# OmniWedges: Improved Radar-Based Audience Selection for Social Networks

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**Abstract.** Selecting the right audience for Facebook posts is a task that users often skip, resulting in unwanted information disclosure or avoidance of sharing sensitive posts. We present OmniWedges, a user interface designed to allow users of online social networks to make meaningful decisions on who to share their posts with. Our study results also show that with all Facebook friends, the error rate can be significantly reduced compared to the Facebook interface. In an interview, we were also able to spot a change in posting behavior and frequency with our interface.

## 1 Introduction

The current designs of the social network sites require users to scroll through their endless friend lists of several hundreds or thousands of users, or even to remember which of them they want to include or exclude from their post. Therefore most posts are shared with all of the user's friends, even though this is often not the best idea [3]. Radar interfaces have been shown to provide a better overview on the privacy settings [2] which furthermore engages users in adjusting their privacy settings more regularly [2]. Nevertheless, radar interfaces often suffer a space problem, as the available space inside the radar is limited, in contrast to a list, which can be extended endlessly using scrollbars [6]. Especially when it comes to selecting the audience for social network posts, the number of potential recipients, which is the friend list of the user, can contain up to thousands of users. In our work, we took this use-case as an example to find out *How radar interfaces can be enhanced to be able to display a large amount of data items* and *Whether a radar interface is a suitable method to define the post audience for social networks*.

Our interface *"OmniWedges"* uses a radar metaphor for aligning the users' friends around the user, based on their interpersonal distance and friend groups they belong to. The audience for a post can be chosen by selecting single or multiple areas inside the radar or subsequently adding single persons. OmniWedges is highly scalable and offers several functionalities to enable displaying *all* of a user's hundreds or thousands of friends while still providing an overview of who is selected and who is not. In a comparative user study with the Facebook custom privacy setting interface as a control condition, we found that OmniWedges is able to reduce the amount of errors made with *all* of the users' Facebook friends.

## 2 Related Work

Despite the existence of a multitude of ways to edit and adapt privacy settings on mobile social networking platforms, social network users often do not use privacy settings at all [3]. In theory, it is possible to have different privacy settings for each friend. However, it is quite cumbersome to do this and it does not scale with respect to usual numbers of friends in a social network [3]. Social network providers tried to tackle this problem by introducing lists or "circles" of friends. This means that users are enabled to create lists containing subsets of their online friends, and then share their posts only with the people in these lists. Although this technique is very powerful, creating these lists manually comes at a significantly increased burden for the users [5]. Radar interfaces have been proven to be highly effective for such tasks, like getting an overview on data shared inside an intelligent retail store like Amazon Go [7]. In our work, we try to adapt this metaphor on the domain of social network audience selection, which introduces one major obstacle, namely the high amount of data items (firends) to display in the limited space of the UI.

## 3 OmniWedges

OmniWedges offers a graphical user interface, which allows audience selection based on interpersonal distance, for different groups. The interface contains the profile picture for each social network friend, later denoted as "friend picture". Each of the user's friend groups is represented by a wedge in the UI. The friend pictures are aligned around the center according to the *tie strength* between the friend and the user. The current implementation of OmniWedges uses the tie strength calculation and friend groups offered by the Facebook website. To reduce side effects, we let the participants review and adapt the friend lists and tie strength ordering in the experiment. Initially, no friends are selected. The user clicks and drags from the center of a wedge to the outer rim to select a subset of friends as recipients for a post. The selected area is colored grayish. All friends which are inside the selected area of the wedge (from here on called the "wedge area") will receive the post. The number of selected friends and a list of the ten closest friends that are selected is displayed below the graph. In the bottom left corner, there are two buttons for selecting all friends and for resetting the selection. All selection possibilities of OmniWedges are shown in Figure 1.

Radar interfaces often suffer from the limited space available in the radar UI, which limits the number of displayble friends in our case. We therefore implemented several functionalities in order to reduce the problem of limited space within our UI: Only a small subset of the Facebook friends are real friends that are of importance for recipient selection [1]. We therefore decrease the size of the friend images with decreasing tie strength, so that the closest friends gain the most importance (**"Incremental picture size"**). Using a double click, it is possible to zoom into and out of a certain area of the wedge to have a better overview, especially in crowded areas (**"Zooming"**). Based on the number of friends inside a wedge, OmniWedges selects some of the friend images (every second, third, fourth...) as lighthouse images that can be used as orientation points for the selection. All other friend images are shrunk to a small dot to avoid crowding (**"lighthouse design"**).

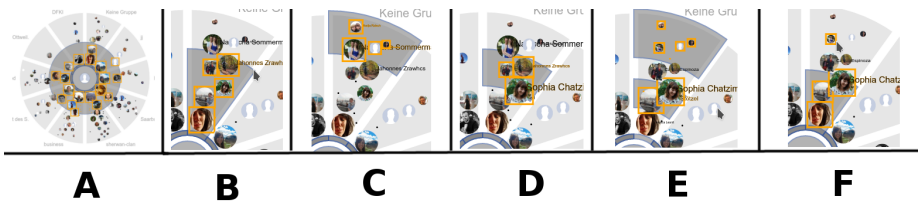


**Fig. 1.** Actions for the different use cases in OmniWedges: Select all friends up to a given tie strength (A), select friends of one or more friend groups up to a given tie strength (B), exclude friends up to a given tie strength (C) and (D), select multiple areas inside a friend group (E) and Select/deselect single friends (F)

## 4 User study

The study was performed with 20 participants using a within-subject design: Half of the subjects started with the Facebook interface and continued with OmniWedges, and vice versa for the other half of the subjects. Before the study, users had to first organize their friends into friend groups, and to sort them with ascending tie strength. At the experiment, the user was given 12 different tasks to solve for each interface. The first six tasks were of an *explicit* nature, meaning we explicitly stated for example *"select the 20 closest friends"*. For the remaining six tasks, we gave the subjects explicit posts with a sensitive nature like *"Please imagine you want to share pictures of a party that caused you to miss your family's Thanksgiving event"*. After each condition, the user was given a list of all friends for each task together with a "+" if the friend was selected as a recipient or a "-" if not. The user then had to go through the list and identify friends that were included by mistake (false positive) or mistakenly not inluded as a recipient (false negative). The users had to fill in an AttrakDiff [4] usability questionnaire after each condition, and were given a five-minute break to rest and recover. The experiment closed with a semi-structured interview, where we tried to find out whether they would use OmniWedges on Facebook, and whether their posting behavior might change.

The number of Facebook friends of the participants ranged from 53 to 1260 (mean 437). As the amount is highly variable, we normalized the amount of false positives and negatives by dividing them by the number of friendlist entries prior to the analysis. We performed a 2(condition) x 2(explicit or implicit task) x 2(false positive or false negative) ANOVA to compare the errors made throughout the study. Taking only the interface as an effect, the results indicate that significantly fewer errors are made using OmniWedges ($F = 5.57$, $p = 0.031$, $M_{Wedges} = 0.0076$, $M_{Facebook} = 0.020$). The type of task, explicit or implicit, did not have any significant effect on the error rate($F = 0.677$, $p = 0.423$). OmniWedges outperforms its Facebook counterpart in terms of attractiveness ($T = 6.115, p < 0.001$, $M_{Wedges} = 5.37, M_{Facebook} = 3.35$) as well as the hedonic quality ($T_{HQ-I} = 4.93, p_{HQ-I} < 0.001$, $M_{HQ-I-Wedges} = 5.09, M_{HQ-I-Facebook} = 3.66$; $T_{HQ-S} = 7.83, p_{HQ-S} < 0.001$, $M_{HQ-S-Wedges} = 5.26, M_{HQ-S-Facebook} = 3.17$) with high significance, assuring a better user experience. There is also a tendency for a higher pragmatic quality using OmniWedges ($T = 1.83, p = 0.082, M_{Wedges} = 4.75, M_{Facebook} =$ 4.06 ), although we could not prove a significance here. 50% of the users stated they

preferred OmniWedges with an additional search field for finding specific friends, 33% preferred a combination of OmniWedges and the Facebook interface, and 8.3% wished to keep only OmniWedges or the Facebook interface, respectively. 85.7% stated they would change their posting behavior when using OmniWedges. Of those who would, 88.9% would do more narrowcasting, and the remaining 11.1% would post more sensitive posts.

## 5 Discussion and outlook

In contrast to earlier work [6], we introduced several UI mechanisms that allow the display of all of a user's friends inside our radar interface. The results of the study show that, using these improvements, the concept of a radar metaphor can also be used to display a large number of friends while still reducing the amount of errors made during the selection process. According to the interview results, a large majority of users would replace the current audience selection method on Facebook with a version of OmniWedges. The interview answers also indicate a change in users' mental model: Most users tend to do more narrowcasting, or publish more sensitive posts. This may be caused by a different awareness of the post audience: Rather than always displaying only a small portion of all friends at once in a scrollable list, the radar interface displays *all* of a user's friends at once, allowing them to have an overview of the large number of friends that would receive the post, possibly resulting in a higher trust in the UI. Therefore, users begin to think about whether this large audience is really the desired audience for their post, resulting in a more rigorous limitation of the post audience with OmniWedges. As a first step in future work, we would like to integrate our approach into a social network website and evaluate the usage frequency of our tool against the standard audience selection functionality, especially when using the already existing friend groups (created either automatically or by the user) and the tie strength calcluation offered by the social network provider.

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# OmniWedges: Improved Radar-Based Audience Selection for Facebook

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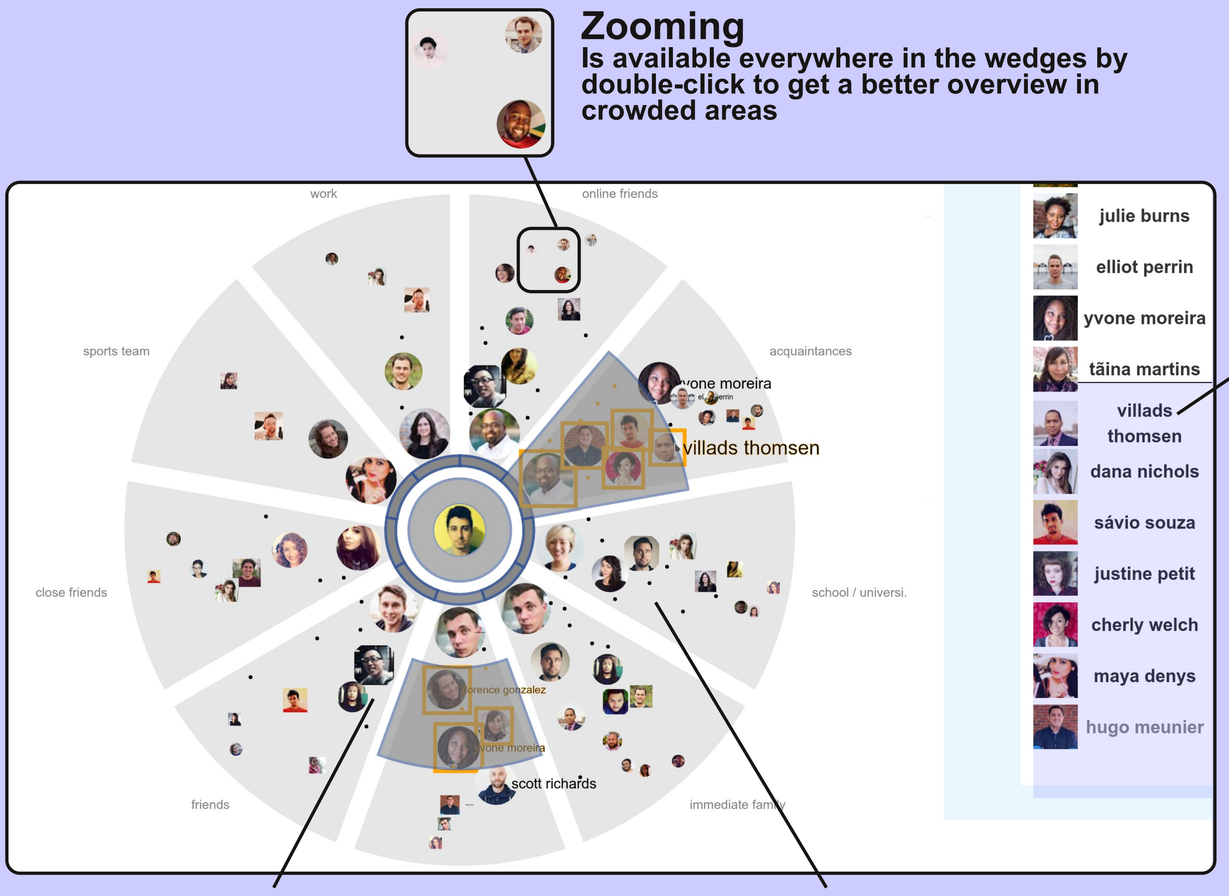
## Motivation

Selecting the correct recipients and doing the privacy settings for a post on social networks is surely not one of users' favorite tasks. The current designs of the social network sites require the users to scroll through their endless friend lists of several hundreds or thousands of users, or even to remember which of them they want to include or exclude from their post. Therefore most posts are shared with all of the user's friends, although this is often not the best idea. Radar interfaces have been shown to provide a better overview on the privacy settings  which furthermore engages users to update their privacy settings more regularly.

## OmniWedges

Our interface "OmniWedges" uses a radar metaphor for aligning the users' friends around the user, based on their interpersonal distance and friend groups they belong to. The audience for a post can be chosen by selecting single or multiple areas inside the radar or subsequently adding single persons. OmniWedges offers several functionalities to allow it to to display all of a user's hundreds or thousands of friends while still providing an overview of who is selected and who is not.




**Zooming**
**Is available everywhere in the wedges by double-click to get a better overview in crowded areas**

**Overview bar**
**Shows which friends are currently being selected, and which are not**

**Incremental picture size**
**Draws attention to the closest friends, while fading out distant acquaintances**

**Lighthouse design**
**Some friend images are displayed for orientation, others are shrunk to dots**

## User study

- 20 participants, within-subject design

- 53 to 1260 Facebook friends (mean 437)

- 2 conditions: OmniWedges, Facebook

- 12 different tasks for each interface

  - 6 explicit tasks
    *"select all university friends"*

  - 6 implicit tasks
    *"Please imagine you want to share pictures of a party that caused you to miss your family's Thanksgiving event"*

- AttrakDiff questionnaire after each condition

- Semi-structured interview about usage likelihood, changes in posting behavior, missing functionalities

## Results

- Significantly **fewer errors** ($F=5.57$, $p= 0.031$, $M_{Wedges}=0.0076$, $M_{FB}=0.02$)
- No effect on task type ($F=0.677$, $p=0.423$)
- **Type of error independent** from interface ($F=0.001$, $p=0.98$)

- Significantly **better hedonic quality and attractiveness**
  $T_{HQ\text{-}I} = 4.93$, $p< 0.001$, $M_{Wedges}=5.09$, $M_{FB}=3.66$
  $T_{HQ\text{-}S} = 7.83$, $p< 0.001$, $M_{Wedges}=5.26$, $M_{FB}=3.17$
  $T_{ATT} = 6.12$, $p< 0.001$, $M_{Wedges}=5.37$, $M_{FB}=3.35$

- Trend for better pragmatic quality ($F=1.83$, $p= 0.082$, $M_{Wedges}=4.75$, $M_{FB}=4.06$)

- 85.7 % would use OmniWedges (61% only for narrowcasting)
- 85.7 % would change posting behavior
  → 88.9% do more narrowcasting, 11.1% post more critical content
- 42.9% would post more frequently using OmniWedges, 38% would not

- Favorite interface:
  - **OmniWedges with search functionality** (50%)
  - Combination of OmniWedges and Facebook (33%)

## Lessons learned & future work

OmniWedges outperformed the Facebook interface in terms of error rates as well as attractiveness and user experience. There is also a tendency toward better usability, although we could not prove a significance with our small test set. In an interview, participants stated that they would change their posting behavior with OmniWedges, as the interface leads them to select a smaller amount of friends rather than all of them. Some even claimed to disclose more critical information as they feel more secure with OmniWedges. Most participants stated that there would be willing to use OmniWedges if it was available on Facebook, although they mentioned the need for a search functionality or a combination with the Facebook UI for the perfect interface, which we would like to elaborate up on in future work.