Fidgebot: Working Out while Working

'A pilot study [*]

Jürgen Brandstetter
HITLabNZ
University of Canterbury
New Zealand
juergen.brandstetter
@pg.canterbury.ac.nz

Noah Liebman
CollabLab
Northwestern University
Evanston, IL
nliebman
@u.northwestern.edu

Kati London
FUSE Labs
Microsoft Research
New York
katil@microsoft.com

ABSTRACT

More and more people suffer from chronic health issues related to posture and lack of movement in their office work. We developed a novel approach to motivate employees to be more physically active.

Our approach focuses on using the social characteristics of the NAO robot platform to deliver social cues for motivation. Like a coworker who is very motivated to exercise, we used NAO to invite employees to do short "micro-exercises" along with NAO. This approach has multiple advantages when compared to conventional notification systems. Our pilot study shows that employees found it easy and enjoyable to perform micro-exercises with NAO. According to our qualitative data, NAO's social appearance was essential for the motivation of the employees.

Categories and Subject Descriptors

H.5.2 [**User Interfaces**]: Interaction styles; I.2.9 [**Robotics**]: Manipulators

Keywords

human-robot interaction; motivation; pilot study; social situations

1. INTRODUCTION

Chronic diseases are becoming increasingly prevalent in industrialized countries [4, 5]. In the last couple of years, more and more evidence has been generated that connects many of those problems with the habit of sitting [11, 6]. The American population, as just one example, spends more than half of its waking hours at work [10], and most of this work is done sitting [5]. To tackle this problem researchers

---

and engineers have worked on different solutions. One which gained a lot of traction is the standing desk. It has also been shown that small amounts of movement throughout the day, "fidgeting", can be very beneficial for one's health [9]. While a standing desk can be a good complement to a conventional desk, and fidgeting is better than being sedentary, neither addresses the main problem, which is motivation. Without the intrinsic and extrinsic motivation to change behavior, tools and medical research will be of no help.

Social factors are among the strongest contributors to motivation. Examples of social factors include: belonging to a group, contribution to a group, acknowledgement, etc [1]. However, looking at popular and state-of-the-art systems we find mainly notification systems with almost no social factor, or social systems that lack an embodied, copresent component. To counterbalance this, we decided to try a novel approach using a social robot (NAO) and its social cues to motivate people to exercise more at work. Our system, Fidgebot, uses a NAO robot to invite and encourage office workers to use their standing desks more and perform short "micro-exercises" at their desks.

2. METHOD

In a two-week pilot study at the Microsoft Research lab in New York City, we tested our motivational social robot on a group of four employees. The group members' desks were in close proximity to each other, and NAO had her own place among the group. To track whether employees interacted with the robot and engaged in the micro-exercises, we created a small on-screen behavior logging interface.

2.1 Social persuasion

Several social factors made our application different from many conventional ones. First, NAO is relatively loud while walking, so nearby employees instantly hear her beginning to approach. Second, moving objects, in this case a walking robot, grab human attention better than stationary objects [8, p. 259], which would be text that changes from "resting" to "workout" in a conventional setting. It is also harder to ignore a real-world entity that approaches one at one's desk than to dismiss a notification.

We also took advantage of several findings from social science to guide our design. For example, NAO calls employees by their real names. This is a well established persuasive technique to grab one's attention [7], and is also known as the Cocktail Party Effect [2]. In addition, by having employees in a group and making NAO's presence salient, we

make individually socially unacceptable behaviors acceptable: performing otherwise ridiculous movements with a (human or robot) partner in an open space office environment feels much less embarrassing than doing them alone. Finally, we aim to provoke guilt by making the robot sad when an employee declines an invitation to exercise.

2.2 Interaction Generation

To make sure that the tasks do not get too repetitive and boring, we generate a unique script before each interaction. The script is also necessary because a real social character would rarely repeat exactly the same thing over and over again, and we wanted to preserve the illusion of an "independent" character. The script itself is divided into five sections: invitation, answer (accept, decline, or ignore), micro-exercise, thank you, and a reminder to manually log the behavior. Each of these sections is generated by randomly choosing one sentence from a selection of several options, except the micro-exercise section, which is generated by combining multiple exercises to make a routine that is about 30 seconds long. The reason for the short duration of the exercises was to motivate employees [3]. Most included dances, or, if they were regular exercises like squatting, included a playful underlying story.

3. RESULTS

Looking back at our original goal, motivation, we find that employees enjoyed the experience and had fun. Employees had a generally fun time and tended to follow NAO's instructions, and reported being especially entertained by the dance micro-exercises. For example, an employee told us that they "like the robot because it makes me excited." NAO was not able to persuade employees to exercise each time she approached them, but our data suggests that this had less to do with declined invitations, and more to do with the fact that some employees were not always at their desks, which was interpreted by NAO as a rejection.

However, when an employee was at their desk, NAO's invitations were rarely rejected. Our qualitative data suggests that the social properties of NAO contributed to this. As one employee told us, "When [coworker] rejected NAO, I actually felt bad for the robot." This influenced people to not reject NAO.

Interviews also revealed some unexpected behaviors. NAO's presence and interactions "forced" group members to participate in often ridiculous tasks, which had the result of breaking down hierarchical social barriers. This was positively perceived by the employees and led to more casual team communication. Additionally, employees began mimicking NAO's gestures and way of sitting.

3.1 Challenges and Limitations

In addition to the technical challenges one would expect in working with robotics — like path finding, face recognition, and battery usage — the central problems we faced were behavioral in nature.

For example, for calibration purposes, NAO scanned its position by turning the head from one side to the other. During qualitative interviews we learned that this behavior can be very disturbing for people since the rotation speed and radius appear unnatural and unhealthy. One employee said, "In the whole exercise you view her as a human or kid and all of a sudden she flips her head over. And then you are back to reality."

Other problems were related to the open plan office layout of our location: multiple coworkers complained that the noise and fun was interrupting their own work. And finally, as a result of running the pilot study in a real-world setting, employees were sometimes out of the office, which disrupted the continuity of our data.

4. CONCLUSIONS AND FUTURE WORK

Since this experiment was a pilot project, we have limited data on the actual impact NAO had on employees' performance. However, tracking, interviews, and observation do reveal interesting trends which we want to investigate further. In this work, we were unable to determine whether employees enjoyed the robot because our system was inherently enjoyable to use or as a result of novelty effects. A longer deployment should help assess the impact of novelty effects, as well as enable us to make more substantive claims about behavioral outcomes. In future work we also intend to focus more deeply on NAO's social presence. Our preliminary results suggest that drawing on what employees found fun, and what helped them to not feel alone while working out at work, seems to be a promising direction.

5. REFERENCES

[1] Y. A. W. De Kort and W. A. Ijsselsteijn. People, places, and play: Player experience in a socio-spatial context. *Comput. Entertain.*, 2008.

[2] J. Dean. The cocktail party effect - psyblog, 2009.

[3] B. Fogg. Tiny habits, 2011.

[4] V. M. Freid, A. B. Bernstein, and M. A. Bush. Multiple chronic conditions among adults aged 45 and over: trends over the past 10 years. *Centers of Disease Control and Prevention*, 2012.

[5] E. George, R. Rosenkranz, and G. Kolt. Chronic disease and sitting time in middle-aged australian males: findings from the 45 and up study. *International Journal of Behavioral Nutrition and Physical Activity*, 2013.

[6] M. Hamilton, G. Healy, D. Dunstan, T. Zderic, and N. Owen. Too little exercise and too much sitting: Inactivity physiology and the need for new recommendations on sedentary behavior. *Current Cardiovascular Risk Reports*, 2008.

[7] D. J. Howard, C. Gengler, and A. Jain. What's in a name? a complimentary means of persuasion. *Journal of Consumer Research*, 1995.

[8] J. W. Kalat. *Introduction to Psychology (PSY 113 General Psychology)*. Cengage Learning, 2010.

[9] J. A. Levine. Role of nonexercise activity thermogenesis in resistance to fat gain in humans. *Science*, 1999.

[10] B. of labor statistics. Charts from the american time use survey. http://www.bls.gov/tus/charts/, 2014. Accessed: 2014-11-16.

[11] M. S. Tremblay, R. C. Colley, T. J. Saunders, G. N. Healy, and N. Owen. Physiological and health implications of a sedentary lifestyle. *Applied Physiology, Nutrition, and Metabolism*, 2010.