Lunchocracy: Improving Eating Dynamics in the Workplace Using a Bot-Based Anonymous Voting System

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Abstract
Previous studies have shown that when individuals join groups for lunch, they tend to conform to the decision of the group. As result, people do not always have the chance to pick the food they wish for, which in turn may have negative consequences, such as not abiding to healthy diets. To address this problem, we created Lunchocracy, an anonymous decision support tool for lunch spots in a workplace based on feedback from a focus group with 7 participants. The tool implements a conversational skype-bot, Lunchbot, that allows users to express interest in joining lunch and to vote for diners to eat at. We deployed the tool for four weeks with 14 participants from the same university department. Post-interviews with 5 participants revealed an overall satisfaction with Lunchocracy, in particular due to it structuring the lunch decision-making and saving time. We discuss how the use of Lunchocracy can positively influence the group's eating dynamics.

Author Keywords
Decision Making, Food Choice, Workplace

ACM Classification Keywords
H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous

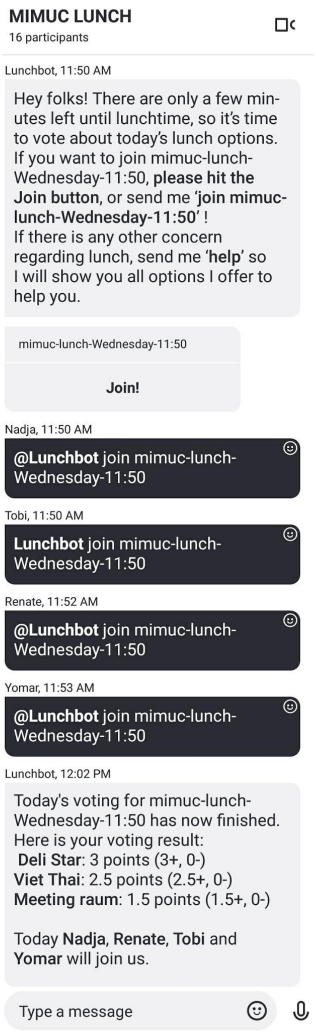

Figure 1: Lunchbot asks users if they will join lunch, and then allows them to vote for a diner.

Introduction

Previous research established the influence of many social factors on food choice decisions [9, 10]. In particular, eating in groups results in individuals conforming to group choices [1], which might in turn hinder personal food choices and make it difficult to abide to healthy diets [3, 4].

We ease social pressure associated with food choice in work groups through conceptualizing and implementing a bot-based voting system (Figure 1) that collects food preferences anonymously before a group goes for lunch. The bot triggers a "lunch event" every day, and allows all participants to (1) propose diners to eat at, (2) upvote diners they would like to eat at, and (3) downvote diners they do not wish to eat at. Furthermore, we included a scoring system that would reduce the "tyranny of the majority" effect [7] by giving more weight to the votes of those who ended up not having the food choice they wished for in previous days. Results indicate that the use of anonymous voting systems for food choices reduces the associated social pressure, allows for better consideration of involved individuals, and saves decision-making time.

The contribution of this work is twofold. We first present the concept development emerged from a focus group and the following implementation of a novel bot-based system for organizing lunch decision making via anonymous voting. Second, we report on qualitative insights from a 4-weeks field study with 14 participants, as well as interviews with 5 participants. The positive aspects associated with our tool pave the way for individuals to make healthier eating decisions, and induce pleasant group experiences.

Background and Related Work

Food decision making is influenced by factors that vary across and within individuals, depending on timing and context, cultural, social and personal differences as well as an own personal system that balances all previous factors [9]. Previous work in HCI explored persuasive technologies that support an individual's decision process of, for example, overcoming unhealthy cravings [6]. Svensson et al. [11] showed an affirmative influence others have on user's recipe choice when being navigated through a recipe recommender system by the means of other user's actions. However, there is still a lack of systems that support food decision making in a greater scope than individual or interpersonal in a familiar environment [5]. In our work, we aim to fill this gap by focusing on group's eating dynamics.

During decision-making in groups, group members tend to fall under social influence either because of compliance or conformity [2]. Group decision support systems (GDSS) aim, among others, at reducing these psychological phenomena [8]. For example, BallotShare [12] is a system for voting in the workplace. Studying it revealed that group members perceived their ability to succeed in their goals as higher. Unlike BallotShare, our tool is optimized for the particular use case of lunch decision making with the aim to support healthy eating dynamics.

Concept Development

Before developing a tool that addresses the issues related to workgroup eating dynamics, it was first essential to understand the eating habits of the group, and identify the problems they face. Therefore, we conducted a one-hour focus group with 7 participants (3 females) who work at the same university department and regularly (1) go to lunch as a group, and (2) engage in lunch decisions together.

Focus Group Procedure

We first wanted to understand the group's lunch routine, and the challenges the group encounters when deciding the

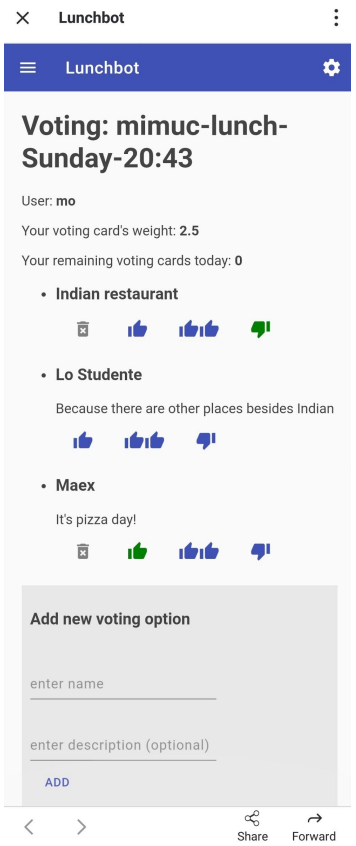

Figure 2: Once a user checks into a lunch session, the bot sends them a link to the voting page, in which they can (1) add voting options, (2) upvote, and (3) downvote options.

lunch place. In the second part of the focus group, we presented the idea of a voting tool that allows users to express their lunch preferences. The discussion then took place around the central question: *"How can we design Lunchocracy for a better lunch decision-making experience?"*.

As discussion basis, we used Vlachokyriakos et al.'s [12] design space for digital voting in the workspace. We guided the participants to discuss each design element until a consensus was reached. An overview of the design space elements and the responses are summarized in Table 1.

Focus Group Results

Initiating the lunch break: Initially, someone would write a Skype message around noon saying it is lunch time, and then others would respond that they are joining. Nevertheless, people ready to go for lunch go to other people's offices to invite them as well, in case for example, someone missed the message. Until then, a consensus about where to have lunch is not yet reached in the vast majority of cases. The size of the group joining for lunch might change from day to day, depending on the availability of the coworkers.

Impact of group size: In case of a smaller group, the members usually walk and neglect lunch options that are crowded or serve unsuitable portion sizes. When the group gets bigger, finding a free table big enough to accommodate all group members becomes important. In such cases, the group sometimes splits.

Deciding where to go for lunch: Usually, one group member proposes an option. If no one disagrees, the group would take that option, otherwise whoever disagrees is often expected to offer an alternative. There is a general consensus that places that have been visited recently should be excluded.

Final Concept: Lunchocracy

Based on the focus group, and the responses modeled in the design framework (Table 1), we developed "**Lunchocracy**" (**Lunch** + Dem**ocracy**) with the following key features:

(1) Lunchocracy automatically starts a voting session daily at 11:50am, and closes the voting at 12:05. If someone wants to have lunch later, he/she can start another session, and note how many minutes the voting should remain open.
(2) Once a voting session is open, the bot queries the members to "check in" to join the session's lunch.
(3) After check in, group members can vote for a place proposed by others or nominate a new option.
(4) With two voting cards, users can: (a) upvote + downvote, (b) upvote twice, (c) upvote once or (d) no votes. To conform with the group's protocol of suggesting alternatives in case of a disagreement, users are required to upvote (or suggest) at least one option before downvoting. Users are also able to revoke their votes.
(5) Based on Table 1, the user's vote weight increases by 0.5 for every day his/her choice was not elected, and resets to 1, if the choice gets elected. This holds for both up- and downvotes, and can increase over multiple days (e.g., 2.0 if one did not get his/her wish fulfilled for 2 days in row).
(6) After the voting has been closed (see point 1) the system (a) shows the anonymous results sorted by votes, (b) shows who is joining for lunch, and (c) asks for feedback to log what the group eventually did.

Implementation

The Lunchocracy tool consists of two components, a Skypebot (Lunchbot) and a voting webpage (see Figure 2). Figure 3 illustrates the system architecture.

First, participants added Lunchbot to their contact list, and set their user name by the command "Install user John-

Design Element	Description	Value in Lunchocracy
Eligibility		
A. Suffrage	Who should be eligible to vote?	Everyone from the group
B. Closing poll condition	When should the poll be closed?	Timely closed around noon
Fairness		
C. Vote Weighting	How should the votes of each participant be weighted?	Votes should get stronger when the next day if the voter does not get what he/she wants on the previous day
D. Accessibility	How to ensure that eligible voters are able to cast a vote?	
E. Verifiability	How to ensure the integrity of the poll and that the voters vote was indeed counted?	Create a Skype chat-bot as every group member is included and let the chat-bot present the voting results.
Secrecy		
F. Ballot secrecy/publicity	Should the votes be publicly displayed?	Secret votes
G. Publishing results	Should interim results be displayed?	No, as in that case strategic vote placing would be possible. Only show the voting results in the end.
Expression		
H. Nomination	How should the options in the poll be nominated?	Everyone should be able to nominate his/her preferred option and vote either for his/her option or an option someone else nominated. If a person nominates a new option, all those who voted should receive a notification.
I. Vote delegation	Should others be able to vote for another voter?	No.
J. Revocation of votes	Should the voters be able to revoke their already given votes?	Yes.
K. Type of voting	What form should the votes have?	Both voting for and voting against a nominated option.
L. Number of votes	How many votes should a voter have?	Multiple.

Table 1: We adopted the design framework by Vlachokyriakos et al. [12] for digital voting in the workspace in our focus group.

Doe". All participants are members of a group conversation, in which the Lunchbot announces at 11:50 that it is time to plan for lunch (Figure 1). Participants had to click the "Join" button to be eligible to vote for lunch options. The participant is then redirected to a page on which they can anonymously cast their votes on others' suggestions, or make their own suggestions (Figure 2). Once the voting is over, Lunchbot shows a summary of the results (Figure 4).

Lunchocracy Study

We recruited the same group from the focus group to participate in the Lunchocracy study as well. All members of the group were invited via email to install Lunchbot, including a short usage manual. Group members could come and go as they wished. After 4 weeks of usage, we interviewed 5 (2 females) participants from the group to understand their experience with Lunchocracy.

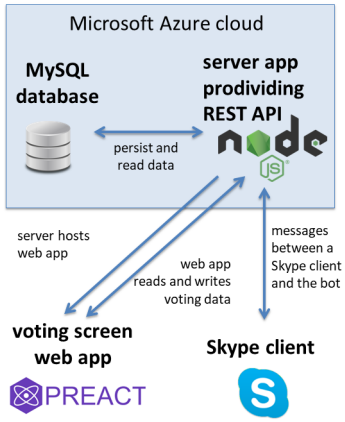

Figure 3: Lunchbot uses Microsoft's Bot Framework and its backend runs on Azure Cloud and uses Node.js's Bot Builder SDK. The voting page is implemented in Preact and communicates with the server via web sockets and HTTPS requests.

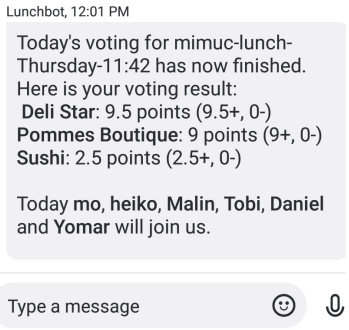

Figure 4: After the voting has ended, Lunchbot shows the vote distribution and the people joining.

Results and Discussion

Lunchocracy was used 12 times over the study's period. 14 participants, including 2 study executors, voted at least once in a session. The bot and a non-participating admin were also in the voting group. We summarize the main themes that emerged from interviewing 5 participants.

Perceived Usefulness and Time-Savings When discussing the overall perception of Lunchocracy, all interviewees asserted its helpfulness in lunch decision-making. Four praised that Lunchocracy eliminated the, sometimes long, discussions about where to go to lunch, and "made the decision quicker" as P2 puts it. P1 emphasized the benefits of knowing what everybody agrees on; he described the dynamics before Lunchocracy as: "Somebody suggests [a diner].. And then this information has to propagate through the group–which always takes time–then nobody is really sure if that's cool with people". P4 echoed this, describing how awkward it becomes when no one expresses their opinion strongly to avoid annoying others, at the expense of spending more time to make a decision. P4 said this was not necessary with Lunchocracy due to the anonymous downvote option. P2 stated,"it is nice that once we leave for lunch, we know where to go, rather than spending time being not sure". P3 and P5 had nothing against wasting time in discussions, yet confirmed the organizational benefits of Lunchocracy. P1 and P4 reaffirmed what we also learned from the focus group; before Lunchocracy, those who disagree with proposals are expected to suggest alternatives, and this was easier through Lunchocracy.

Earlier Knowledge on the Group's Lunch Tendencies Participants commended knowing the group's dynamics early enough to act accordingly, which allows aligning own needs and wishes, e.g., they could know that others are heading to a place, that they do not like. P4 expressed that, when not liking the winning option, she goes for the second one if it has many points. She added that social aspects, i.e., who is going for lunch, are as important to her as the diner. Similarly, P2 reported that Lunchbot informed her who is joining, which helped her decide whether or not to join. In an interesting situation, P2 and P3 headed to the winning diner earlier than the others, and met two other group members who were heading to a diner that P3 had chosen but lost the vote. P3 then joined the other two, and was comfortable leaving P2 behind, knowing that she will be joined by other group members who used Lunchocracy.

Reduction of Social Pressure While some participants stated feeling no social pressure before Lunchocracy, P3 and P4 agreed that the anonymity of votes made it easier to express their opinion and to opt out, since it would not be interpreted as an "attack" on someone's choice.

Perceived Ease of Use P1, P2, and P4 considered Lunchocracy easy and straightforward to use. In one case, P2 and P3 have experienced technical difficulties, with P3 wanting to trigger a later lunch session but posting in the wrong conversation channel. P5 suggested improvements, such as voting directly in the bot-channel, and showing diner suggestions. All participants found Lunchocracy helpful and stated they will continue using it after the study.

Future Improvements of Tool

Necessity of Excluding Options P1 and P2 expressed concerns over including options that will always be voted. They noted that there is a group of people that bring food and prefer eating at the workplace's meeting room. P2 discussed that the meeting room's inclusion could discourage from voting those who prefer eating outside. They proposed giving such options a special status that does not influence results, e.g., a check-box in the voting page "I will stay here".

Necessity for a Group-Splitting Option All participants pointed that they have missed a “split group” option. 5 out of 11 times, the group has split (1 unknown). The reason behind was either (1) the group size was too big for the winning diner or (2) several groups were formed, each with distinct lunch preferences.

Conclusion and Future Work

In this work, we investigated the effect of Lunchocracy, a lunch voting tool, on reducing social pressure while organizing the lunch decision process in the workplace. Through a focus group we collected the requirements for such tool. We then successfully deployed the tool for 4 weeks, and collected positive feedback from participants through individual interviews. Results indicate that in addition to structuring decision making and alleviating social pressure, participants also value the earlier knowledge about the work-group tendencies since they can tailor their actions accordingly. Our next step is to investigate how Lunchocracy can nudge participants to healthier food choices. For example, by leveraging the history, Lunchocracy could remind the participants that their last food choice was not healthy, and promote a healthier alternative for the current lunch.

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