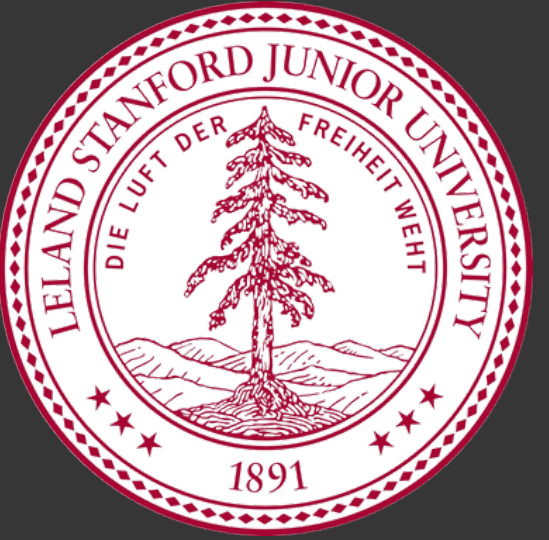


# AnnoDiver: Applying Visual Analytics on Social Annotations to Facilitate Balanced Research Paper Discourse

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## Introduction

Prior work has revealed two issues in the use of social annotation as a learning tool for research paper discussion:

1. It can be difficult to navigate a large volume of social annotations on a research paper
2. Establishing discussions with balanced contributions and diverse viewpoints remains a challenge

To address these issues, we designed a prototype social annotation tool that displays interactive visualizations of annotation threads, and tested the following hypotheses in a user study:

- H1.** The interactive visualizations of the comments will lead learners to explore more annotation threads  
**H2.** Displaying the total counts of comments per contribution category will motivate learners to leave comments in less-populated categories

## System Design & Features

The screenshot displays a research paper with social annotations. A 'Keywords' section lists terms like 'sounds', 'senses', 'homes', etc. A 'Social Annotation' section shows a comment by 'Kevin' with a sentiment score of +0.29. A 'ThreadView' section shows a list of comments, including one by 'Miroslav' with a sentiment score of 0.00. A 'Comment Category Chart' shows the distribution of comments across four categories: support, self-reflection, alternative, and disagreement.

### Key Term Frequency List

- A quickly digestible synthesis of peer commentary
- Navigable feature allows the user to explore and locate comments of interest

### Sentiment Axis

- Displays the distribution of the sentiments conveyed in the paper annotation comments (user's own are in blue)
- Allows the user to navigate annotations by sentiment

### Comment Category Chart

- Interactive bar chart that displays the comment counts in each of the four contribution categories
- The user's own contributions are distinguished in solid color to help the user to keep track and compare

## Evaluation

We conducted a user study with 8 participants, who were separated into a control group (no visualization features) and an experimental group.

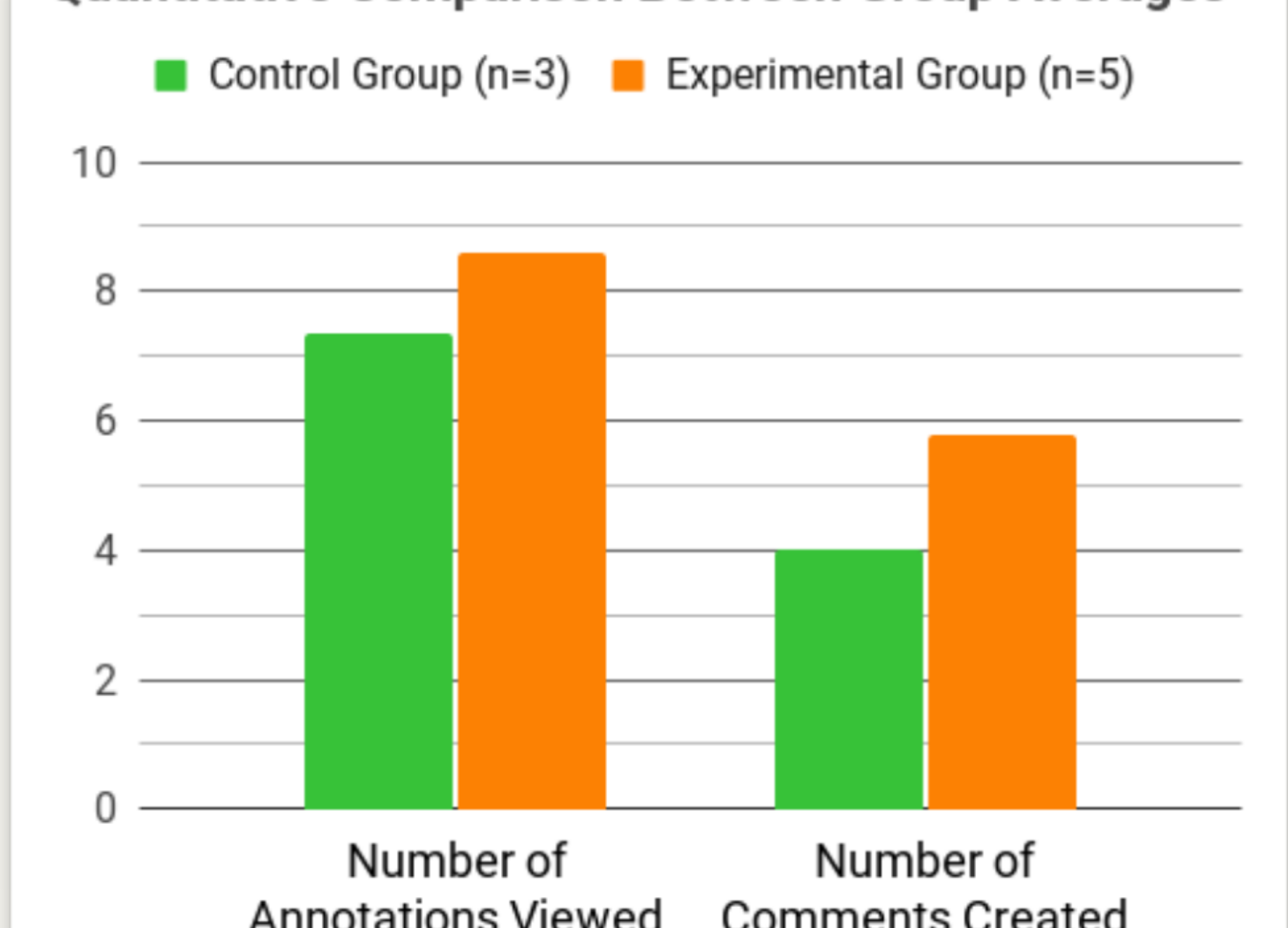
During 45-minute Zoom sessions, each participant was asked to complete two tasks as they read a short paper that we seeded with 25 comments:

1. Create at least three comments
2. Find three different viewpoints presented by the paper or discussed in the social annotations

For H1, our quantitative results indicated some promise in that **the experimental group tended to explore more annotations threads\***. We found no support for H2, although the visualizations seemed to have led to an **increase in the creation of comments\***.

\*not statistically significant

Quantitative Comparison Between Group Averages



## Acknowledgments

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