On the complementary roles of face-to-face and mediated social interactions

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Social interaction patterns have long been a subject of great interest. Several recent studies (e.g., [3, 2]) have examined the influence of face-to-face and mediated (e.g., phone, text and online social networks) communication channels on employees' mood, but since their motivation stemmed from professional productivity, they did not include interactions that occurred outside the working environment. In this paper, we seek to understand how mood is affected by face-to-face and mediated interactions during the entire day, focusing on the relationship between the two types of interactions. Unlike previous studies, our analysis is performed on two distinct high-resolution datasets that were collected over long periods of time. We find that in different moods, people prefer one communication method (either face-to-face or mediated) and that the two types of interactions have complementary roles in practice. Moreover, this relationship becomes specifically strong in cases of extreme mood states – i.e. when people report being inordinately happy or unhappy. Our findings provide initial insights into how mood is affected by different types of social interactions, and can be used in the future as a basis for predicting and influencing individuals' mood based on the pattern of their social interactions.

For our analysis, we used the *Friends and Family* dataset [1] and the *Mobile Territorial Lab* dataset[1]. The *Friends and Family* dataset contains data on $n = 130$ participants that has been collected over the course of 12 months. The *Mobile Territorial Lab* dataset contains data on $n = 70$ participants that has been collected over the course of 6 weeks. In both datasets, call and text logs were collected using a dedicated Android app installed on the mobile devices of the participants. In addition, Bluetooth scans were collected and used as a proxy to face-to-face encounters with other individuals. Finally, mood data was collected via self-reported surveys that were completed by the participants on a daily basis. The self-reported surveys were introduced automatically as part of a mobile application, thus ensuring the reliability of the self-reported results. While the *Friends and Family* dataset measured mood directly on a scale of $1-7$, the *Mobile Territorial Lab* followed the *Positive and Negative Affect Schedule* measure (PANAS) [4]. In order to make the results in the *Mobile Territorial Lab* dataset comparable to those of the *Friends and Family* dataset, we computed the average PA portion of the survey, rounded to the nearest integer, resulting in 5 distinct mood states.
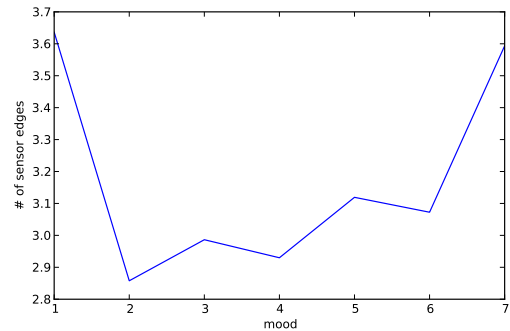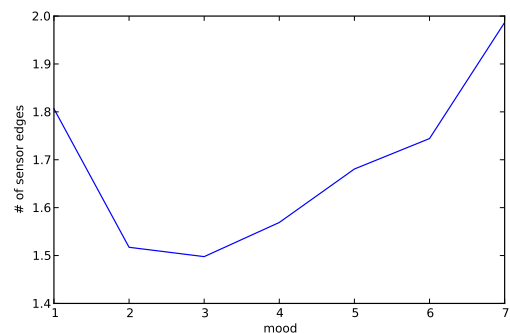
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[1] http://www.mobileterritoriallab.eu/

(a) Average number of distinct daily calls.

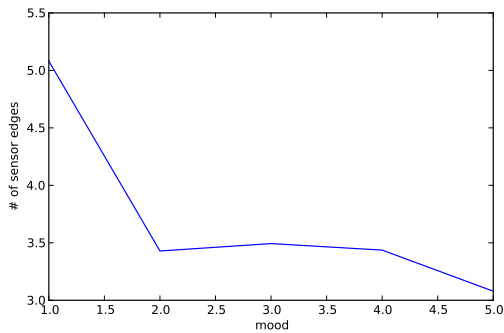(b) Average number of distinct daily texts.
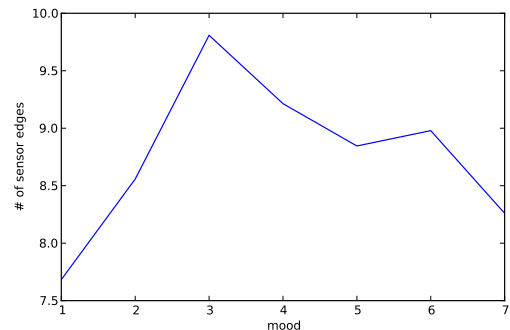
(c) Average number of distinct face-to-face encounters.

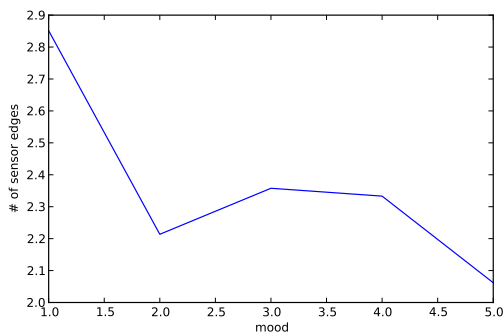Figure 1: Communication patterns effect on mood in the *Friends and Family* dataset.

Figure 1 shows the average number of distinct interactions depending on the mood, for all individuals and for all

days, in the *Friends and Family* dataset. As can be seen in the figure, calls and texts, both being mediated types of communication, exhibit similar patterns, while face-to-face follows a complementary pattern. More specifically, in extreme situations ($mood = 1$ or $mood = 7$), people prefer to use mediated communication over face-to-face interaction, and the opposite result holds in intermediate mood states ($mood \in [2, 6]$).

(a) Average number of distinct daily calls.

(b) Average number of distinct daily texts.
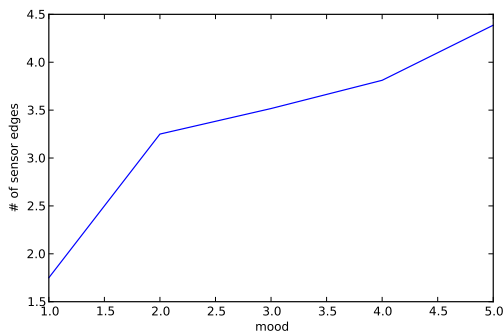
(c) Average number of distinct face-to-face encounters.

Figure 2: Communication patterns effect on mood in the *Mobile Territorial Lab* dataset.

Figure 2 presents the same analysis for the *Mobile Territorial Lab* dataset, focusing on Positive Affect (PA) questions. As can be seen in the figure, the results are consistent in the sense that the same complementary relationship between mediated communication (i.e., calls and texts) and face-to-face encounters is present. In addition, while not shown here, it is

constructive to note that the Negative Affect (NA) questions also followed a consistent pattern.

In conclusion, understanding how mood is affected by different types of social interactions provides a mechanism for inferring well-being. Hence, our results could be used as a first important step in achieving this goal. Further research could examine more closely different types of subjects based on their personality traits (e.g., using the Big Five personality traits model) and see if it affects their communication preferences. Similarly, controlling for the strength of the ties could also reveal interesting results.

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