.

Satisfaction factors captured in generalized satisfaction questions section included: convenience of access, accuracy, precision, reliability, completeness, format of output, language, volume of output, relevancy, understanding, perceived utility, confidence, feeling of control, and flexibility. Each factor was divided into five related areas of relevance, using a seven point semantic differential scale which used bipolar adjectives as the anchor points, and were scored on a scale from +3 ... 0 ... -3, where +3 was the positive end of the spectrum and -3 was the negative end of the spectrum. Participants were given a text based prompt informing them which factor was being examined and where asked to rate how it positively or negatively it was represented by the adjective pairs provided. To see the 14 factors, their text based prompts, and their breakdown of related areas presented in this question section of the survey please see Appendix a11.

Following the Bailey satisfaction questions Likert scale questions were introduced to capture additional information about the participants' feelings after completing the search exercise. Questions in this section asked participants to rate their level of agreement to statements focused on the topic of comfort of using the system, the challenge level of using the search exercise, and their satisfaction experience with the accomplishing the goal of the search simulation. These questions provided more information about the participants' experiences and general feelings about the search exercise in a different format than the Bailey satisfaction survey tool allowed for (see Appendix a12 for the specific list of likert scale questions used). One additional Bailey satisfaction tool questions was asked just to participants that have been presented word clouds with their search results. Functioning in the same way as the previous Bailey satisfaction tool questions used in this research study, this Baily satisfaction question asked participants about the job effects the word cloud had on their searching experience. This question was asked to better understand the effect of the presence of word clouds in the search simulation tool (please see Appendix a14 for depiction as depicted in the actual search simulation tool).

Following the Bailey satisfaction question, likert scale questions were introduced to capture additional information about the word cloud stream of participants' feelings after completing the search exercise. Questions in this section asked participants to rate their level of agreement to statements focused on the helpfulness of word clouds, the necessity of word clouds, the visual attractiveness of word clouds, and the effect on the search simulation that the inclusion of word clouds had. These questions provided more information about the participants' experiences with word clouds and participants' general feelings about word clouds in a different format than the Bailey satisfaction survey tool allowed for (please see Appendix a12 for a depiction of the entire list of likert scale questions in this section).

While this chapter presented a description data captured in order to create a microblogging search simulation tool, the creation of word clouds used within the search simulation tool, described procedurally how the search simulation tool was used, and finally discussed the design of the questions related to the search simulation presented to study participants the next chapter will go on to explain in further detail the design of the research experiment.

Experimental Design

This research project addresses the question of whether word clouds improve the user satisfaction of using a microblog search engine. The results of experiment described were largely statistically insignificant yet may indicate research participants felt a neutral or slightly positive satisfaction with their search simulation tasks regardless of the presence of word clouds.

Participants in this experiment interacted with a simulated twitter search engine with the ability to display microblog author's word clouds. Approximately half of the participants were provided with word clouds in addition to the regular search results interface. User satisfaction was assessed using a modified version of the computer user satisfaction survey tool created by (Bailey & Pearson, 1983a) administered to study participants using an online survey after completing the search exercises. Further, research participants were administered likert scale satisfaction questions in addition to the Bailey/Pearson satisfaction tool. Participants in the research group that had word clouds presented with their search results were asked one additional Bailey/Pearson satisfaction tool question along with a number of additional word cloud specific likert scale questions.

This chapter presents a description of a repeatable experimental set up, the setup that was used to simulated search a microblogging search task, a description of the experimental process used, and finally a description of what the participants did during the experiment including what data was collected and what analysis was done.

4.1 Experiment Outline (from the research perspective)

The following section outlines the procedural flow of the entire participant research study from the perspective of the researchers. This research study tests the hypothesis that word clouds improves the user satisfaction of using a microblog search engine while searching for focused microblog content. This experiment used two groups of participants, one shown word clouds along with their simulated search results and one that was not shown word clouds with their simulated search results. After the completion of the search simulation both groups of participants were asked about their experiences with the microblogging search simulation tool.

- 1. Users chose a specific search topic from a list of six preselected search keywords.
- Users were presented with pre-created Twitter search results based on the search word selected by the users.
- 3. Users choose a single microblog to explore in more depth from a list of microblog blogs returned to them in their simulated search results.
- Users examined the selected microblog in greater depth to ascertain, using their own judgment, how well that particular microblog focused on the keyword they had selected.
- Users repeated step 1-4 two additional times, but selected a different search term each time.
- Users answered a set of demographic and usage questions (please see Appendix a10 for a full list of questions).

- Users answered a set of 14 satisfaction questions adapted from (Bailey & Pearson, 1983a) (please see Appendix a11 for a full list of questions).
- 8. Users answered a set of 9 Likert scale questions focused on the search simulation they performed (please see Appendix a12 for a full list of questions).
- Participants, who had word clouds presented along with their simulated Twitter search results, answered one additional satisfaction question adapted from (Bailey & Pearson, 1983a) (please see Appendix a14 to review the question in its entirety).
- 10. Participants, who had word clouds presented along with their Twitter search results, answered 11 additional Likert scale questions focused on the inclusion of word clouds in the search simulation tasks (please see Appendix a14 for a full list of questions).

4.2 Data Types Captured

This table below outlines what data types were captured by the survey administered to the

research participants.

Survey Consent	Data Types Captured:	A numerical response of 0 or 1 was captured
Section	Integer Numerical Score	to indicate consent to participate in the
		research study.
Survey Coin-Flip	Data Types Captured:	A numerical response of 0 or 1 was captured
Section	Integer Numerical Score	to indicate the display of a heads or tails coin
		to participants.
Survey Instructional	Data Types Captured:	No information was recorded for data
Section	None	analysis.
Survey Exercise	Data Types Captured:	A numerical response of 1,2,3,4,5,6
Section	Integer Numerical Scores	corresponding to the search terms "CBC",
		"Obama", "Green Party", "Palm Treo",
		"Britney Spears", and "Facebook" was
		"Britney Spears", and "Facebook" was captured to indicate which search term was
		"Britney Spears", and "Facebook" was captured to indicate which search term was selected during each round of the search
		"Britney Spears", and "Facebook" was captured to indicate which search term was selected during each round of the search simulation task

Demographics and	Integer Numerical Scores	the gender of the participants. A numerical
Usage Section	and Open Ended Text	integer entry was used to capture participant
	Entry	age. Open ended text entry fields captured
		participant occupation. Numerical scores and
		an open ended text entry field captured the
		primary langue of participants. Numerical
		scores captured represented what level of
		education participants possessed. Usage
		information was captured with integer likert
		scale score ranging from the integers 1
		through 5.
Modified	Data Types Captured:	For each factor presented in this section four
Bailey/Pearson	Integer Numerical Scores	numerical response integer responses, using a
Satisfaction Survey	and Open Ended Text	seven point semantic differential scale which
Tool Section	Entry	used bipolar adjectives as the anchor points,
		ranging from -3 0 +3 were collected.
		Additionally, for each factor one self-reported
		satisfaction integer from -3 0 +3 were
		collected corresponding to the level of self-
		reported satisfaction for that factor.
Survey Likert	Data Types Captured:	Satisfaction information was captured with
Satisfaction	Integer Numerical Scores	integer likert scale scores of 1-7

Question Section		corresponding to the level of agreement to				
		each question prompt.				
Word Cloud	Data Types Captured:	A numeric integer score of 1 or 2 captured if				
Inclusion Question	Integer Numerical Scores	participants had been shown word clouds				
Section		along with their simulated search results.				
Survey Word Cloud	Data Types Captured:	This factor information was captured using				
Job Effect Question	Integer Numerical Scores	four numerical response integers, using a				
Section		seven point semantic differential scale which				
		used bipolar adjectives as the anchor points,				
		ranging from -3 0 +3. Additionally, one				
		self-reported satisfaction integer from -3 0				
		+3 was collected corresponding to the level				
		of self-reported satisfaction for this factor.				
Survey Word Cloud	Data Types Captured:	Information was captured with integer likert				
Likert Scale	Integer Numerical Scores	scale scores of 1-5 in the first half of this				
Question Section		section and 1-7 in the second half of this				
		section corresponding to the level of				
		agreement to each question prompt				
		provided.				

Survey Wrap-Up	Data Types Captured:	Open ended text entry fields captured			
Section	Open Ended Text Entry	generalized comments about the survey and			
		email addresses if participants wished to			
		enter the survey draw for a University of			
		Guelph hospitality gift card.			

Table 4.1 -Outline of the data types captured during the online survey procedure

4.3 Question and Activity Data Capture

The only means used to capturing data from survey participants was an online survey tool created using SurveyMonkey²⁵.

Due to the online nature of the survey tool, and to minimize the additional need for recording software, no video or audio data was captured from participants.

The following table outlines what data was captured during each stage of the online survey procedure:

Survey Consent Section	It was recorded if participants has read and agreed to the "Consent
	to Participate in Research" form and wished to continue with the
	online survey.
Survey Coin-Flip Section	It was recorded which side of an image of quarter participants they
	were shown. A simulation of a coin flip was used to split the survey
	population into two different groups.
Survey Instructional	It was recorded that participants read the sets of survey
Section	instructions. These clicks are not captured for data analysis.
Survey Exercise Section	The participants' choice of search terms was recorded for each
	round of the microblogging search simulation.
Survey Demographics and	Participant demographic and usage information was captured

²⁵ http://www.surveymonkey.com/

Usage Section	including: gender, age, location, occupation, primary language,
	education background, computer and twitter.com experience.
	(please see Appendix a10 for a complete list of questions in this
	survey section)
Modified Bailey/Pearson	Participants' satisfaction with the online search tool using during
Satisfaction Survey Tool	three rounds of the search exercises was captured. All the
Section	questions in this section originated from the paper, Development
	of a Tool for Measuring and Analyzing Computer User Satisfaction
	(Bailey & Pearson, 1983b). Satisfaction factors captured included:
	Convenience of Access, Accuracy, Precision, Reliability,
	Completeness, Format of Output, Language, Volume of Output,
	Relevancy, Understanding, Perceived Utility, Confidence, Feeling of
	Control, and Flexibility. (please see Appendix a11 for a complete list
	of factors and subfactors in this section)
Survey Likert Satisfaction	Participants' likert scale responses to the search simulation
Question Section	exercises were captured. (please see Appendix a12 for a full list of
	likert scale questions used in this section)
Word Cloud Inclusion	It was recorded if participants had seen a word cloud in their
Question Section	search simulation. (please see Appendix a13 for a graphic
	representation of this question)
Survey Word Cloud Job	Participants' satisfaction with the effects of word clouds on the job

Effect Question Section	asked of them was captured. This question originated from the			
	paper, Development of a Tool for Measuring and Analyzing			
	Computer User Satisfaction (Bailey & Pearson, 1983b).			
Survey Word Cloud Likert	Participant job satisfaction with reference to word clouds			
Scale Question Section	presented during the search simulations was captured. Additional			
	Likert scale responses relating to the experience with word clouds			
	during the search simulation and the usefulness of word clouds,			
	which did not fall within the topic of participant job satisfaction,			
	was captured. (see Appendix a14)			
Survey Wrap-Up Section	Additional generalized comments about the survey were captured			
	from the survey participants. Additionally, participants email			
	addresses were collected if they chose to enter the survey draw for			
	a University of Guelph hospitality gift card. (please see Appendix			
	a15 for a graphical depiction of this section)			

Table 4.2 - Outline of the data captured during each stage of the online survey procedure

4.4 Experiment Outline (from the participants' perspective)

The following section outlines the procedural flow of the entire participant research study from the point of view of the research participants. This participant research study tests the hypothesis that word clouds improve the user satisfaction of using a microblog search engine while looking for focused microblogs.

- Participants were presented with the web address (http://atthelib.com/twitter/) via advertisement in the local university newspaper, a classified online advertisement, postings on Twitter and Facebook, word of mouth, and messages sent to University of Guelph undergraduate classes. This address redirected participants to an online survey created with the SurveyMonkey survey tool.
- 2. Participants were asked to give their consent to participate in a research project. Participants that agreed to give their consent were able to continue with the online survey while participants that did not give their consent were informed they could not participate in the research project. At this point participants were also informed that they needed to use the Firefox web browser to continue on with the survey.
- 3. Participants were split into two groups, those whose search results would contain word clouds and those who search results would not. The survey required that participants state whether a picture of a coin displayed to them displayed the coin face as "Head" or "Tails". This was done to split survey participants into two streams, those that would be shown word clouds in the search exercise and those that would not be shown word clouds in the search exercise. The coin was randomly displayed approximately 50 % of

the time to participants as "Heads" and approximately 50 % of the time to participants as "Tails".

- 4. Participants were displayed one of two sets of information. Participants either had the definition of a blog and microblog presented to them or the definition of a blog, a microblog, and word clouds. The information displayed to participants was dependent on which stream the participant had been grouped into in the previous step.
- 5. Participants where shown extra information about the search task to clarify exactly what they as participants would be asked to do during an upcoming search exercise.
- 6. Participants then completed three rounds of the simulated microblogging search exercises. The exercises were structurally the same for both streams of participants with the exception that one stream had word clouds displayed alongside their simulated search results and the other stream did not.
- Participants entered their demographic and computer usage information into the online survey.
- Participants answered survey questions about their experience with the microblogging search simulation. The majority of the questions in this section arose out of the paper, Development of a Tool for Measuring and Analyzing Computer User Satisfaction (Bailey & Pearson, 1983b). Participants answered additional Likert scale questions related to the microblogging search exercise.

- 9. Participants were asked if they were shown word clouds alongside their simulated search results. Participants that did not have word clouds in their search exercise were automatically directed to procedural step 11.
- 10. Participants that did have word clouds incorporated into their search exercise were instructed to answer an additional page of questions relating to the word clouds presence in the search simulation exercise. The first question in this section arose out of the paper, Development of a Tool for Measuring and Analyzing Computer User Satisfaction (Bailey & Pearson, 1983b). Participants also answered additional Likert scale questions related to the microblogging search exercise with the inclusion of word clouds.
- 11. Participants were asked to leave comments about the survey and enter their email address to enter into a draw for a \$25 University of Guelph hospitality gift card.

4.5 Metrics Used to Analyze the Captured Data

The tool used to analyze user satisfaction with the microblogging search simulations was a modified implementation of a satisfaction tool first developed by (Bailey & Pearson, 1983a). This survey tool was found to be reliable and valid measures of computer user satisfaction as compared to other available satisfaction survey tools present in the academic literature (Ives et al., 1983).

(Bailey & Pearson, 1983b) identified 39 factors relating to user satisfaction of which 14 were used in our online survey. Each factor was broken down into four subfactors of relevance and an overall scale for general satisfaction was added to each factor. The subfactors and satisfaction scale allowed participants to rate their related feeling from +3 (extremely positive) to -3 (extremely negative) following an integer number progression from +3 to -3. (see Figure 4.1)

	+3	+2	+1	0	-1	-2	-3	
(+3) Satisfied	tremely	iite	ightly	ither equally	ghtly	iite	tremely	Dissatisfaction (-3)
	es.	ъ	sli	ne	sli	ъ	G	

Figure 4.1 - Bailey Satisfaction Scale from (Bailey & Pearson, 1983a)²⁶

²⁶ The authors of the original paper were contacted about including image captured from their published paper in this thesis paper but did not respond to an email request.

The interval scale of seven intervals from positive to negative for any given adjective pair was proposed by (Osgood, 1962) and accepted by (Bailey & Pearson, 1983b). The seven intervals were quantified by assigning them the values +3, +2, +1, 0, -1, -2, and -3. Each subfactor, an adjective pair, is rated by the participant using the scale shown in Figure 4.1. An example of one factor, the convenience of access, is shown below In Figure 4.2:

Convenience of Access:							
(The ease or difficulty with which you were able to utilize the	capability of the	+ microblog	ging search t	cool to comp	lete the searc	ch exercise	:S.)
Using the search tool to perform the search exercises	was						
	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
Convenient (+) or Inconvenient (-)	0	5)	5)	5	5
Good (+) or Bad (-)))	5	5)	5)
Easy (+) or Difficult (-)))	5	5)	5	5
Efficient (+) or Inefficient (-))	0	\sim	0	\sim	5)
Satisfactory (+) or Unsatisfactory (-)	0	5)	5	5	5)

Figure 4.2 - Sample Bailey Factor Question

The satisfactory and unsatisfactory pair was included for each factor in order to test the internal validity of the other subfactor adjective pairs ((Bailey & Pearson, 1983b)). This allows the reaction of a participant to a factor to be expressed as the sum responses to four adjective pairs associated with that factor (see Figure 4.3).

$$R_{ij} = \frac{1}{4} \sum_{k=1}^{4} I_{i, j, k} \quad \text{where}$$
(2)

 $I_{i, j,k}$ = the numeric response of user *i* to adjective pair *k* of factor *j*,

= -3, -2, -1, 0, 1, 2 or 3.

Thus, R_{ij} can take on values from -3 to +3 in increments of 0.25.

Summing the individual weighted factor responses, one gets the overall satisfaction for the user:

$$S_i = \sum_{j=1}^{39} \frac{W_{ij}}{4} \sum_{k=1}^{4} I_{i,j,k} \,. \tag{3}$$

Figure 4.3 - Bailey's Original Formula for Determining User Satisfaction using 39 factors (Bailey & Pearson, 1983a)

The numerical output of above formula was then normalized to produce a more readable and understandable result. The normalized score is, "...based only on factors with at least one nonzero response in the first four adjective pairs" ((Bailey & Pearson, 1983b)). Factors evaluated with only zero responses were omitted as not meaningful. Thus, the normalized score is equal to a participant's actual score divided by the maximum possible score shown by the formula shown in Figure 4.4:

$$NS_i = S_i / (F_i \times 3.0) \text{ where}$$

$$NS_i = \text{Normalized satisfaction for user } i,$$

$$F_i = \text{Number of meaningful factors}$$

$$= \sum_{j=i}^{39} \delta_{ij}, \text{ where}$$

$$\delta_{ij} = 1 \text{ if } \sum_{h=1}^{4} I_{ijk} > 0.0,$$

$$= 0 \text{ otherwise.}$$



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The normalized scores then ranged from -1 to +1 and ((Bailey & Pearson, 1983b)) suggests that the ranges translate to user satisfaction as shown in Figure 4.5. This score is referred to as the computed normalized score in the following sections of this document.

Normalized score	Translation
+ 1.00	Maximally satisfied
+ 0.67	quite satisfied
+ 0.33	slightly satisfied
0.0	neither satisfied nor dissatisfied
- 0.33	slightly dissatisfied
- 0.67	quite dissatisfied
-1.00	maximally dissatisfied

Figure 4.5 – Bailey's Score Boundaries for User Satisfaction from (Bailey & Pearson, 1983b)

The satisfied and unsatisfied adjective pair used in addition to the other four adjective pairs for each factor is referred to as the self-reported satisfaction score in the following sections of this document. The satisfied and unsatisfied adjective pair is scored using the numerical values shown in Figure 4.1 (-3, -2, -1, 0, +1, +2, +3). These integer values from -3 ... 0 ... 3 were used to computer the mean values of each factors' self-reported satisfaction score without the requirement to normalize the scores as described above for the other adjective pairs.

Using the above methods one computed satisfaction mean, standard deviation score, and confidence interval score and one self-reported satisfaction mean, standard deviation score, and confidence interval score was calculated for each factor in this section for each of the two groups of participants in this research study. The mean scores in each question in this section were translated into an English descriptive statement based on the translation provided by (Bailey & Pearson, 1983a).

A non-parametric statistics test was used to compare the two groups' satisfaction scores for each of the fourteen factors. A non-parametric statistic test was used as non-parametric statistics do not depend on the population data fitting any parameterized distributions. Nonparametric tests are useful for studying populations that take on a ranked order and measure data on an ordinal scales²⁷ (Siegel, 1957).

A non-parametric Kolmogorov-Smirnov test was selected to compare the two groups' data sets for each factor. The Kolmogorov-Smirnov (KS) test provides a means of testing if the observed data sets are from a completely specified continuous distribution (Lilliefors, 1967). In other word, the Kolmogorov–Smirnov test provides a way to measure whether two underlying onedimensional probability distributions differ. The advantage of the KS test is that it can be used with small sample sizes, as obtained in this research study and it is often more powerful test than the chi-square test for any sample size (Lilliefors, 1967).

The KS test was used to generate p-values which were used to decide whether the null hypothesis²⁸ should be rejected for the data sets found for each factor. The null hypothesis is typically rejected if the p-value is less than 0.05 or 0.01, corresponding to a 5% or 10% chance respectively of an outcome that is extreme. The KS test was used to generate a p-value to compare the two groups of research participants in terms of the computed normalized mean satisfaction score and self-reported satisfaction score for each modified Bailey/Pearson factor used in this research study. If the p-values generated for each factor was deemed to be low then

²⁷ An ordinal scale is a measurement scale that assigns values to objects based on their ranking with respect to one another.

²⁸ A null hypothesis is a hypothesis (within the context of statistical hypothesis testing) that might be falsified on the basis of observed data.

the satisfaction scores of the two research groups for that factor could be more correctly compared and said to be significant.

In additional to the Bailey/Pearson satisfaction survey questions, questions formatted using likert based scales were used to capture participant satisfaction levels based upon their level of agreement to statements provided to them. The likert survey sections of the online survey asked participants to rate the level of agreement to statements on the scale: strongly agree, agree, somewhat agree, neutral, somewhat disagree, disagree, and strongly disagree (please see Appendix 3.12 for a complete list of questions in this section). The mean score for each question in this section was translated into an English descriptive statement based on the scale used in each question. The two groups of participants data captured in this section were analyzed with a KS test. The KS test was used to generate a p-value to compare the two groups of research participants data captured in the previous section of the research survey results. If the p-values generated for each likert scale prompt was deemed to be low then the satisfaction scores of the two research groups for that factor could be more correctly compared and said to be significant.

Participants who had word clouds presented with their search result answered an additional section of questions related to the effects of word clouds on their search experience. The first question of this word cloud specific section was a modified Bailey/Pearson satisfaction question. This question generated one computed satisfaction mean, standard deviation score, and confidence interval score and one self-reported satisfaction mean, standard deviation score for word cloud group of participants. The mean scores for this question were translated into an English descriptive statement based on the translation provided by (Bailey & Pearson, 1983a).

Without a generated p-value as in the first Bailey and Pearson satisfaction question section these results were presented without any claims made about their statistical significance.

The demographic and usage questions asked before the start of the satisfaction section of this survey and the final group of question in the word cloud section used a number of likert scales similar to the likert scale mentioned above. For each likert scale question in these sections one mean score, standard deviation score, and confidence interval score was generated. The mean score in each question was translated into an English descriptive statement based on the scales used in each question when appropriate. If possible a KS test was performed, and a p-value generated for the questions in the demographic and usage section.

The following chapter will discuss the results captured via the use of the online survey administered to participants after the completion of the three rounds of the microblogging search simulation task.

Results

A research experiment was carried out to test whether word clouds improve the user satisfaction of using a microblog search engine. Participants completed a series of three exercises in which they interacted with a simulated twitter search engine in order to locate microblogs focused on particular search terms. These search simulations were designed with the ability to display microblog author's word clouds along with the simulated search results. Half of the participants in the research study were provided with word clouds in addition to the regular search results.

Following the search simulation exercises participants were administered a survey in which they were asked about their experiences with the search simulations. The participants in the group that had word clouds displayed with their search results also answered an additional set of questions related to the effects of the word clouds on their simulated search experiences.

This chapter presents the results of this survey in two sections. The first section of the next chapter displays all survey results in a raw format. The second section of the next chapter presents a closer analysis of the actually findings of the survey. The results of this experiment were largely statistically insignificant and may indicated participants in the research study felt neutral or slightly positive satisfaction with their search simulation tasks regardless of the presence of word clouds.

5.1 Presentation of Findings (raw data)

5.1.1 Demographic and Usage Sections Findings

The demographic and usage findings of the survey are presented in the tables below.

No Word Cloud Group	Word Cloud Group
Total Number of Participants: 19	Total Number of Participants: 22
Number Men: 10 – Number Women: 8	Number Men: 16 – Number Women: 6
Mean Age: 25 - STD ²⁹ : 4.421	Mean Age: 27 - STD: 5.382
Non-parametric Kolmogorov-Smirnov Comparis	son of the Two Age Data Sets
<i>P</i> of: 0.517	
Primary Language: English	Primary Language: English
Average Educational Background:	Average Educational Background:
Some graduate level work	Undergraduate Degree
Non-parametric Kolmogorov-Smirnov Comparis	son of the Two Educational Background Data
Sets	
<i>P</i> of: 0.342	

²⁹ Standard Deviation (STD) - In probability theory and statistics, the standard deviation of a statistical population, a data set, or a probability distribution is the square root of its variance. Standard Deviation shows how much variation there is from the "average" (mean).

Average Time Currently Spent on Twitter per	Average Time Currently Spent on Twitter per
Week: Less than 1 hour	Week: Less than 1 hour
Non-parametric Kolmogorov-Smirnov Comparison of the Two Time Spent on Twitter Data Sets	
<i>P</i> of: 0.663	
The Most Chosen Search Terms Using During	The Most Chosen Search Terms Using During
The most chosen scalen remis using burning	The Most chosen scalen remis osing buring
the Search Simulation Tasks (from most	the Search Simulation Tasks (from most
selected to least selected):	selected to least selected):
CBC (1 st), Britney Spears (tied for 2 nd), Obama	Britney Spears (tied for 1 st), Facebook (tied for
(tied for 2 nd), Facebook (4 th), Green Party (5 th),	1 st), Obama (3 rd), CBC (4 th), Green Party (tied
Palm Treo (6 th)	for 5 th), Palm Treo (tied for 6 th)

Table 5.1 - Demographic Findings of Word Cloud and Non-Word Cloud Group of Participants
Likert Rating Scale Used: Expert (5) - 4 – Average (3) - 2 – (NA / Novice (1))			
No Word Cloud Group	Word Cloud Group		
Self-Reported Computer Experience/	Self-Reported Computer Experience/		
Knowledge	Knowledge		
Mean : 4.158	Mean : 4.364		
STD : 0.834	STD : 0.790		
Confidence Interval : +/- 0.402	Confidence Interval : +/- 0.350		
Non-parametric Kolmogorov-Smirnov Comparis	son of the Two Computer Experience Data Sets		
<i>P</i> of: 0.995			
Self-Reported Blogging	Self-Reported Blogging		
Experience/Knowledge	Experience/Knowledge		
Mean : 3.158 (Average)	Mean : 3.286 (Average)		
STD : 1.5000	STD : 1.056		
Confidence Interval : +/- 0.723	Confidence Interval : +/- 0.481		
Non-parametric Kolmogorov-Smirnov Comparison of the Two Blogging Experience Data Sets			
<i>P</i> of: 0.433			

Self-Reported Microblogging	Self-Reported Microblogging
	Sen-Reported Wherobiogenig
Experience/Knowledge	Experience/Knowledge
Lypenence/ knowledge	Lapenence/ knowledge
Mean : 2.895 (Average)	Mean : 2.857 (Average)
STD : 1 440	CTD - 1 280
SID : 1.449	SID : 1.389
Confidence Interval : +/- 0.698	Confidence Interval : +/- 0.632
Non-parametric Kolmogorov-Smirnov Comparis	son of the Two Microblogging Experience Data
Sate	
5615	
<i>P</i> of: 1.000	

Table 5.2 - Usage Information Findings of the Word Cloud and Non-Word Cloud Group of Participants

Normalized score	Translation
+ 1.00	Maximally satisfied
+ 0.67	quite satisfied
+0.33	slightly satisfied
0.0	neither satisfied nor dissatisfied
- 0.33	slightly dissatisfied
- 0.67	quite dissatisfied
-1.00	maximally dissatisfied

5.1.2 Legend for Interpretation of Satisfaction Results

Figure 5.1 Normalized Mean Score Translation Chart for Section 5.1.3

Figure 5.1 provides a chart which allows for the computed normalized mean scores displayeded in section 5.1.3 to be translated from numerical scores to their equivalent scores in english words.



Figure 5.2 - Mean Self-Reported Satisfaction Translation Rating Scale for Section 5.1.3

Figure 5.2 provides a figure which allows for the mean self-reported satisfaction scores displayeded in section 5.1.3 to be translated from numerical scores to their equivalent scores in english words.

5.1.3 Satisfaction Section Findings

The satisfaction findings of the survey tool are presented in the tables below.

Factor (F#)	No Word Cloud Group	Word Cloud Group
F1 - Convenience of Access :	Data Points: 19	Data Points: 22
(The ease or difficulty with which you	Computed Satisfaction	Computed Satisfaction
were able to utilize the capability of	(Normalized Mean / STD	(Normalized Mean / STD
the microblogging search tool to	/ 95 % Confidence	/ 95 % Confidence
complete the search exercises.)	Interval):	Interval) :
Prompt :	0.598 / 0.312 / [+/-] 0.102	0.596 / 0.224 / [+/-] 0.099
Using the search tool to perform the	Quite Satisfied	Quite Satisfied
search exercises was	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	0.947 / 1.545 / [+/-] 0.508	1.174 / 1.193 / [+/-] 0.516
	Slightly Satisfied	Slightly Satisfied

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Normalized Data Sets	
<i>P</i> of: 0.756	
Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 1.000	

Table 5.3 – Convenience of Access Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F2 - Accuracy:	Data Points: 19	Data Points: 22
(The correctness of the output	Computed Satisfaction	Computed Satisfaction
information.)	(Normalized Mean / STD	(Normalized Mean / STD
Prompt:	/ 95 % Confidence	/ 95 % Confidence
The accuracy of information dicplayed	Interval) :	Interval) :
by the search tool in the search	0.095 / 0.528 / [+/-] 0.173	0.348 / 0.293 / [+/-] 0.531
exercises was	Neither Satisfied Nor	Slightly Satisfied
	Dissatisfied	Self-Reported
	Self-Reported	Satisfaction (Mean/STD/
	Satisfaction (Mean/STD/	95 % Confidence Interval)
	95 % Confidence Interval)	:
	:	0.652 / 1.229 / [+/-]
	0.316 / 1.827 / [+/-] 0.601	0.531
	Neither or Equally	Slightly Satisfied
	Satisfied	
	Non-parametric Kolmogoro	ov-Smirnov Comparison of
	the Two Normalized Data S	iets

<i>P</i> of: 0.156
Non-parametric Kolmogorov-Smirnov Comparison of
the Two Self-Reported Data Sets
<i>P</i> of: 0.907

Table 5.4 – Accuracy Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F3 - Precision :	Data Points: 19	Data Points: 21
(The variability of the output	Computed Satisfaction	Computed Satisfaction
information from that which it	(Normalized Mean / STD	(Normalized Mean / STD
purposes to measure.)	/ 95 % Confidence	/ 95 % Confidence
Prompt:	Interval) :	Interval) :
The precision of the information	0.110 / 0.546 / [+/-] 0.179	0.121 / 0.478 / [+/-] 0.212
displayed by the search tool during	Neither Satisfied Nor	Neither Satisfied Nor
the search exercises was	Dissatisfied	Dissatisfied
	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	0.316 / 1.827 / [+/-] 0.601	0.136 / 1.320 / [+/-] 0.585
	Neither or Equally	Neither or Equally
	Satisfied	Satisfied
	Non-parametric Kolmogorov-Smirnov Comparison of the Two Normalized Data Sets	

<i>P</i> of: 0.920
Non-parametric Kolmogorov-Smirnov Comparison of
the Two Colf Deverted Date Cate
the Two Self-Reported Data Sets
P OT: 0.863

Table 5.5 – Precision Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F4 - Reliability :	Data Points: 19	Data Points: 22
(The consistency and dependability of	Computed Satisfaction	Computed Satisfaction
the output information.)	(Normalized Mean / STD	(Normalized Mean / STD
Prompt:	/ 95 % Confidence	/ 95 % Confidence
	Interval) :	Interval) :
The reliability of the information displayed by the search tool during the	0.120 / 0.564 / [+/-] 0.185	0.100 / 0.520 / [+/-] 0.231
search exercises was	Neither Satisfied Nor	Neither Satisfied Nor
	Dissatisfied	Dissatisfied
	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	0.368 / 1.832 / [+/-] 0.602	0.174 / 1.642 / [+/-] 0.710
	Neither or Equally	Neither or Equally
	Satisfied	Satisfied
	Non-parametric Kolmogoro	ov-Smirnov Comparison of
	the Two Normalized Data Sets	

<i>P</i> of: 0.997
Non-parametric Kolmogorov-Smirnov Comparison of
the Two Self-Reported Data Sets
<i>P</i> of: 0.951
<i>P</i> of: 0.951

Table 5.6 – Reliability Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F5 - Completeness:	Data Points: 19	Data Points: 21
(The comprehensiveness of the output	Computed Satisfaction	Computed Satisfaction
information content.)	(Normalized Mean / STD	(Normalized Mean / STD
Prompt:	/ 95 % Confidence	/ 95 % Confidence
	Interval) :	Interval) :
The completeness of the information		0.215 / 0.426 / [1/] 0.102
display by the search tool during the	-0.000 / 0.555 / [+/-]	0.213 / 0.436 / [+/-] 0.195
search exercises was	0.184	Slightly Satisfied
	Neither Satisfied Nor	Self-Reported
	Dissatisfied	Satisfaction (Mean/STD/
	Self-Reported	95 % Confidence Interval)
	Satisfaction (Mean/STD/	:
	95 % Confidence Interval)	0.261 / 1.421 / [+/-] 0.615
	:	
	0 159 / 1 924 / [+/]	Neither or Equally
	-0.136/ 1.834/ [+/-]	Satisfied
	0.603	
	Neither or Equally	
	Satisfied	

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Normalized Data Sets	
<i>P</i> of: 0.058	
Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 0.938	

Table 5.7 – Completeness Factor Scores-

Factor (F#)	No Word Cloud Group	Word Cloud Group
F6 - Format of Output:	Data Points: 19	Data Points: 22
(The material design of the layout and	Computed Satisfaction	Computed Satisfaction
display of the output contents.)	(Normalized Mean / STD	(Normalized Mean / STD
Prompt:	/ 95 % Confidence	/ 95 % Confidence
	Interval) :	Interval) :
The format of the information	0 599 / 0 3// / [+/-]	0 540 / 0 301 / [+/-] 0 130
displayed by the search tool during	0.5557 0.5447 [17]	0.5407 0.5017 [17-] 0.150
the search exercises was	0.113	Quite Satisfied
	Quite Satisfied	Self-Reported
	Self-Reported	Satisfaction (Mean/STD/
	Satisfaction (Mean/STD/	95 % Confidence Interval)
	95 % Confidence Interval)	:
	:	1.261 / 1.287 / [+/-] 0.556
	1.053 / 1.615 / [+/-] 0.531	Slightly Satisfied
	Slightly Satisfied	
	Non-parametric Kolmogoro	ov-Smirnov Comparison of
	the Two Normalized Data Sets	
	<i>P</i> of: 0.135	

Non-parametric Kolmogorov-Smirnov Comparison of
the Two Self-Reported Data Sets
<i>P</i> of: 0.972

Table 5.8 – Format of Output Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F7 - Language:	Data Points: 19	Data Points: 22
(The set of vocabulary, syntax, and	Computed Satisfaction	Computed Satisfaction
grammatical rules used to interact	(Normalized Mean / STD	(Normalized Mean / STD
with the microblogging search	/ 95 % Confidence	/ 95 % Confidence
system.)	Interval) :	Interval) :
Prompt:	0.627 / 0.267 / [+/-] 0.088	0.518 / 0.462 / [+/-] 0.200
The language displayed by the search	Quite Satisfied	Quite Satisfied
tool during the search exercises	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	1.789 / 0.855 / [+/-] 0.281	0.957 / 1.522 / [+/-] 0.658
	Quite Satisfied	Slightly Satisfied
	Non-parametric Kolmogorov-Smirnov Comparison of	
	the Two Normalized Data Sets	
	<i>P</i> of: 0.880	

Non-parametric Kolmogorov-Smirnov Comparison of
the Two Self-Reported Data Sets
<i>P</i> of: 0.464

Table 5.9 – Language Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F8 – Volume of Output:	Data Points: 19	Data Points: 21
(The amount of information conveyed	Computed Satisfaction	Computed Satisfaction
to you from the search tool during the	(Normalized Mean / STD	(Normalized Mean / STD
search exercise. This is expressed not	/ 95 % Confidence	/ 95 % Confidence
only by the number of reports or	Interval) :	Interval) :
outputs but also by the	0.322 / 0.487 / [+/-] 0.160	0.319/0.301/[+/-]0.134
voluminousness of the output		
contents.)	Slightly Satisfied	Slightly Satisfied
Prompt:	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
The amount of the information	95 % Confidence Interval)	95 % Confidence Interval)
displayed by the search tool during the	:	:
search exercise was	· · · · · · · · · · · · · · · · · · ·	
	0.684 / 1.701 / [+/-] 0.559	0.652 / 1.301 / [+/-] 0.562
	Slightly Satisfied	Slightly Satisfied
	Non-parametric Kolmogoro	ov-Smirnov Comparison of
	the Two Normalized Data Sets	
	<i>P</i> of: 0.193	
	Non-parametric Kolmogoro	ov-Smirnov Comparison of

the Two Self-Reported Data Sets	
<i>P</i> of: 0.931	

Table 5.10 – Volume of Output Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F9 – Relevancy :	Data Points: 18	Data Points: 21
(The degree of congruence (sameness)	Computed Satisfaction	Computed Satisfaction
between what you want or require	(Normalized Mean / STD	(Normalized Mean / STD
and what is provided by the search	/ 95 % Confidence	/ 95 % Confidence
during the search exercise.)	Interval) :	Interval) :
Prompt:	0.117 / 0.521 / [+/-]	0.153 / 0.483 / [+/-] 0.214
The relevancy of the information	0.174	Neither Satisfied Nor
displayed by the search tool during	Neither Satisfied Nor	Dissatisfied
the search exercise was	Dissatisfied	Self-Reported
	Self-Reported	Satisfaction (Mean/STD/
	Satisfaction (Mean/STD/	95 % Confidence Interval)
	95 % Confidence Interval)	:
	:	0.391 / 1.644 / [+/-] 0.711
	0.263 / 1.628 / [+/-] 0.535	Neither or Equally
	Neither or Equally	Satisfied
	Satisfied	

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Normalized Data Sets	
<i>P</i> of: 0.981	
Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 1.000	

Table 5.11 – Relevancy Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F10 – Understand of the Search Tool:	Data Points: 19	Data Points: 22
(The degree of comprehension that	Computed Satisfaction	Computed Satisfaction
you possess about the search tool	(Normalized Mean / STD	(Normalized Mean / STD
provided.)	/ 95 % Confidence	/ 95 % Confidence
Prompt:	Interval) :	Interval) :
My understanding of the information	0.361 / 0.618 / [+/-] 0.203	0.524 / 0.381 / [+/-] 0.165
displayed by the search tool during the	Slightly Satisfied	Quite Satisfied
search exercise was	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	0.947 / 1.779 / [+/-] 0.585	1.500 / 1.300 / [+/-] 0.576
	Slightly Satisfied	Quite Satisfied
	Non-parametric Kolmogorov-Smirnov Comparison of	
	the Two Normalized Data Sets	
	<i>P</i> of: 0.588	

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 0.543	

Table 5.12 – Understand of the Search Tool Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F11 – Perceived Utility:	Data Points: 17	Data Points: 21
(Your judgment about the considered	Computed Satisfaction	Computed Satisfaction
usefulness of the microblogging tool	(Normalized Mean / STD	(Normalized Mean / STD
provided.)	/ 95 % Confidence	/ 95 % Confidence
Prompt:	Interval) :	Interval) :
The usefulness of information	0.225 / 0.507 / [+/-] 0.172	0.269 / 0.377 / [+/-] 0.172
displayed by the search tool during the	Slight Satisfied	Slight Satisfied
search exercise was	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	0.474 / 1.611 / [+/-] 0.530	0.391 / 1.373 / [+/-] 0.594
	Neither or Equally	Neither or Equally
	Satisfied	Satisfied
	Non-parametric Kolmogoro	ov-Smirnov Comparison of
	the Two Normalized Data Sets	
	<i>P</i> of: 0.690	

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 0.998	

Table 5.13 – Perceived Utility Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F12 – Confidence in the Search Tool:	Data Points: 18	Data Points: 22
(Your feelings of assurance or	Computed Satisfaction	Computed Satisfaction
certainty about the search tool	(Normalized Mean / STD	(Normalized Mean / STD
provided for the task asked of you.)	/ 95 % Confidence	/ 95 % Confidence
Prompt:	Interval):	Interval):
The usefulness of information	0.014 / 0.540 / [+/-]	0.083 / 0.473 / [+/-] 0.205
displayed by the search tool during	0.180	Neither Satisfied Nor
the search exercise was	Neither Satisfied Nor	Dissatisfied
	Dissatisfied	Self-Reported
	Self-Reported	Satisfaction (Mean/STD/
	Satisfaction (Mean/STD/	95 % Confidence Interval)
	95 % Confidence Interval)	:
	:	0.217 / 1.413 / [+/-]
	0.211 / 1.512 / [+/-] 0.497	0.0611
	Neither or Equally	Neither or Equally
	Satisfied	Satisfied

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Normalized Data Sets	
<i>P</i> of: 0.940	
Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 0.870	

Table 5.14 – Confidence in the Search Tool Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
F13 – Feeling of Control:	Data Points: 16	Data Points: 20
(Your awareness of the personal	Computed Satisfaction	Computed Satisfaction
power or lack of power to regulate,	(Normalized Mean / STD	(Normalized Mean / STD
direct or dominate execution of the	/ 95 % Confidence	/ 95 % Confidence
search tool's perceived function.)	Interval) :	Interval) :
Prompt:	0.116 / 0.667 / [+/-] 0.229	0.086 / 0.459 / 0.209
My feeling of control during the	Neither Satisfied Nor	Neither Satisfied Nor
search exercise was	Dissatisfied	Dissatisfied
	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	:	:
	0.211 / 1.686 / [+/-]	0.136 / 1.207 / [+/-] 0.535
	0.554	Neither or Equally
	Neither or Equally	Satisfied
	Satisfied	

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Normalized Data Sets	
<i>P</i> of: 0.348	
Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 0.928	

Table 5.15 – Feeling of Control Factor Scores

Factor (F#)	No Word Cloud Group	Word Cloud Group
[14] Flowibility of the Secret Tool	Data Dainta 17	Data Dainta: 21
F14 – Flexibility of the Search Tool:	Data Points: 17	Data Points: 21
(The capacity of the search tool to	Computed Satisfaction	Computed Satisfaction
change or to adjust in response to new	(Normalized Mean / STD	(Normalized Mean / STD
conditions, demands, or	/ 95 % Confidence	/ 95 % Confidence
circumstances.)	Interval) :	Interval) :
Prompt:	-0.106 / 0.574 / [+/-]	-0.115 / 0.530 / [+/-]
The flexibility of the search tool during	0.194	0.241
the search exercise was	Neither Satisfied Nor	Neither Satisfied Nor
	Dissatisfied	Dissatisfied
	Self-Reported	Self-Reported
	Satisfaction (Mean/STD/	Satisfaction (Mean/STD/
	95 % Confidence Interval)	95 % Confidence Interval)
	-0.263 / 1.558 / [+/-]	0.087 / 1.311 / [+/-] 0.567
	0.751	Neither or Equally
	Neither or Equally	Satisfied
	Satisfied	

Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Normalized Data Sets	
<i>P</i> of: 0.990	
Non-parametric Kolmogorov-Smirnov Comparison of	
the Two Self-Reported Data Sets	
<i>P</i> of: 0.957	

Table 5.16 – Flexibility of the Search Tool Factor Scores

5.1.4 Likert Scale Satisfaction Section Findings

The likert scale satisfaction survey results are presented in the tables below.

Likert Scale Used:		
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –		
Disagree (2) – Strongly Disagree (1)		
Likert Question (L#)	No Word Cloud Group	Word Cloud Group
L1	Data Points : 17	Data Points : 22
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence
The Twitter microblog I	Interval:	Interval:
chose focused entirely on	2.842 / 1.741 / [+/-] 0.895	2.409 / 1.469 / [+/-] 0.651
the search term I was	Somewhat Disagree	Somewhat Disagree
provided.		
	Non-parametric Kolmogorov-Smirnov Comparison of the Two Data Sets	
	<i>P</i> of: 0.980	

Table 5.17 – The likert satisfaction scale responses to prompt L1

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Likert Scale Used:			
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –			
	Disagree (2) – Strongly Disagree (1)		
Likert Question (L#)	No Word Cloud Group	Word Cloud Group	
L2	Data Points : 17	Data Points : 22	
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence	
Finding a correctly focused	Interval:	Interval:	
Twitter microblog using the	3.353 / 1.656 / [+/-] 0.851	3.182 / 1.651 / [+/-] 0.732	
search term provided was a difficult process.	Somewhat Disagree	Somewhat Disagree	
	Non-parametric Kolmogorov-Smirnov Comparison of the Two		
	Data Sets		
	<i>P</i> of: 1.000		

Table 5.18 – The likert satisfaction scale responses to prompt L2

Likert Scale Used:			
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –			
	Disagree (2) – Strongly Disagree (1)		
Likert Question (L#)	No Word Cloud Group	Word Cloud Group	
L3	Data Points : 17	Data Points : 22	
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence	
I felt comfortable finding a	Interval:	Interval:	
correctly focused Twitter	5.471 / 1.179 / [+/-] 0.874	5.227 / 1.193 / [+/-] 0.529	
microblog using the system provided to me.	Somewhat Agree	Somewhat Agree	
	Non-parametric Kolmogorov-Smirnov Comparison of the Two Data Sets		
	<i>P</i> of: 0.828		

Table 5.19 – The likert satisfaction scale responses to prompt L3

Likert Scale Used:			
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –			
	Disagree (2) – Strongly Disagree (1)		
Likert Question (L#)	No Word Cloud Group	Word Cloud Group	
L4	Data Points : 17	Data Points : 22	
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence	
I believe I could choose	Interval:	Interval:	
other appropriately focused	4.471 / 2.017 / [+/-] 1.075	3.864 / 1.677 / [+/-] 0.744	
Twitter microblogs if	Somewhat Agree	Neutral	
provided a new search term.	Non-parametric Kolmogorov Sp	airnov Comparison of the Two	
	Data Sets		
	<i>P</i> of: 0.387		

Table 5.20 – The likert satisfaction scale responses to prompt L4
Likert Scale Used:		
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutra	l (4) – Somewhat Disagree (3) –
	Disagree (2) – Strongly Disagree ((1)
Likert Question (1#)	No Word Cloud Group	Word Cloud Group
L5	Data Points : 16	Data Points : 22
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence
I found using Twitter in this	Interval:	Interval:
exercise difficult.	3.250 / 2.017 / [+/-] 1.075	3.364 / 1.677 / [+/-] 0.744
	Somewhat Disagree	Somewhat Disagree
	Non-parametric Kolmogorov-Smirnov Comparison of the Two	
	Data Sets	
	<i>P</i> of: 1.000	

Table 5.21 – The likert satisfaction scale responses to prompt L5

Likert Scale Used:		
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)		
Likert Question (L#)	No Word Cloud Group	Word Cloud Group
L6	Data Points : 17	Data Points : 22
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence
I would use Twitter again to	Interval:	Interval:
find information again after	4.118 / 1.833 / [+/-] 0.942	3.909 / 1.849 / [+/-] 0.820
having participated in this experiment.	Neutral	Neutral
	Non-parametric Kolmogorov-Sm	irnov Comparison of the Two
	Data Sets	
	<i>P</i> of: 1.000	

Table 5.22 – The likert satisfaction scale responses to prompt L6

Likert Scale Used:		
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –		
Disagree (2) – Strongly Disagree (1)		1)
Likert Question (L#)	No Word Cloud Group	Word Cloud Group
L7	Data Points : 17	Data Points : 22
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence
I would recommend Twitter	Interval:	Interval:
to friends after having	3.412 / 1.622/ [+/-] 0.834	3.500 / 1.711 / [+/-] 0.759
participated in this experiment.	Somewhat Disagree	Neutral
	Non-parametric Kolmogorov-Smirnov Comparison of the Two	
	Data Sets	
	<i>P</i> of: 1.000	

Table 5.23 – The likert satisfaction scale responses to prompt L7

Likert Scale Used:		
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –		
	Disagree (2) – Strongly Disagree (1)	
Likert Question (L#)	No Word Cloud Group	Word Cloud Group
L8	Data Points : 17	Data Points : 22
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence
Using Twitter search in this	Interval:	Interval:
study was a confusing	4.588 / 2.002 / [+/-] 1.029	3.273 / 1.579 / [+/-] 0.700
process.	Somewhat Agree	Somewhat Disagree
	Non-parametric Kolmogorov-Smirnov Comparison of the Two	
	Data Sets	
	<i>P</i> of: 0.309	

Table 5.24 – The likert satisfaction scale responses to prompt L8

Likert Scale Used:		
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –		
	Disagree (2) – Strongly Disagree (1)	
Likert Question (L#)	No Word Cloud Group	Word Cloud Group
L9	Data Points : 15	Data Points : 22
Prompt:	Mean / STD / 95% Confidence	Mean / STD / 95% Confidence
Finding a correctly focused	Interval:	Interval:
Twitter microblog using the	4.533 / 1.922/ [+/-] 1.065	3.500 / 1.300 / [+/-] 0.576
search term provided was a lengthy process.	Somewhat Agree	Neutral
	Non-parametric Kolmogorov-Smirnov Comparison of the Two	
	Data Sets	
	<i>P</i> of: 0.399	

Table 5.25 – The likert satisfaction scale responses to prompt L9

Normalized score	Translation
+ 1.00	Maximally satisfied
+ 0.67	quite satisfied
+ 0.33	slightly satisfied
0.0	neither satisfied nor dissatisfied
- 0.33	slightly dissatisfied
- 0.67	quite dissatisfied
-1.00	maximally dissatisfied

5.1.5 Legend for Interpretation of Job Satisfaction Result

Figure 5.3 - Normalized Mean Score Translation Chart for Section 5.1.6

Figure 5.3 provides a chart which allows for the computed normalized mean scores displayed in section 5.1.6 to be translated from numerical scores to an equivalent scores in english words.





Figure 5.4 provides a figure which allows for the mean self-reported satisfaction scores displayeded in section 5.1.6 to be translated from numerical scores to their equivalent scores in english words.

5.1.6 Word Cloud Job Satisfaction Section Findings

The word cloud job satisfaction findings are presented in the table below.

Word Cloud Factor (WCF#)	Word Cloud Group
WCF1 – Job Effects :	Data Points: 22
(The changes in job performances that	Computed Satisfaction (Normalized Mean / STD / 95
are ascertained by you as resulting	% Confidence Interval) :
from the inclusion of word clouds in	0.139 / 0.565 / [+/-] 0.257
the search tool during the search	
exercise.)	Neither Satisfied Nor Dissatisfied
Prompt :	Self-Reported Satisfaction (Mean/STD/ 95 %
	Confidence Interval) :
The effects of the word clouds while	
using the search tool during the search	0.318 / 1.585 / [+/-] 0.703
exercise were	Slightly Satisfied

Table 5.26 – Word Cloud Job Effects Factor Scores

5.1.7 Word Cloud Likert Scale Section Findings

The word cloud likert scale survey results are presented in the tables below.

Likert Scale Used:		
Stimulating (5) – 4 – Neutral (3) – 2 – Dull (1)		
Word Cloud Likert Question	Word Cloud Group	
(WCL#)		
WCL1 - Word Cloud	Data Points : 22	
Stimulation Rating	Mean / STD / 95% Confidence Interval:	
Prompt:	3.318 / 1.287 / [+/-] 0.571	
Overall reaction to word	Neutral	
clouds.		

Table 5.27 – The word cloud likert satisfaction scale responses to prompt WCL1

Likert Scale Used:		
Wonderful (5) – 4 – Neutral (3) – 2 – Terrible (1)		
Word Cloud Likert Question	Word Cloud Group	
(WCL#)		
WCL2 - Word Cloud	Data Points : 22	
Satisfaction Rating	Mean / STD / 95% Confidence Interval:	
Prompt:	3.455 / 0.963 / [+/-] 0.427	
Overall reaction to word	Neutral	
clouds.		

Table 5.28 – The word cloud likert satisfaction scale responses to prompt WCL2

Likert Scale Used:		
Satisfying (5) – 4 – Neutral (3) – 2 – Frustrating (1)		
Word Cloud Likert Question	Word Cloud Group	
(WCL#)		
WCL3 - Word Cloud	Data Points : 22	
Satisfaction Rating	Mean / STD / 95% Confidence Interval:	
Prompt:	3.409 / 1.333/ [+/-] 0.591	
Overall reaction to word	Neutral	
clouds.		

Table 5.29 – The word cloud likert satisfaction scale responses to prompt WCL3

Likert Scale Used:		
Expert (5) – 4 – Average (3) – 2 – Novice (1)		
Word Cloud Likert Question	Word Cloud Group	
(WCL#)		
WCL4 - Please provide a	Data Points : 22	
rating for the following areas	Mean / STD / 95% Confidence Interval:	
of experience/knowledge		
Prompt:	3.048 / 1.499 / [+/-] 0.682	
	Average	
I would rate my word cloud		
experience/knowledge.		

Table 5.30 – The word cloud likert satisfaction scale responses to prompt WCL4

Likert Scale Used:		
Extremely Positive (+3) – Qu	iite Positive (+2) – Slightly Positive (+1) – Neither or Equally (0) –	
Slightly Negative	e (-1) – Quite Negative (-2) – Extremely Negative (-3)	
Word Cloud Likert Question	Word Cloud Group	
(WCL#)		
WCL5 - How satisfied are	Data Points : 22	
ou with the world clouds		
	Wearry STD / 95% confidence interval.	
effect on the microblogging		
	0 409 / 1 623 / [+/-] 0 720	
search system	0.4037 1.0237 [17] 0.720	
	Neutral	
Prompt:		
Catiofaction		
Sausiaction		

Table 5.31 – The word cloud likert satisfaction scale responses to prompt WCL5

	Likert Scale Used:
Strongly Agree (7) – Agree (6	5) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –
	Disagree (2) – Strongly Disagree (1)
Word Cloud Likert Question	Word Cloud Group
(WCL#)	
· · · ·	
WCL6	Data Points : 21
Prompt:	Mean / STD / 95% Confidence Interval:
The word clouds helped me	4.471 / 1.662 / [+/-] 0.756
find a correctly focused	
Twitter microbled	Neutral
i witter microbiog.	

Table 5.32 – The word cloud likert satisfaction scale responses to prompt WCL6

Likert Scale Used:					
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –					
	Disagree (2) – Strongly Disagree (1)				
Word Cloud Likert Question	Word Cloud Group				
(WCL#)					
WCL7	Data Points : 22				
Prompt:	Mean / STD / 95% Confidence Interval:				
I think the word clouds were	4.091 / 1.688 / [+/-] 0.748				
unnecessary in order to find	Somewhat Agree				
a correctly focused Twitter					
microblog.					

Table 5.33 – The word cloud likert satisfaction scale responses to prompt WCL7

	Likert Scale Used:				
Strongly Agree (7) – Agree (6	5) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –				
	Disagree (2) – Strongly Disagree (1)				
Word Cloud Likert Question	Word Cloud Group				
Word Cloud Likert Question	Word Cloud Group				
(WCL#)					
WCL8	Data Points : 22				
Prompt:	Mean / STD / 95% Confidence Interval:				
-					
I thought that the word	5.273 / 1.486 / [+/-] 0.659				
0					
clouds were visually					
	Neutral				
attractive.					

Table 5.34 – The word cloud likert satisfaction scale responses to prompt WCL8

Likert Scale Used:				
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –				
	Disagree (2) – Strongly Disagree (1)			
Word Cloud Likert Question	Word Cloud Group			
(WCL#)				
WCL9	Data Points : 22			
Prompt:	Mean / STD / 95% Confidence Interval:			
Without the word clouds I	3.636 / 2.036 / [+/-] 0.903			
would feel lost when trying	Neutral			
to find a focused Twitter				
microblog.				

Table 5.35 – The word cloud likert satisfaction scale responses to prompt WCL9

	Likert Scale Used:		
Strongly Agree (7) – Agree (6	5) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –		
	Disagree (2) – Strongly Disagree (1)		
Word Cloud Likert Question	Word Cloud Group		
() () () ()			
(VVCL#)			
WCL10	Data Points : 22		
Prompt:	Mean / STD / 95% Confidence Interval:		
Frompt.			
The word clouds made my	4.091 / 1.716 / [+/-] 0.761		
eniovment of twitter			
	Somewhat Aaree		
greater.			

Table 5.36 – The word cloud likert satisfaction scale responses to prompt WCL10

	Likert Scale Used:				
Strongly Agree (7) – Agree (6	6) – Somewhat Agree (5) – Neutral (4) – Somewhat Disagree (3) –				
	Disagree (2) - Strongly Disagree (1)				
	Disagree $(2) = 500000000000000000000000000000000000$				
Mand Claud Libert Outsting	Ward Claud Craw				
word Cloud Likert Question	word Cloud Group				
(WCL#)					
WCL11	Data Points : 22				
Prompt: Mean / STD / 95% Confidence Interval:					
I believe that word clouds	4 773 / 1 798 / [+/-] 0 797				
i believe that word clouds					
are a feature that should be	Samauhat Aaraa				
	Somewhat Agree				
incorporated into Twitter	incorporated into Twitter				
search pages.					

Table 5.37 – The word cloud likert satisfaction scale responses to prompt WCL11

5.2 Presentation of Findings (analysis)

The following sections expand on the results presented in section 5.1 and present an analysis of the findings of the research experiment. To simplify the information presented below all participants that did not receive word clouds with their simulated search results will be referred to as the NWC group and the group that did receive word clouds with their simulated search results will be referred to as the WC group.

5.2.1 Demographics and Usage Sections Findings

In total 41 participants took part in the research study. Of the 41 participants 27 were men and 14 were women. The 41 participants were divided into two groups, the first group (NWC group) contained 19 participants, 11 men and 8 women, while the second group (WC group) contained 22 participants, 16 men and 6 women, this group did have word clouds presented with their results. The average age of the NWC group was 25 while the average age of the WC group was 27.

The mean level of education obtained by the NWC research participants was some graduate level work while the WC group reported the mean level of education obtained as an undergraduate degree. The second largest percentage of the WC group indicated some graduate level education as their level of education.

A majority of participants indicated that their current occupation as being a student while a smaller minority indicated they were in the software development industry. The large proportion of students and software developers combined with the age means of the two groups likely indicated that a large proportion of the survey respondents were computer science students or graduates of computer science programs and may have also been known to the researchers. This was likely due to the participant recruitment techniques employed by the researchers.

The primary language of both groups of participants was English with only four participants indicating English was not their primary language. The other languages indicated as primary languages were Spanish, Romanian, Hebrew, and Turkish.

The average amount of time spent on Twitter by participants previous to this experiment was less than one hour per week for both groups of participants. The mean self-reported level of experience / knowledge of computers of both the NWC and WC group were above average. The mean self-reported level of experience / knowledge of blogging of both the NWC and WC group were average. The mean self-reported level of experience / knowledge of microblogging of the NWC and the WC group were also average. Both groups mean self-reported experience / knowledge levels dropped as the area of focus became more narrowed from computers, to blogging, and finally to microblogging.

In both the NWC and WC groups "Obama" and "Britney Spears" were popular search term chosen for the search simulation exercises while the "Green Party" and "Palm Treo" were the least popular search term chosen by each group.

5.2.2 Satisfaction Section Findings

The satisfaction section of the survey following the completion of the search simulation exercises is the most important survey section for ascertaining if word clouds do improve user satisfaction while searching for focused microblogs. While the results obtained in this research experiment cannot give a definite answer to the thesis statement several interesting results have been discovered.

Fourteen factors were employed to test user satisfaction. Factors' results are discussed below beginning with the factors with the most significant results found. For each factor a normalized computed mean satisfaction rating was discovered for both the NWC group and the WC group. In addition, for each factor a self-reported mean satisfaction rating was discovered for both the NWC group and the WC group.

The comprehensiveness of the output information content, completeness is the factor that can be discussed with the most certainty. A non-parametric Kolmogorov-Smirnov comparison of the NWC and WC normalized responses produced a P value of: 0.058. This allows the null hypothesis to be rejected with 94.2 % certainty. The self-reported satisfaction of this factor cannot be reported on with certainty however both the NWC and WC groups reported they were neither or equally satisfied. The computed normalized scores reveal that the WC groups were slightly satisfied with the comprehensiveness of the output information content while the NWC group was neither satisfied nor dissatisfied with the comprehensiveness of the output information content.

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The material design of the layout and display of the output contents, format of the output, cannot be discussed with a large amount or certainty. A non-parametric Kolmogorov-Smirnov comparison of the NWC and WC normalized responses produced a P value of: 0.135 allowing the null hypothesis to be rejected with 86.5 % percent certainty. The self-reported satisfaction of this factor cannot be reported on with certainty however both the NWC and WC groups reported they were slightly satisfied. The computed normalized scores reveal that both the NWC and WC group were quite satisfied with the format of the output information during the search exercise.

The correctness of the output information, accuracy, cannot be discussed with a large amount or certainty. A non-parametric Kolmogorov-Smirnov comparison of the NWC and WC normalized responses produced a P value of: 0.156 allowing the null hypothesis to be rejected with 84.4 % percent certainty. The self-reported satisfaction of this factor cannot be reported on with certainty however the NWC was neither or equally satisfied with the accuracy during the search simulation while the WC group was slightly satisfied with the accuracy. The computed normalized scores reveal that both the NWC and WC group were quite satisfied with the format of the output information during the search exercise.

A final factor of interest was volume of output factor. A non-parametric Kolmogorov-Smirnov comparison of the NWC and WC normalized responses produced a P value of: 0.193 allowing the null hypothesis to be rejected with 80.7 % percent certainty. The self-reported satisfaction of this factor cannot be reported on with certainty. For both groups with both the computed normalized result and self-reported result the participants reported being slightly satisfied with the volume of output during the search exercise.

All of the remaining 11 factors cannot be discussed with any large degree of statistical certainty for either the computer normalized scoring or the self-reported scoring. The results of all the factors are listed below (the highlighted results reflect the factors discussed above).

Factor	NWC NCS ³⁰	WC NCS	NPKSC ³¹	NWC SRS ³²	WC SRS	NPKSC
Convenience	Quite	Quite	<i>P</i> of: 0.756	Slightly	Slightly	<i>P</i> of:
of Access	Satisfied	Satisfied		Satisfied	Satisfied	1.000
Accuracy	Neither	Slightly	<i>P</i> of: 0,156	Neither or	Slightly	P of:
, lecuracy	iventilei	Sugnery	7 01. 0.150	Neither of	Singhting	7 01.
	Satisfied No	Satisfied		Equally	Satisfied	0.907
	Dissatisfied			Satisfied		
Precision	Neither	Neither	<i>P</i> of: 0.920	Neither or	Neither or	P of:
	Satisfied No	Satisfied No		Equally	Equally	0.863
	Dissatisfied	Dissatisfied		Satisfied	Satisfied	
Reliability	Neither	Neither	<i>P</i> of: 0.997	Neither or	Neither or	P of:
	Satisfied No	Satisfied No		Equally	Equally	0.951
	Dissatisfied	Dissatisfied		Satisfied	Satisfied	
Completeness	Neither	Slightly	<i>P</i> of: 0.058	Neither or	Neither or	<i>P</i> of:

³⁰ Normalized Computed Score

³¹ Non-parametric Kolmogorov-Smirnov Comparison P-Value

³² Self-Reported Satisfaction

	Satisfied No	Satisfied		Equally	Equally	0.938
	Dissatisfied			Satisfied	Satisfied	
Format of	Quite	Quite	<i>P</i> of: 0.135	Slightly	Slightly	P of:
Output	Satisfied	Satisfied		Satisfied	Satisfied	0.972
Language	Quite	Quite	<i>P</i> of: 0.880	Quite	Slightly	P of:
	Satisfied	Satisfied		Satisfied	Satisfied	0.464
Volume of	Slightly	Slightly	<i>P</i> of: 0.193	Slightly	Slightly	P of:
Output	Satisfied	Satisfied		Satisfied	Satisfied	0.931
Relevancy	Neither	Neither	<i>P</i> of: 0.981	Neither or	Neither or	P of:
·	Satisfied No.	Satisfied No.		Faually	Faually	1 000
	Satisfied No	Satisfied No		Equaliy	Equaliy	1.000
	Dissatisfied	Dissatisfied		Satisfied	Satisfied	
Understanding	Slightly	Quite	<i>P</i> of: 0.588	Slightly	Quite	P of:
of the Search	Satisfied	Satisfied		Satisfied	Satisfied	0.543
Tool						
Perceived	Slightly	Slightly	<i>P</i> of: 0.690	Neither or	Neither or	P of:
Utility	Satisfied	Satisfied		Equally	Equally	0.998
				Satisfied	Satisfied	

Confidence in	Neither	Neither	<i>P</i> of: 0.940	Neither or	Neither or	<i>P</i> of:
the Search	Satisfied No	Satisfied No		Equally	Equally	0.870
Tool	Dissatisfied	Dissatisfied		Satisfied	Satisfied	
Feeling of	Neither	Neither	<i>P</i> of: 0.348	Neither or	Neither or	P of:
Control	Satisfied No	Satisfied No		Equally	Equally	0.928
	Dissatisfied	Dissatisfied		Satisfied	Satisfied	
Flexibility of	Neither	Neither	<i>P</i> of: 0.990	Neither or	Neither or	P of:
the Search	Satisfied No	Satisfied No		Equally	Equally	0.957
ΤοοΙ	Dissatisfied	Dissatisfied		Satisfied	Satisfied	

Table 5.38 – Summary Table of the Bailey/Pearson Satisfaction Question Section Results

The results of this section of the survey questions provides additional information about the effects of words clouds on satisfaction when performing a search task but the information itself cannot be presented as statistically significant as seen in the table above. However, this does not mean that this information does not provide a bit of insight into the original thesis question.

It appears that in most cases the presence of a word cloud has no major effect on the ultimate satisfaction ratings recorded be they computed normalized results or self-reported results.

It also appears that the research participants were largely neutral or slightly positively satisfied with their search simulation tasks regardless of the presence of word clouds.

Positive changes in satisfaction were seen in the understanding of the search tool factor from slightly satisfied for the NWC group to quite satisfied for the WC group for both the calculated normalized and self-reported values. This is an interesting observation as the addition of word clouds generated additional levels of complexity in the understanding of the results of the search simulation. Perhaps, the added information provided to participants by the inclusion of word clouds offset any additional complexity added by the word clouds' presence.

Negative change in self-reported satisfaction scores were seen in the language factor from quite satisfied in the NWC group to slightly satisfied in the WC group. This is perhaps a result of adding additional new terms to participants' search experience and in the process making the language required to understand the search exercise slightly more complicated and thereby lowering the satisfaction level of the WC group for the language factor

5.2.3 Likert Scale Satisfaction Section Findings

The results of Likert scale response questions offer another opportunity to provide insight into correctness of the thesis hypothesis. Unfortunately, the results of this section cannot provide any statistically significant findings. A summary of the findings of this question section is presented below.

Likert Question	NWC MR ³³	WC MR	NPKSC
L1 - The Twitter	Somewhat Disagree	Somewhat Disagree	<i>P</i> of: 0.980
microblogs I chose			
focused entirely on			
the search terms I			
was provided.			
L2 - Finding a	Somewhat Disagree	Somewhat Disagree	<i>P</i> of: 1.000
correctly focused			
Twitter microblog			
using the search term			
provided was a			
difficult process.			

³³ Mean Response

L3 - I felt comfortable	Somewhat Agree	Somewhat Agree	<i>P</i> of: 0.828
finding a correctly			
focused Twitter			
microblog using the			
system provided to			
me.			
L4 - I believe I could	Somewhat Agree	Neutral	<i>P</i> of: 0.387
choose other			
appropriately			
focused Twitter			
microblogs if			
provided a new			
search term.			
L5 - I found using	Somewhat Disagree	Somewhat Disagree	<i>P</i> of: 1.000
Twitter in this			
exercise difficult.			
L6 - I would use	Neutral	Neutral	<i>P</i> of: 1.000
Twitter again to find			
information again			
after having			
participated in this			
experiment.			

L7 - I would	Somewhat Disagree	Neutral	<i>P</i> of: 1.000
recommend Twitter			
to friends after			
having participated			
in this experiment.			
L8 - Using Twitter	Somewhat Agree	Somewhat Disagree	<i>P</i> of: 0.309
search in this study			
was a confusing			
process.			
L9 - Finding a	Somewhat Agree	Neutral	<i>P</i> of: 0.399
correctly focused			
Twitter microblog			
using the search term			
provided was a			
lengthy process.			

Table 5.39 – Summary Table of Likert Question Section Results

The information presented above cannot be used to make statistically significant statements but several results are interesting in that they display a difference in the responses between the NWC and the WC group.

Questions L7, L8, and L9 all indicated a shift towards increased satisfaction for the WC group. L7 indicated that the NWC group would somewhat disagree to recommending Twitter to friends after having participated in this experiment while the WC group was neutral. L8 indicated that the NWC group somewhat agreed that the Twitter search simulation was confusing while the WC group somewhat disagreed that the simulation was confusing. Finally, L9 indicated that the NWC group found the search simulation to be lengthy process while the WC group was neutral in their reaction to the length of the search simulation process. Overall this could indicate greater satisfaction in the WC group but this cannot be said with any real degree of certainty.

Interestingly, L4 indicated that the NWC group somewhat agreed that they could choose other appropriately focused Twitter microblogs if provided a new search term whereas the WC was neutral about their ability to do so. This factor could be examined in more detail in future research to understand if this is an anomaly of the findings.

Overall these questions indicate both groups of participants felt similarly about the simulated search tasks regardless of their group affiliation. Participants did indicate that they found that the microblogs they choose in the search simulation did not focus on the search terms they originally choose. Further, results seem to indicate the search simulation was not a difficult process for either the NWC or WC group of participants.

5.2.4 Word Cloud Job Satisfaction Section Findings

The following two sections of questions cannot be discussed with statistical significance. Only the WC group answered questions in this section. This section does provide some interesting non-significant findings that can provide some further insight into for the original hypothesis that word clouds will increase participant satisfaction in choosing a focusing microblog during a microblog search.

The one Bailey/Pearson satisfaction factor included in this section was the job effects factor. The WC group reported a computed normalized mean response of neither satisfied nor dissatisfied while self-reporting a mean response of slightly satisfied. Neither result indicates a strong satisfaction level for the job effect factor due to the presence of word clouds. Again, this information appears to indicate that the presence of a word cloud during a focused microblog search task has no major effect on the ultimate satisfaction ratings recorded be they computed normalized satisfaction results or self-reported satisfaction results.

5.2.5 Word Cloud Likert Scale Section Findings

A summary of the findings of word cloud likert scale section is presented below.

Word Cloud Likert Question	MR
WCL1 - Word Cloud Stimulation Rating	Neutral
Stimulating (5) – 4 – Neutral (3) – 2 – Dull (1)	
WCL2 - Word Cloud Satisfaction Rating	Neutral
Wonderful (5) – 4 – Neutral (3) – 2 – Terrible (1)	
wonderful (5) = 4 - Weathar (5) = 2 - Terrible (1)	
WCL3 - Word Cloud Satisfaction Rating	Neutral
Wells Word Gloud Satisfaction Rating	neatrai
Satisfying (5) – 4 – Neutral (3) – 2 – Frustrating (1)	
WCL4 - I would rate my word cloud experience/knowledge.	Average
Expert (5) – 4 – Average (3) – 2 – Novice (1)	
WCL5 - How satisfied are you with the world clouds effect on	Neutral
the microblogging search system.	
<i>Extremely Positive (+3) – Quite Positive (+2) – Slightly Positive (+1)</i>	
– Neither or Equally (0) – Slightly Negative (-1) – Quite Negative (-	
2) – Extremely Negative (-3)	

WCL6 - The word clouds helped me find a correctly focused	Neutral
Twitter microblog.	
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4)	
– Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)	
WCL7 - I think the word clouds were unnecessary in order to	Somewhat Agree
find a correctly focused Twitter microblog.	
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4)	
– Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)	
WCL8 - I thought that the word clouds were visually	Neutral
attractive.	
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4)	
– Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)	
WCL9 - Without the word clouds I would feel lost when trying	Neutral
to find a focused Twitter microblog.	
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4)	
– Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)	
WCL10 - The word clouds made my enjoyment of twitter	Somewhat Agree
greater.	
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4)	
– Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)	

WCL11 - I believe that word clouds are a feature that should	Somewhat Agree
be incorporated into Twitter search pages.	
Strongly Agree (7) – Agree (6) – Somewhat Agree (5) – Neutral (4)	
– Somewhat Disagree (3) – Disagree (2) – Strongly Disagree (1)	

Table 5.40 – Summary Table of Word Cloud Likert Question Section Results

The findings of this section cannot be presented with statistical significance but are presented as interesting insight into the original thesis hypothesis. While WCL7 indicated that participants felt the word clouds were somewhat unnecessary to find focused microblogs in the search simulation exercises, WCL10 indicated that word clouds somewhat improved the enjoyment of using Twitter in the search simulation exercises and perhaps most importantly WCL11 indicated that participants somewhat agree that word clouds should be a feature that is incorporated into Twitter search result pages. It appears as if participants enjoyed the presence of word clouds in their search simulation exercises but that the word clouds themselves did not have a great deal of impact on the outcome of the simulation exercises as WCL6 indicates a neutral feeling about the ability of word clouds to help locate focused microblogs. Overall participants seem to exhibit a neutral and/or slightly positive satisfaction level when searching for focused microblogs regardless of the presence of word clouds in their microblogging search results.

5.3 Summary of Results

A research experiment was designed to test whether word clouds improve the user satisfaction of using a microblog search engine when searching for focused microblogs. Participants interacted with a simulated twitter search engine with the ability to display microblog author's word clouds. Half of the participants were provided with word clouds in addition to the regular search results. The results of this experiment were largely statistically insignificant but mean sample data indicates largely neutral or slightly positive satisfaction with their search simulation tasks regardless of the presence of word clouds.

The modified Bailey/Pearson satisfaction section of the survey revealed, with diminishing levels of significance, that in most cases the presence of a word cloud has no major effect on the ultimate satisfaction ratings recorded whether computed normalized satisfaction mean scores or self-reported satisfaction mean scores are examined. A positive shift in satisfaction was observed for the computed normalized mean scores for the accuracy of information factor, completeness factor, and understanding of the search tool factor of which only the completeness factor meets the 90 % confidence rating requirement to reject the null hypothesis. Overall it also appears that the research participants were largely neutral or slightly positively satisfied with their search simulation tasks regardless of the presence of word clouds.

The likert satisfaction section of the survey cannot be used to make statistically significant statements but several results are interesting in that they display a difference in the responses between the NWC and the WC group. This question section does indicated that the NWC group

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would somewhat disagree to recommending Twitter to a friend after having participated in this experiment while the WC group was neutral in their response to whether or not they would recommend Twitter to a friend. The NWC group somewhat agreed that the Twitter search simulation was confusing while the WC group somewhat disagreed that the simulation was confusing. Finally, the NWC group found the search simulation to be lengthy process while the WC group was neutral in their reaction to the length of the search simulation process. These findings might indicate greater satisfaction in the WC group than the NWC group but this cannot be said with any real degree of certainty.

Overall these satisfaction sections indicate both groups of participants felt the same way in response to the questions regardless of their group affiliation. Results seem to indicate the search simulation was not a difficult process for either the NWC or WC group of participants. Participants indicate that they found that the microblogs they choose in the search simulating did not focus on the search terms they originally selected. This result may be caused by microblogs tending not to focus on particular subjects in the same way that blogs have been found to do so. This result could also be explained by a potential lack of focused microblogs available in the pre-generated search results displayed by the Twitter search simulation tool. Either of the two above explanations could be potential reasons why neither group reported high levels of satisfaction with the search tasks asked of them.

The final word cloud sections results can also not be used to make statistically significant statements but can provide some insight into the original thesis hypothesis statement. For the Bailey/Pearson job effect satisfaction factor included in this section the WC group reported a computed normalized mean response of neither satisfied nor dissatisfied while self-reporting a mean response of slightly satisfied. Neither result indicates a strong satisfaction level for the job

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effect factor due to the presence of word clouds. Again, this information appears to indicate that the presence of a word cloud has no major effect on the ultimate satisfaction ratings recorded be they computed normalized results or self-reported results.

The word clouds likert scale indicated that participants felt the word clouds were somewhat unnecessary to find focused microblogs in the search simulation exercises while word clouds somewhat improved the enjoyment of using Twitter in the search simulation exercises. Participants did feel that word clouds should be a feature incorporated into Twitter search result pages. It appears as if participants enjoyed the presence of word clouds in their search simulation exercises but that the word clouds themselves did not have a great deal of impact on the outcome of the search simulation exercises. Overall participants seem to exhibit a neutral and/or slightly positive satisfaction level when searching for focused microblogs regardless of the presence of word clouds in their microblogging search results.

6 Conclusion and Future Work

This research study finds that we cannot yet conclusively understand the effects on user satisfaction when word clouds are added alongside microblogging search results for user attempting to find focused microblogs. The results of this research study were largely statistically insignificant however the mean values of the data collected might indicate a largely neutral and/or slightly positive satisfaction with microblogging search regardless of the presence of word clouds.

It was found that users presented with word clouds along with their microblogging search results while looking for focused microblogs felt the search experience was more complete (slightly satisfied with the completeness) than users who did not have word clouds included in their microblogging search results. This research also showed that users would like to have post authors' word clouds included in search results on Twitter.

The original question of the effects on user satisfaction when adding word clouds to microblog search results still remains to be answered. For this research study and the methodology produce to provide more value the experiment described in this study should be rerun while ensuring the recruitment of more participants. The addition of more survey participants to this research study could potentially produce statistical significance findings and allow for stronger claims to be made about effects of word clouds on user satisfaction while performing focused microblog search exercises. The satisfaction tool used in this research study could also be

changed or the search task performed changed and the results measured to access similarities or differences to the results found during this research project.

This research study has left many questions unanswered and brought to attention other important avenues of future research. Some basic differences between blogs and microblogs and their effects remain poorly understood at present. It is not yet known to what degree of the knowledge and information known about blogs can be applied or transferred to the platform of microblogs.

Microblog search results are presented in reverse chronological order while most blog searchers used page ranked results from large search engines. The effect of the change from page ranked results to reverse chronological order is currently not understood and research exploring this would prove valuable to understanding microblog search in more general terms.

Additionally, while research into the categories of blog has been published, the categories of microblog content are not as well understood. It is not yet know if unlike blogs, microblogs tend not to focus on specific concepts of themes. A research study to produce a reproducible and valid methodology to understand the categories of blogs and microblogs would be helpful to the understanding of the concept of personal publishing and online diary content creation.

Word clouds still present a lot of interesting research possibilities. Additional research into the effects of word clouds on other platforms outside of blogs and microblogs would be useful to know to help analyze the research results presented in this document. The effects on satisfaction of differences in word clouds, for examples changes in composition and/or artistry, would also be helpful to provide insight into the field of cloud visualizations. Ultimately this research study may have raised more questions than it was able to answer.

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8 Appendix

The following Appendix section contains additional information referenced to in early

sections of this document.

a1.

Microblogging Search Tool Study

Consent Page

Microblogging Search Tool Study

CONSENT TO PARTICIPATE IN RESEARCH

You are being asked to participate in a research study conducted by Jonathan Haber (jhaber [at] uoguelph.ca), an M.Sc. student, Dr. Judi McCuaig from the Department of Computing and Information Science at the University of Guelph. The valuable results you are contributing will be included in Master's thesis research.

If you have any questions or concerns about the research, please feel free to contact Jonathan Haber: jhaber [at] uoguelph.ca

PARTICIPANTS

Persons who are 18 years of age or older.

PURPOSE OF THE STUDY

This study will examine user satisfaction with microblogging search tools.

POTENTIAL RISKS AND DISCOMFORTS

We expect no potential risks and discomforts associated with this study.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

We expect that information from this study will inform design of blog/microblogging software, and clarify and consolidate previous microblogging research.

We expect no direct benefit to participants.

PAYMENT FOR PARTICIPATION

One participant will be chosen at random to receive a \$25 University of Hospitality Gift card otherwise there will be no payment or remuneration for participation in this research. The odds of winning are approximately 1 in 50.

CONFIDENTIALITY

Every effort will be made to ensure confidentiality of any identifying information that is obtained in connection with this study. Please note that the data from this survey is stored on a US server and are subject to US privacy laws.

Any information you contribute will be contributed confidentially, but will be identifiable to the researchers in this study.

PARTICIPATION AND WITHDRAWAL

If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may exercise the option of removing your data from the study. To withdraw please email: jhaber [at] uoguelph.ca stating you wish to withdraw. The investigator may withdraw you from this research if circumstances arise that warrant doing so. If you wish to receive an email about the findings of this research please indicate so in the comment box on the last page of the online survey.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board.

PROCEDURES

If you volunteer to participate in this study we ask that you click 'yes' to the question below.

You will be involved in a computer driven search exercise. After the completion of the exercise you will be asked to complete an online survey.

* Do you wish to continue:

(Warning: You must be using Firefox internet browser to continue with this study. If not please reload this page using Firefox now.)

U No

Yes

	5%	
	5%	

Next

a1 - Online survey consent page

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a2.

Microblogging Search Tool Study

Heads or Tails?





≭ The coin above is showing...

- 🌙 Heads
- 🌙 Tails

	10%
Prev Next	

a2 - The head / tails divider survey page

Microblogging Search Tool Study

Search Exercise Primer

A blog (a contraction of the term "weblog") is a type of website, usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video. Entries are commonly displayed in reverse-chronological order. Many blogs provide commentary or news on a particular subject; others function as more personal online diaries.

Micro-blogging is another type of blogging, featuring very short posts.

	14%
Prev Next	

a3 - Online exercise non-word cloud group primer page 1

a3.

43%

a4.

Microblogging Search Tool Study

Search Exercise Primer

A blog (a contraction of the term "weblog") is a type of website, usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video. Entries are commonly displayed in reverse-chronological order. Many blogs provide commentary or news on a particular subject; others function as more personal online diaries.

Micro-blogging is another type of blogging, featuring very short posts.

A word cloud (or weighted list in visual design) are a visualization of word frequency in a given text as a weighted list.

Words in the cloud are usually single words and the importance of a word is shown with font size.

The bigger the word the higher the frequency of that words use in a given collection of words.

For the purposes of this study word clouds you be shown represent the entire collected posts of microblog authors.

For example...



a4 - Online exercise word cloud group primer page 1

Prev Next

a5.

Microblogging Search Tool Study

What You Will Be Doing

The following pages will ask you to do a few things.

- 1. You will perform a simple search exercise three (3) times picking a different search term each time.
- 2. To complete each round click the link at the top of the page. Follow the instructions at the top of the page.
- 3. When you are done with that specific round of the exercise proceed to the next round by going to the next page of the survey.
- 4. At the end of the three search exercises you will be asked to answer questions based on the search exercises you completed.

	19%
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a5 -Online exercise primer page 2

Haber 151 of 178

a6.

Microblogging Search Tool Study

Things You Should Know Before Starting

Important Things You Should Know Before You Start (read below)

During the search exercise you will be shown search results for a given search term.

Each search result will contain the search term at least once.

Clicking on the post's author name, or author's picture, will you take you to the author Twitter microblog.

You will be asked to go to one author's microblog, judging from the single search result, that focuses on the search term.

Focus means: A microblog that talks about / addresses the search term frequently.

When in doubtjust go with your best guess.

Finally, you will read through more posts by the author to see if in fact their microblog does "focus" on the search term rather than simply mentioning the search term just once or very rarely.

The search exercises should take about 5 minutes to complete.

	24%
Prev Next	

a6 -Online exercise primer page 3

a7.

Microblogging Search Tool Study

Search Exercise : Round 1 / 3

Step 1:

** CLICK ME TO LAUNCH THE 'SEARCH TOOL' AND BEGIN THE SEARCH EXERCISE **

(note : clicking the above will pop up a new window)

Please return to this page after clicking the above link and completing the exercise.

*	Step	2:

Which search terms did you select in Step 1?

- 🌙 britney spears
- 🌙 cb c
- 🌙 facebook
- 🌙 green party
- 🌙 obama
- 🌙 palm treo

* Did you click the above link and complete all the required steps?

- Yes
- 🌙 No Take me back a page

	29%
Prev Next	

a7 - Online exercise page 1

a8.

Microblogging Search Tool Study

Search Exercise : Round 2 / 3

Step 1:

** CLICK ME TO LAUNCH THE 'SEARCH TOOL' AND BEGIN THE SEARCH EXERCISE **

Pick a different search term this time through.

(dicking the link above will pop up a new window)

Please return to this page after dicking the above link and completing the exercise.

* Step 2:

Which search terms did you select in Step 1?

🌙 britney spears

🌙 cb c

- 🌙 facebook
- 🌙 green party
- 🌙 obama
- 🌙 palm treo

* Did you click the above link and complete all the required steps?

- Yes
- 🌙 No Take me back a page

	33%
Prev Next	

a8 - Online exercise page 2

a9.

Microblogging Search Tool Study

Search Exercise : Round 3 / 3

Step 1:

** CLICK ME TO LAUNCH THE 'SEARCH TOOL' AND BEGIN THE SEARCH EXERCISE **

Pick an additional (new) different search term this time through.

(dicking the link above will pop up a new window)

Please return to this page after dicking the above link and completing the exercise.

The following section will ask you questions about the exercise you are about to complete.

* Step 2:

Which search terms did you select in Step 1?

🌙 britney spears

🌙 cb c

- 🌙 facebook
- 🌙 green party
- 🌙 obama
- 🌙 palm treo

* Did you click the above link and complete all the required steps?

🌙 Yes

🌙 No - Take me back a page

	38%
Prev Next	

a9 - Online exercise page 3

a10

Microblogging Search Tool Study

Demographics

The following questions are of a demographic nature (ie questions about you).

Please answer them as best you can.

The gender I most identify with is:

\cup	Man
\cup	Wom an

My age is:

What is your current location:

City	
Province/State	

What is your current occupation (if student please write student):

My primary language is:

Other (please specify)

My educational background is best described as:

- 🌙 Some high school
- 🤳 High school graduate
- 🌙 Some undergraduate level study
- 🥥 Undergraduate degree
- 🌙 Some graduate level
- 🌙 Graduate degree

Please provide a rating for the following areas of experience/knowledge.

	Expert	3	Average	2	NA / Novice
I would rate my computer experience/knowledge.	0)	0)	0
I would rate my blogging experience/knowledge.	0	\mathbf{J}	5	\mathbf{J})
I would rate my microblogging experience/knowledge.	0	0	0	0	0

On the average, how much time do you spend per week on Twitter.com?

- J No time at all. I don't visit Twitter.com.
- J Less than one hour.
- 🥥 1 to less than 4 hours.
- 4 to less than 10 hours.
- Over 10 hours.

Prev Next

71%

a10 - Online survey demographics page

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a11.

Microblogging Search Tool Study

ons Page 1/2

The questions below all relate to the exercise that you completed a few moments ago. Please answer all the questions with that completed exercise in mind.

The following questions ask you to read the text prompts and then respond to each prompt by using the scales provided.



In the above scale:

- + 3 would mean : Extremely Satisfied
- + 2 would mean : Quite Satisfied
- + 1 would mean : Slightly Satisfied
- \sim 0 would mean : Neutral (Neither or Equally)
- 1 would mean : Slightly Unsatisfied
- 2 would mean : Quite Unsatisfied
- 3 would mean : Extremely Unsatisfied

When in doubt just go with your best guess.

Convenience of Access: (The ease or difficulty with which you were able to utilize the capability of the microblogging search tool to complete the search exercises.)

Using the search tool to perform the search exercises was ...

	Extremely (+3)	Quite (+2)	Slightly (+1)	Neutral	Slightly (-1)	Quite (-2)	Extremely (-3)
Convenient (+) or Inconvenient (-)	0	0	5	0	0	5	0
Good (+) or B ad (-)	0)	0	0	0))
Easy (+) or Difficult (-)	0	0	5	5	0))
Efficient (+) or Inefficient (-)))	0	0	0	5)
Satisfactory (+) or Unsatisfactory (-)	0	5)	5)	0	5

Accuracy: (The correctness of the output information.)

The accuracy of information displayed by the search tool in the search exercises was ...

Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
5	0	5)	0	5)
0))	5	0	5	5
)	0	0)	5	5)
0	0	5	5	0	5	5
)	5	0	5	0	5	0
	Extremely (+3)))))))))))))))))))	Extremely Quite (+3) (+2) 	Extremely Quite Slightly (+3) (+2) (+1) J J J J J J J J J J J J J J J J J J J J J J J J	Extremely Quite Slightly Neutral (+3) (+2) (+1) (0)	Extremely Quite Slightly Neutral Slightly (+3) (+2) (+1) (0) (-1)	Extremely Quite Slightly Neutral Slightly Quite (+3) (+2) (+1) (0) (-1) (-2)

Precision: (The variability of the output information from that which it purposes to measure.)

The precision of the information displayed by the search tool during the search exercises was ...

Neutral Slightly Quite Extrem	Neutral (0)	slightly (+1)	ely Quite) (+2)	Extremely	
(0) (-1) (-2) (-3)				(+3)	
JJJJJ	5	5	5	5	Sufficient (+) or Insufficient (-)
	\sim	0	5	0	Consistent (+) or Inconsistent (-)
c c c c	5)	5	0	High (+) or Low (-)
	\sim	0	5	0	Certain (+) or Uncertain (-)
i i i i)	5)	0	Satisfactory (+) or Unsatisfactory (-)
	c c c c	c c c c	c c c c	(((Consistent (+) or Inconsistent (-) High (+) or Low (-) Certain (+) or Uncertain (-) Satisfactory (+) or Unsatisfactory (-)

Reliability: (The consistency and dependability of the output information.)

The reliability of the information displayed by the search tool during the search exercises was ...

	Extremely	Quite (+2)	Slightly (+1)	Neutral (0)	Slightly (-1)	Quite (-2)	Extremely (-3)
	(+3)						
Consistent (+) or Inconsistent (-)	5	0	5	5)	5	5
High (+) or Low (-))	0	0	5	0	0	5
Superior (+) or Inferior (-)	0	0	5	5	5	5	5
Sufficient (+) or Insufficient (-)	0	0	0	5	0	0	5
Satisfactory (+) or Unsatisfactory (-)	0	0	5	5	5	5	5

Completeness:

(The comprehensiveness of the output information content.)

The completeness of the information display by the search tool during the search exercises was ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
Complete (+) or Incomplete (-)	0	5	5))	5)
Consistent (+) or Inconsistent (-)	5	5	5	5	5	5	5
Sufficient (+) or Insufficient (-)	5	5	5	5	5	5	0
Adequate (+) or Inadequate (-)	5	5	5	5	5	5	5
Satisfactory (+) or Unsatisfactory (-))	5	5	5	5)	5

Format of Output:

(The material design of the layout and display of the output contents.)

The format of the information displayed by the search tool during the search exercises was ...

Extremely (+3)	Quite (+2)	slightly (+1)	Neutral (0)	slightly (-1)	Quite (-2)	Extremely (-3)
0	5	5	5	5	0	5
)	0	5	5)	0	5
0	0	0	0)	0	0
5	5	5	5	5	5	0
	Extremely (+3)	Extremely Quite (+3) (+2) J J J J J J J J J J J J J J J J J J J J J J	Extremely Quite Slightly (+3) (+2) (+1)	Extremely Quite Slightly Neutral (+3) (+2) (+1) (0)	Extremely Quite Slightly Neutral Slightly (+3) (+2) (+1) (0) (-1)	Extremely Quite Slightly Neutral Slightly Quite (+3) (+2) (+1) (0) (-1) (-2)

Language: (The set of vocabulary, syntax, and grammatical rules used to interact with the microblogging search system.)

The language displayed by the search tool during the search exercises ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
Simple (+) or Complex (-))	5	5	5	5	5	5
Powerful (+) or Weak (-)	0	0	0	0	0)	0
Easy (+) or Difficult (-))	0	5	5	0	0	5
Easy-to-Use (+) or Hard-to-Use (-)	0	0	0	0	0	0	0
Satisfactory (+) or Unsatisfactory (-)	5	5	5	5	5	5	5

Prev Next

76%

a11.1 - Online survey satisfaction questions page 1

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Microblogging Search Tool Study

The questions below all relate to the exercise that you completed a few moments ago. Please answer all the questions with that completed exercise in mind.

The following questions ask you to read the text prompts and then respond to each prompt by using the scales provided.

The scales will look like the following:

$$(+3)$$
 Satisfied
 $(+3)$ Sati

- In the above scale:
- + 3 would mean : Extremely Satisfied
- + 2 would mean : Quite Satisfied
- + 1 would mean : Slightly Satisfied
- ~ 0 would mean : Neutral (Neither or Equally)
- 1 would mean : Slightly Unsatisfied
- 2 would mean : Quite Unsatisfied
- 3 would mean : Extremely Unsatisfied

When in doubt just go with your best guess.

Volume of Output:

(The amount of information conveyed to you from the search tool during the search exercise. This is expressed not only by the number of reports or outputs but also by the voluminousness of the output contents.)

The amount of the information displayed by the search tool during the search exericse was ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
Concise (+) or Redundant (-)	0	5	0)	0	5	5
Sufficient (+) or Insufficient (-)	0	5	0	5	0	5)
Necessary (+) or Unnecessary (-)	0	5	5))	5	5
Reasonable (+) or Unreasonable (-)	0	5	5	5	5)	5
Satisfactory (+) or Unsatisfactory (-)	5	5	5)	5	5)

Relevancy:

(The degree of congruence (sameness) between what you want or require and what is provided by the search during the search exercise.)

The relevancy of the information displayed by the search tool during the search exercise was ...

n uuring the s	earch exerci	se was				
Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
5	5	5	5	0	5	5
0	0	0)	0	0	5
5	0	0	0	5	5	5
0	0	5)	0	5)
5)	5)	5	5)
	Extremely (+3)	Extremely Quite (+3) (+2) (+3) (+2) (+3) (+2) (+3) (+2) (+3) (+2) (+3) (+2) (+3) (+2) (+3) (+2) (+2) (+2) (+3) (+2) (+2) (+2) (+2) (+2) (+2) (+2) (+2	Image the sector sector sector sector Slightly (+3) (+2) (+1)	Image for set of the text of text o	Image: Signed value Signed value Signed value Extremely Quite Slightly Neutral Slightly (+3) (+2) (+1) (0) (-1) Image: Im	Image und set to even user

Understanding of the Search Tool: (The degree of comprehension that you possess about the search tool provided.)

My understanding of the information displayed by the search tool during the search exercise was ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
High (+) or Low (-)	0	5	5)	0	5	5
Sufficient (+) or Insufficient (-)	0	0	5	5	0	0)
Complete (+) or Incomplete (-)))	5))	5	5
Easy (+) or Hard (-)	0	0	0	5	0	0	0
Satisfactory (+) or Unsatisfactory (-)))	5	5	5)	5

Perceived Utility:

(Your judgment about the considered usefulness of the microblogging tool provided.)

The usefulness of information displayed by the search tool during the search exercise was ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
High (+) <i>o</i> r Low (-)	0	5	5	5	5	5	5
Sufficient (+) or Insufficient (-)	0)	5	5	0)	0
Complete (+) or Incomplete (-)	0	5	5	5	5	5	5
Easy (+) or Hard (-)	0)	0	0	0	5	0
Satisfactory (+) or Unsatisfactory (-)	0)	5	5	5	5	5

Confidence in the Search Tool:

(Your feelings of assurance or certainty about the search tool provided for the task asked of you.)

My confidence in the information displayed by the search tool during the search exercise was ...

	Extremely (+3)	ly _{Quite}	Slightly (+1)	Neutral (0)	Slightly (-1)	Quite (-2)	Extremely (-3)
High (+) or Low (-)	0	5	5)	5	5	5
Strong (+) or Weak (-)	0	5	0	5	0	5	0
Definite (+) or Uncertain (-)	0	5	0	5	0	5	0
Good (+) or B ad (-)	0	0	0	0	0	5	0
Satisfactory (+) or Unsatisfactory (-)	5	5	5	5	5	5	5

Feeling of Control:

(Your awareness of the personal power or lack of power to regulate, direct or dominate execution of the search tool's perceived function.)

My feeling of control during the search exercise was ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
High (+) or Low (-)	0	5	5	5	5	5	5
Sufficient (+) or Insufficient (-)	0	5)))))
Precise (+) or Vague (-))	5	5	5	5)	5
Strong (+) or Weak (-)	0	5))	0)	0
Satisfactory (+) or Unsatisfactory (-))	5	5	5	5	5	5

Flexibility of the Search Tool:

(The capacity of the search tool to change or to adjust in response to new conditions, demands, or circumstances.)

The flexibility of the search tool during the search exercise was ...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
Flexible (+) or Rigid (-)	0	5	5	5	5	5	5
Versatile (+) or Limited (-)	0	0	5	0	0	0	0
Sufficient (+) or Insufficient (-)	0	5	5	5	5	5	5
High (+) or Low (-)	0	0	0	0	0)	0
Satisfactory (+) or Unsatisfactory (-)	0	5	5	5	5	5	5

Prev Next

81%

a11.2 - Online survey satisfaction questions page 2

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a12.

Microblogging Search Tool Study

Twitter Microblogging Search System Questions

The following questions deal with the Twitter exercise you completed a few moments ago. Please rate as best you can your feelings (from Strongly Agree to Strongly Disagree) in reference to the sentences provided.

State your level of agree with the following statements:

	Strongly Agree	Agree	Som ewhat Agree	Neutral	Som ewhat Disagree	Disagree	Strongly Disagree
I would recommend Twitter to friends after having participated in this experiment.	0	0	0	5	0	J	5
The Twitter microblog I chose focused entirely on the search term I was provided.	J	5	0	J	5	5	5
Finding a correctly focused Twitter microblog using the search term provided was a lengthy process.	0	0	U.	J	0	5	U
Using Twitter search in this study was a confusing process.	0)	0)	5)	5
I would use Twitter again to find information again after having participated in this experiment.	0)	0)	0	0)
I found using Twitter in this exercise difficult.	0	0	0	0	0)	0
I felt com for table finding a correctly focused Twitter microblog using the system provided to me.	0)	U.)	0	J)
I believe I could choose other appropriately focused Twitter microblogs if provided a new search term.	J	5	U)	J	0	J	J
Finding a correctly focused Twitter microblog using the search term provided was a difficult process.	0	U	J	U	0	U	U

Prev Next

86%

a12 - Online survey satisfaction questions page 3

a13.

Microblogging Search Tool Study

Word Clouds?

* Did your twitter results include word douds:

(Word Clouds look something like the example below:)

hahaa birthday reply happyknow love	DNNA chicago			
) Yes No				
				90%
		P	rev Next	

a13 - Word Cloud group divider question page

a14.

Microblogging Search Tool Study

Word Cloud Questions

The following question asks you to read the text prompt and then respond to the prompt by using the scales provided.

The scales will look like the following:



- + 2 would mean : Quite Satisfied
- + 1 would mean : Slightly Satisfied
- \sim 0 would mean : Neutral (Neither or Equally)
- 1 would mean : Slightly Unsatisfied
- 2 would mean : Quite Unsatisfied
- 3 would mean : Extremely Unsatisfied

When in doubt just go with your best guess.

Job Effects:

(The changes in job performances that are ascertained by you as resulting from the inclusion of word clouds in the search tool during the search exercise.)

The effects of the word clouds while using the search tool during the search exercise were ...

		Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely
		(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)
Liberating (+) or Inhibiting ((-)	0	5	5	5	5	5	5
Significant (+) or Insignifica	nt (-))	0	5	0	0	0	0
Good (+) or B ad (-)		0	0)	5	5	0)
Valuable (+) or Worthless (-)	0	0)	0	0	0	0
Satisfactory (+) or Unsatisfa	ctory (-)	0	0	5	5	5	0)
Word Cloud Stimulation Ra	ating:							
	Stimulating	2		3		4	I	Dull
Overall reaction to word douds.	5)		5		5)
Word Cloud Overall Rating	:							
	Wonderful	2		3		4	Te	rrible
Overall reaction to word douds.	0	5		5		5		5

95%

Word Cloud Satisfaction Ratio	ng:				
	Satisfying	2	3	4	Frustrating
Overall reaction to word douds.)	0	0)	0
Please provide a rating for th	e following areas of o	experience/knowle م	dge.	2	Novice
I would rate my word cloud experience/knowledge.	J	0	J	Ĵ	J

How satisfied are you with the world clouds affect on the microblogging search system:

	Extremely Positive	Quite Positive	Slightly Positive	Neither or Equally	Slightly Negative	Quite Negative	Extremely Negative
Satisfaction)	0	0	0	5)	5

State your level of agree with the following statements:

	Strongly Agree	Agree	Som ewhat Agree	Neutral	Som ewhat Disagree	Disagree	Strongly Disagree
I believe that word clouds are a feature that should be incorporated into Twitter search pages.	J	0	0	J	J	U	U
The word clouds made my enjoyment of twitter greater.)	0	\sim)))	5
I thought that the word douds were visually attractive.	5	\odot	0	5	0	5	5
Without the word clouds I would feel lost when trying to find a focused Twitter microblog.	J	5	J	J	J	J	J
I think the word clouds were unnecessary in order to find a correctly focused Twitter microblog.	J	0	J	J	J	U	U
The word clouds helped me find a correctly focused Twitter microblog.	J	0	J	J	J	J	J

Prev Next

a14 - Online survey word cloud satisfaction page

a15.

Microblogging Search Tool Study

Completed - Thanks! Inank you for taking the time complete this research survey. If you have additional comments please leave them below. Image: State of the distribution of the distributication of the distredistribution of the distribution of the distr

a15 - Online survey completion and comments page

.

a16.

Instructions:

1. Please click on one of the following seach terms.

You will then be presented with the search results of that term on Twitter.com.

Twitter is a catalogue of microblogs.

Remember you will be asked to click on the microblog you believe <u>most focuses</u> on the term you choose below after the following search page.

Britney Spears
<u>Green Party</u>
Facebook
<u>Obama</u>
<u>CBC</u>
<u>Palm Treo</u>

a16 - Online search exercise page 1

a17.

Instructions:

1. Please click the picture next to the microblog post you think would \boldsymbol{best} focus on the current search term.

2. Take a minute to review the posts on the microblog you clicked on. Check to see how well the author's posts focused on the search term you picked. When completed please close the browser window to return to the rest of the survey.

	Share and discover what's happening right now, anywhere in the world.	
obama	Search	
Search	Results for obama	
	GetsGreased MSM ask Obama : What does your Green advisor Van Jones intend when he says, "we're going to change the whole system"? #tcot	
P	DeadMansGun OBAMA wants to level the playing field with income redistribution and punishment to the achievers of society. HEALTH CARE NRA NPR CBS NBC	
o_0	Jgean88 Dear liberals & obama supporters,I was wondering,can I borrow \$2trillion?I promise that me,and generations after me,will pay it backI	
WSJ U.S. Politics	WSJPolitics Obama Sets Fast Fund-Raising Pace http://bit.ly/uh0Oe	
	desertgardens Obama and Stealth Reparations http://tinyurl.com /yjn77uh	
Standard	weeklystandard Iran Hardliners Consolidate Control: As President Obama's September deadline for Iran to conduct negotiations on http://snipurl.com/rix8s	

a17 - Online search exercise with No clouds page 2

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Instructions:

1. Please click the picture next to the microblog post you think would \boldsymbol{best} focus on the current search term.

2. Take a minute to review the posts on the microblog you clicked on. Check to see how well the author's posts focused on the search term you picked. When completed please close the browser window to return to the rest of the survey.

obama	e are saying about	
Search	Results for obama	Author's Word Clou
	DeadMansGun OBAMA wants to level the playing field with income redistribution and punishment to the achievers of society. HEALTH CARE NRA NPR CBS NBC	heälthhealthča care
	desertgardens Obama and Stealth Reparations http://tinyurl.com/yjn77uh	blog posted pdsuz wordpress obama wp retirement
WSJ U.S. Politics	WSJPolitics Obama Sets Fast Fund-Raising Pace http://bit.ly/uh0Oe	new heats senate Dealer Obama nutes house "gopplan"
o_0	Jgean88 Dear liberals & obama supporters,I was wondering,can I borrow \$2trillion?I promise that me,and generations after me,will pay it back!	bird pay 2trillocar 2trillocar liberalspromise room hotel generation hell
	GetsGreased MSM ask Obama : What does your Green advisor Van Jones intend when he says, "we're going to change the whole system"? #tcot	# tcot
Stendard	weeklystandard Iran Hardliners Consolidate Control. As President Obama 's Sentember deadline for Iran to	sniñürl

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Instructions:

1. Please click the picture next to the microblog post you think would ${\bf best}$ focus on the current search term.

2. Take a minute to review the posts on the microblog you clicked on. Check to see how well the author's posts focused on the search term you picked. When completed please close the browser window to return to the rest of the survey.

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GMAC Asking for 3rd Infusion of Taxpayer Cash: http://wp.me /pDSUz-c2 6:15 PM Oct 28th from WordPress.com						
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Byron York: Obama Moves America to the Right: http://wp.me /pDSUz-b5 10:50 PM Oct 26th from WordPress.com						
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Seems Our President Likes Golf: http://wp.me/pDSUz-aC 10:46 AM Oct 26th from WordPress.com						
Walter Williams - American Idea: http://wp.me/pDSUz-az 2:22 PM Oct 25th from WordPress.com						
Charles Krauthammer - White House Tactics Go Too Far. http://wp.me/pDSUz-av 9.05 PM Oct 23rd from WordPress.com						
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