

*Extended abstract*

# Grace: Designing for Exercise Motivation Through Social Support and Graceful Interactions

Daphne Menheere<sup>1</sup>, Carine Lallemand<sup>1,2</sup>, Ilse Faber<sup>1</sup>, Jesse Paping<sup>1</sup>, Bram Monkel<sup>1</sup>, Stella Xu<sup>1</sup> and Steven Vos<sup>1,3</sup>

<sup>1</sup> Design, Eindhoven University of Technology, Eindhoven, the Netherlands

<sup>2</sup> HCI Research Group, University of Luxembourg HCI Research Group Esch-sur-Alzette, Luxembourg

<sup>3</sup> School of Sport Studies, Fontys University of Applied Sciences, Eindhoven, the Netherlands

Emails: d.s.menheere@tue.nl, c.e.lallemand@tue.nl, s.vos@tue.nl

Submitted: 9/9/2019

**Keywords:** Constructive design research; graceful interaction; exercise intentions; wearable technology; social support

---

## 1 Introduction

Increasingly aware of the importance of active lifestyles, more and more people intend to be physically active [10]. Even though sport used to be an activity mainly practiced by men, we see an increasing development of women participating in sport, resulting in more gender equality in this area [11]. Despite their positive intentions, the main challenge for many people remains to maintain being physically active [10]. The average drop-out rate is around 50%, where women are less likely to continue their exercise regime compared to men [1, 5]. Studies indicate this is because women experience more unforeseen barriers and additionally attach greater importance to social support [5].

To support people in being more physically active, there has been an exponential increase in sport and physical activity-related wearable technology that enable body-monitoring and data tracking. Despite a general acceptance that people are different, many of these devices tend to take a “one-size-fits-all” approach through quantification of exercise behavior and stimulation of performance and competition [9]. Even though this type of motivation strategy speaks to a segment of people, there are also individuals who are not encouraged by being faster or stronger than others, but value social support more [5, 13]. Studies show that this type of “social thinking” seems to appeal to women in particular [5]. Additionally, studies have shown that not everyone feels comfortable wearing activity trackers due to the sporty and bulky appearances of the devices [12], preferring the ones that are more graceful [6, 7]. We therefore argue to incorporate gracefulness and social support as motivational strategies in sport-related wearable for women, and inform how to design for this.

## 2 Designing Graceful Interactions

Through an expert study involving industrial designers (n = 22), we have explored how to design for graceful interaction in product design. Using the Interaction Vocabulary Cards that consist of 11 seven-point semantic differential items [4], we asked the designers to describe how a graceful interaction with a physical product would feel/look like. We provided them with the following definition of gracefulness: “Gracefulness is characterized by elegance or beauty of form, manner, movement, or speech. It is elegant. Grace is the appearance of an easy presence (graceful movements appear as easy and effortless). And such presence involves a harmonious relatedness to one’s context.” [2, 3]. Based on this definition, the participants were asked to evaluate only the attributes considered relevant and leave the others blank. After the assessment of the 11 attributes, participants were asked to prioritize the 3 most relevant attributes.

The results of this study show that seven attributes are associated with designing for gracefulness: *slow*, *fluent*, *uniform*, *constant*, *precise*, *gentle* and *targeted* (Figure 1). Amongst these attributes, *fluency* (14), *gentleness* (12) and *slowness* (7) were selected as the most important attributes for a graceful aesthetic of interaction.

Attribute 1	Frequency Attribute 1	No Response	Frequency Attribute 2	Attribute 2
Slow	15	6	1	Fast
Stepwise	2	1	19	Fluent
Instant	4	15	3	Delayed
Uniform	14	6	2	Diverging
Constant	15	7	0	Inconstant
Mediated	7	8	7	Direct
Spatial Separation	1	13	8	Spatial Proximity
Approximate	2	3	17	Precise
Gentle	16	6	0	Powerful
Incidental	1	7	14	Targeted
Apparant	4	12	6	Covered

**Figure 1.** Attributes rated by design experts (n = 22) to describe a graceful aesthetic of interaction, using the Interaction Vocabulary [4]

### 3 Design of Grace

Based on the notions that described a gracefulness interaction (slow, fluent and gentle), we designed Grace [8]: a piece of jewelry that encourages women to share and support exercise intentions with friends. Through Grace, users are able to see whether friends have the intention to go exercise that day and are able to cheer for them. This information is also shared about themselves.



**Figure 2.** Grace, a piece of interactive jewelry, enabling women to share their exercise intentions

#### 3.1 Gracefulness Interactions embedded in Grace

To distinguish Grace from physical activity-related devices that focus on performance, which are usually designed as being fast, powerful and precise (by using numbers to provide users with feedback), we embedded the interaction qualities *slow*, *gentle* and *fluent*.

*Slowness* is expressed in the design of Grace and the way the feedback is provided throughout the day. This feedback cannot be seen on demand and is provided in the moment itself.

The attribute *Gentleness* is translated in all the interaction styles of Grace which entails several touch, motion, and mid-air gesture interactions. To plan an exercise, the hand is placed on the heart as to mimic the salutation

of promise. The display, divided into slots for different friends, will now display skewed stripes. When the user is done exercising, she taps herself three times on the chest, showing off a feeling of pride, and changing the stripes into mellow post-workout waves. Lastly, to cheer (regardless of their effort) for friends with a lively zig-zag pattern, you hold your hand on your heart for a feeling of connectedness. The notion of *Fluency* is also embedded in the interaction styles of Grace as well as the smooth act of fidgeting, since these movements are ‘easy or effortless’.

We set up an exploratory user study with three participants, to gain first insights into how the feedback given by Grace was experienced, and whether the different interactions with Grace were considered as graceful. Additionally, we assessed how the target women perceived the qualitative social support mechanism as a motivational strategy. The most important insights are that the participants indicated to value the cheering component of Grace, enabling social support and that the feedback was considered subtle yet graceful.

## 4 Conclusion

Through the design of Grace, we aim to extend the design space of sport-related wearables and inform how to design for exercise motivation through social support and graceful interactions. We believe the present study provides a different approach towards incorporating a more qualitative way by supporting women with their exercise intentions. This work thus provides a qualitative perspective and inspiring implications to designers of sports-related wearables. Additionally, by defining the notion of graceful interactions, designers can also use these attributes as a starting point for the design of interactive technologies in other application areas.

## References

1. Buckworth, J., Dishman, R. K., O'Connor, P. J., & Tomporowski, P. D. (2013). Exercise psychology.
2. Cordner, C. (2003). The meaning of graceful movement. *Journal of the Philosophy of Sport*, 30(2), 132-143.
3. Dictionary.com Retrieved June 26, 2019 from <https://www.dictionary.com/browse/gracefully>
4. Diefenbach, S., Lenz, E., & Hassenzahl, M. (2013, April). An interaction vocabulary. describing the how of interaction. In *CHI'13 Extended Abstracts on Human Factors in Computing Systems* (pp. 607-612). ACM.
5. James, D. V., Johnston, L. H., Crone, D., Sidford, A. H., Gidlow, C., Morris, C., & Foster, C. (2008). Factors associated with physical activity referral uptake and participation. *Journal of sports sciences*, 26(2), 217-224.
6. Martens, J. B. (2019, April). Interpreting the Diversity in Subjective Judgments. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (p. 219). ACM.
7. Menheere, D.S. 2015. *Activogue: A fashion forward activity tracker*. Master's report. Eindhoven University of Technology department of Industrial Design, Eindhoven, the Netherlands
8. Menheere, D.S., Lallemand, C.E., Faber, I. P., Pepping, J., Monkel, B., Xu, S. K., Vos, S., (2019) Graceful Interactions and Social Support as Motivational Design Strategies to Encourage Women in Exercising, In *Proceedings of the 2019 Halfway to the Future Symposium*. ACM
9. Peeters, M. M. R., & Megens, C. J. P. G. (2014). Experiential design landscapes: how to design for behaviour change, towards an active lifestyle.
10. Rhodes, R. E., & de Bruijn, G. J. (2013). How big is the physical activity intention-behaviour gap? A meta-analysis using the action control framework. *British journal of health psychology*, 18(2), 296-309. <https://doi.org/10.1111/bjhp.12032>
11. Scheerder, J., Breedveld, K., & Borgers, J. (Eds.). (2015). *Running across Europe: the rise and size of one of the largest sport markets*. Springer.
12. Shih, P. C., Han, K., Poole, E. S., Rosson, M. B., & Carroll, J. M. (2015). Use and adoption challenges of wearable activity trackers. *IConference 2015 Proceedings*.
13. Vos, S., Walravens, R., Hover, P., & Scheerder, J. (2014). Voor de pret of de prestatie? Typologieën van evenementlopers op basis van hun houdingen en motieven. *Een leven lang sportief en gezond (Abstractboek 4de Dag van het Sportonderzoek 2013)*, 40.