Size Judgment and Comparison in Tag Clouds

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ABSTRACT

Tag clouds can be used for a variety of purposes, like providing a high-level understanding of a document. It is still unclear how users perceive the size of the words in tag clouds and how they make their judgments of the size of words. In this poster, we look at how users estimate the relative sizes of words given different characteristics. We studied the influence of decorations like filled areas, boxes, and shadows to determine whether they would influence the perceived size. Another parameter we tested was the appearance of words (i.e. by choosing words with and without ascenders and descenders). We found significant effects from all of those parameters, which suggests that designers of tag clouds need to be aware of the influence of design choices on the perceived data.

1 INTRODUCTION

Tag clouds are visual presentations of the word content of a text where the frequency of each word is represented with a certain feature such as font size. However, it is still unclear how the words in tag clouds are perceived by users. That rises many questions such as: How do users judge the size of words in a tag cloud? What about if the size of the words was larger and will that affect the users' judgment? What about if we add decorations to the words? Will these decorations drag the attention of the user and will there be a significant effect? Since the size is really important to convey the information in tag clouds, and to the best of our knowledge we did not find research on the relative size judgment in tag clouds, we study the influence of different parameters on how users make judgments of the size of the words on tag clouds. We are focused on the visual features of tag clouds without including the effect of the semantics.

2 RELATED WORK

Our research is inspired by the idea of studying the visual features in tag clouds. Bateman, *et al* found out the most visually important features to the user of the tag clouds are font size, font weight, saturation and color [5]. In similar, yet a different vein Halvey and Keane evaluated the use of tag presentation techniques, the purpose of which was to investigate how alphabetization, position of the tag and using larger fonts can be utilized when presenting tags [6]. According to the results tag clouds took the longest time to complete. Less time was associated with tasks in alphabetized lists and also with larger font size. The two studies suggest the importance of studying the relative sizes of words in tag clouds given different characteristics.

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Studying the visual features of tag clouds is also important in designing and evaluating tag clouds. For instance, Rivadeneira, *et al* described two studies to evaluate how effective tag clouds can be for different tasks including: searching, browsing, impression formation and recognition [7]. Features that can be used to construct tag clouds can be text features and word placement. The authors found that the recall of the words of larger size was higher than that for words of smaller sizes. Furthermore, the recall of the words in the upper left portion was significantly higher than the recall of the words in the other portions. That is an indication that the word size and position are important factors in users' perception. Based on empirical backgrounds, it seems important to study the judgment of size and in this research, we look at the interactions of design elements by using complex factorial design.

3 DESIGN DESCRIPTION

In this experiment, we are interested in how users perceive the size of the words without including any effect of the semantics. Since the effect of semantics can exist if we use English words, we used words from *Lorem Ipsum*, which is a modified piece of Latin text commonly used as filler in layout designs [2]. Latin text is assumed to be unfamiliar to the vast majority of readers, while still retaining roughly the word lengths and letter frequencies found in English. Using words from this sample, as well as nonsense words from other sources [4, 3], ensured that users would focus on the sizes of the words themselves and not the semantics.

We conducted an experiment of 4 independent and one dependent variables. The independent variables are: experiment type, appearance, decoration, and size; below is an explanation of each:

Experiment type: It is two levels where the two words to be compared appear by themselves (level 1) and along with other words in a tag cloud (level 2).

Appearance: This independent variable has three levels

- Neutral: Pair of words with no ascending and descending letters (soom vs. zaum)
- Narrow: Pair of words with the same number of letters with different sizes (louilizings vs. sidespawing)
- Hybrid: Pair of words words that have the same number of letters including the same number of ascending and descending letters (chadge vs. aphing)

Decoration: This independent variable has four levels

- No decoration around words
- Boxes around words
- Filled Areas with no borders
- Shadow around words

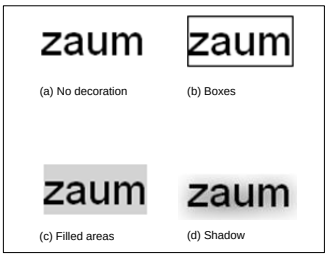

Figure 1: Decorations used in the study: (a) none, (b) boxes, (c) filled areas, (d) shadow

Size: This independent variable has four levels

- Pair of words with font sizes 12 vs. 18
- Pair of words with font sizes 12 vs. 24
- Pair of words with font sizes 12 vs. 30
- Pair of words with font sizes 12 vs. 36

Users are asked to judge how much one word is bigger than another. The dependent variable was the users' judgment of the relative size (Figure 2 is an example of one screen).

Figure 2: Example of one screen

4 Results

We collected data from 65 users using Amazon's Mechanical Turk [1]. We did run 2x3x4x4 repeated measures ANOVA test. There was a significant effect between appearance and size, $F(6,366) = 5.116$, $p < 0.001$, $\eta^2 = 0.077$ and between decoration and size, $F(9,549) = 2.162$, $p = 0.023$, $\eta^2 = 0.034$. In Figures 3 and 4, the blue line shows the veridical (non-distorted) perception and we can clearly see that participants over judged the relative sizes of words. In both graphs, we can also see that as the relative size gets bigger, the perceptual bias increases. In Figure 3, we can also see that the relative font size judgment was influenced when the two words to be compared varied in size. Participants judged these relative sizes as bigger indicating that the appearances of some fonts tend to increase the perceptual bias.

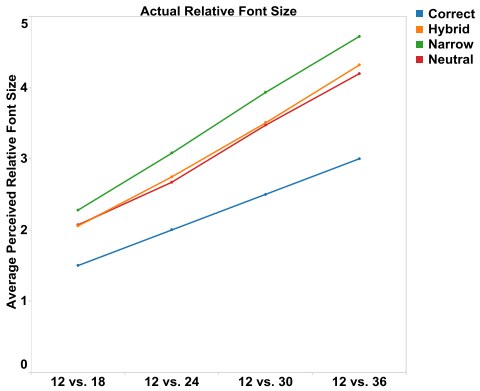

Figure 3: Relationship between font appearance and perceived relative size

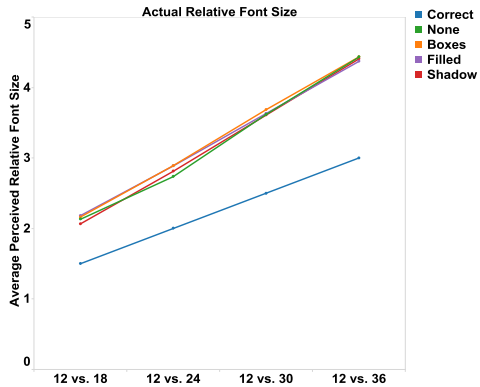

Figure 4: relationship between decoration and perceived relative size

5 Conclusion

This work serves as a basis on how the appearance of the words and the decorations can bias the judgment of the relative font size in tag clouds. Based on the results, we can conclude that these design elements do influence judgments of the relative sizes of words. The significance of this work is that it focuses on the size as the most visually influential feature in a tag cloud which conveys the information and how the relative size judgment is affected if different design elements are used. The findings here can be used to further research on how to apply them in the design of tag clouds.

References

[1] Amazon mechanical turk. http://mturk.com/, November 2011.

[2] Lorem ipsum. http://www.lipsum.com/, May 2011.

[3] Non-sense words. http://www.soybomb.com/tricks/words/, May 2011.

[4] Nonsense words for use in training phonemic awareness. http://www.speech-language-development.com/nonsense-words.html, May 2011.

[5] S. Bateman, C. Gutwin, and M. Nacenta. Seeing things in the clouds: the effect of visual features on tag cloud selections. In *Proceedings of the nineteenth ACM conference on Hypertext and hypermedia*, HT '08, pages 193–202, New York, NY, USA, 2008. ACM.

[6] M. J. Halvey and M. T. Keane. An assessment of tag presentation techniques. In *Proceedings of the 16th international conference on World Wide Web*, WWW '07, pages 1313–1314, New York, NY, USA, 2007. ACM.

[7] A. W. Rivadeneira, D. M. Gruen, M. J. Muller, and D. R. Millen. Getting our head in the clouds: toward evaluation studies of tagclouds. In *Proceedings of the SIGCHI conference on Human factors in computing systems*, CHI '07, pages 995–998, New York, NY, USA, 2007. ACM.