

Activated Motivation: An Opportunity for HCI Research?

JAMES R. WALLACE, University of Waterloo, Canada

ACM Reference Format:

James R. Wallace. 2022. Activated Motivation: An Opportunity for HCI Research?. 1, 1 (March 2022), 3 pages. <https://doi.org/10.1145/nnnnnnn.nnnnnnn>

I am more and more convinced that our happiness or our unhappiness depends far more on the way we meet the events of life than on the nature of those events themselves.

— Wilhelm von Humboldt

1 INTRODUCTION

For years now, the HCI community has explored how technologies like a fitbit, smartwatch, or smartphone can be used for self-improvement. The potential impacts of these technologies are immense; to improve our finances, to educate ourselves and develop new skills, and to improve our health and the health of our planet. However, research has also cast doubt on their effectiveness [5, 8, 13, 20]. That is, we have little evidence for their effectiveness, and in practice people tend to lose motivation over time, and ultimately fail to meet their personal goals.

In search of more effective designs, the HCI community has (loosely) adopted theories like Self-Determination Theory [6, 14, 15]. For instance, researchers have explored designs grounded in SDT in domains like education [16, 17], nutrition [1, 2], and mental health [3, 4]. However, there's little guidance for how to apply the theory in practice, or when to know that it will be most effective, compared to, for example, simple visualizations [1]. This lack of guidance has motivated calls-to-action from the CHI community to more deeply engage with Self-Determination Theory (e.g., [18]), and particularly with its under-explored micro theories, to better inform the design of these technologies.

As one such opportunity, I propose that HCI researchers explore how the concept of *activated motivation* as defined by Causality Orientations Theory [6, 14, 15] can help us to develop novel technologies that motivate change, provoke self-reflection and persistence, and promote our health and well-being.

2 ACTIVATED MOTIVATION

Self-Determination Theory [6, 14, 15] is a decades-old, widely-validated macro-theory that describes human motivation. Generally, it defines motivation on a spectrum ranging from amotivation, or a lack of motivation, to extrinsic motivation driven by external factors like rewards, to intrinsic motivation associated with one's internal enjoyment or interest. Moreover, the theory establishes the benefits of more internal forms of motivation: individuals acting with internal forms of motivation will tend to feel more open and curious, be more persistent, and are more likely to succeed at

Author's address: James R. Wallace, School of Public Health Sciences, University of Waterloo, Ontario, Canada, james.wallace@uwaterloo.ca.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

© 2022 Association for Computing Machinery.

XXXX-XXXX/2022/3-ART \$15.00

<https://doi.org/10.1145/nnnnnnn.nnnnnnn>

difficult tasks [7, 14, 15]. Indeed, these concepts have been widely validated, and have been shown to provide a practical framework for technology design [9]. However, researchers have also argued that current engagement with the theory is shallow [11, 12], particularly in regards to the concepts described in Self-Determination Theory's 'micro-theories' [9].

Causality Orientations Theory [6, 14, 15], one such micro-theory, describes how an individual's motivation shapes their behaviour. It defines three *orientations* that individuals take on in pursuit of a goal: those with *autonomy orientation* are driven by internal factors like their own interests and opportunities for growth; those with *controlled orientation* are driven by external contingencies and power structures; and those with *impersonal orientation* are driven by the need to avoid negative consequences like performance anxiety or failure [14]. Like the benefits associated with more internal motivation, individuals who are autonomously oriented will tend to perform better, invest more effort, be more persistent, and enjoy a task more than those with controlled or impersonal orientations [10]. These traits have been found to translate to concrete outcomes like task time, effort, and performance in experimental settings [7, 19].

Critically, the psychology literature has also shown that an individual's orientation can be *primed*, through environmental messaging like text, music, or images — an effect called *activated motivation* [19]. That is, individuals can be prompted to take on an autonomy orientation for a task, and in doing so also take on its many benefits. Activated motivation has been demonstrated in experimental, short-term contexts for a wide range of activities, including education, sports training, and medicine adherence [7, 19]. However, it's not clear how priming can be implemented in the interactive computer systems people use on a daily basis for self-improvement, and so the potential benefits of activated motivation remain unexplored.

3 NEXT STEPS

To explore how activated motivation can inform HCI research, I propose the following:

- 1. Replication** To date, studies have largely focused on non-technical interventions. We should therefore replicate those studies from the literature, and develop an understanding of how they can be integrated into modern technologies like fitness trackers and food tracking apps, and then quantify how well effects transfer to those contexts. These replications will also provide a baseline from which we can assess the effectiveness of different implementations, and determine where HCI should focus its efforts moving forward.
- 2. Extension** We should then extend those findings to novel technologies like wearables and augmented and virtual reality. These technologies provide new opportunities and mechanisms through which activated motivation may be applied. For instance, physiological or location data from wearables may enable us to personalize interventions and improve their efficacy. Augmented or virtual reality may provide useful mechanisms for integrating interventions with an individual's surroundings.
- 3. Synthesis** Finally, we should consolidate this research into guidance for HCI practitioners. Specifically, there is a need to develop tools that help determine for *when* and *how* activated motivation can be most effectively applied, like standard GUI elements, software design patterns, and working examples that makes this research actionable by developers.

REFERENCES

- [1] Marcela C. C. Bomfim, Sharon I. Kirkpatrick, Lennart E. Nacke, and James R. Wallace. 2020. Food Literacy While Shopping: Motivating Informed Food Purchasing Behaviour with a Situated Gameful App. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)*. Association for Computing Machinery, New York, New York, 1–13. DOI: <http://dx.doi.org/10.1145/3313831.3376801>
- [2] Marcela C. C. Bomfim and James R. Wallace. 2018. Pirate Bri's Grocery Adventure: Teaching Food Literacy through Shopping. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems (CHI EA '18)*. Association for Computing Machinery, New York, New York, 1–6. DOI: <http://dx.doi.org/10.1145/3170427.3188496>
- [3] Long Ting Chan and James R Wallace. 2018. Changing Peer Support Attitudes with Avatar-Based Gamification. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, New York, New York, USA, 1–5.
- [4] Tina Chan. 2021. Merlynnne. *Proceedings of the ACM on Human-Computer Interaction* 5, CHI Play (2021), 1–27.
- [5] Janghee Cho, Laura Devendorf, and Stephen Volda. 2021. From The Art of Reflection to The Art of Noticing: A Shifting View of Self-Tracking Technologies' Role in Supporting Sustainable Food Practices. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 298, 7 pages. <https://doi.org/10.1145/3411763.3451838>
- [6] Edward L. Deci and Richard M. Ryan. 1985. *Causality Orientations Theory*. Springer US, Boston, MA, 149–175. DOI: http://dx.doi.org/10.1007/978-1-4899-2271-7_6
- [7] Fiona B. Gillison, Peter Rouse, Martyn Standage, Simon J. Sebire, and Richard M. Ryan. 2019. A meta-analysis of techniques to promote motivation for health behaviour change from a self-determination theory perspective. *Health Psychology Review* 13, 1 (2019), 110–130. DOI: <http://dx.doi.org/10.1080/17437199.2018.1534071>
- [8] Daniel Johnson, Sebastian Deterding, Kerri-Ann Kuhn, Aleksandra Staneva, Stoyan Stoyanov, and Leanne Hides. 2016. Gamification for health and wellbeing: A systematic review of the literature. *Internet Interventions* 6 (2016), 89–106. <https://www.sciencedirect.com/science/article/pii/S2214782916300380>
- [9] Elisa D. Mekler, Florian Brühlmann, Alexandre N. Tuch, and Klaus Opwis. 2017. Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. *Computers in Human Behavior* 71 (2017), 525–534. <https://www.sciencedirect.com/science/article/pii/S0747563215301229>
- [10] Stephen L Murphy and Ian M Taylor. 2020. Priming autonomous and controlling motivation and effects on persistence. *Current Psychology* 1, 1 (2020), 1–13.
- [11] Rita Orji and Karyn Moffatt. 2018. Persuasive technology for health and wellness: State-of-the-art and emerging trends. *Health Informatics Journal* 24, 1 (2018), 66–91. DOI: <http://dx.doi.org/10.1177/1460458216650979>
- [12] Dorian Peters, Rafael A. Calvo, and Richard M. Ryan. 2018. Designing for Motivation, Engagement and Wellbeing in Digital Experience. *Frontiers in Psychology* 9 (2018), 797. DOI: <http://dx.doi.org/10.3389/fpsyg.2018.00797>
- [13] Amon Rapp, Maurizio Tirassa, and Lia Tirabeni. 2019. Rethinking Technologies for Behavior Change: A View from the Inside of Human Change. *ACM Trans. Comput.-Hum. Interact.* 26, 4, Article 22 (June 2019), 30 pages. DOI: <http://dx.doi.org/10.1145/3318142>
- [14] Richard M. Ryan and Edward L. Deci. 2019. Chapter Four - Brick by Brick: The Origins, Development, and Future of Self-Determination Theory. *Advances in Motivation Science* 6 (2019), 111–156. <https://www.sciencedirect.com/science/article/pii/S221509191930001X>
- [15] Richard M Ryan, C Scott Rigby, and Andrew Przybylski. 2006. The motivational pull of video games: A self-determination theory approach. *Motivation and emotion* 30, 4 (2006), 344–360.
- [16] Liudmila Tahai, James R. Wallace, Christian Eckhardt, and Krzysztof Pietroszek. 2019a. Scalebridge: Design and Evaluation of Adaptive Difficulty Proportional Reasoning Game for Children. In *2019 11th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games)*. IEEE, USA, 1–4. DOI: <http://dx.doi.org/10.1109/VS-Games.2019.8864526>
- [17] Liudmila Tahai, James R Wallace, Christian Eckhardt, and Krzysztof Pietroszek. 2019b. Scalebridge: Design and evaluation of adaptive difficulty proportional reasoning game for children. In *2019 11th International Conference on Virtual Worlds and Games for Serious Applications (VS-Games)*. IEEE, IEEE, USA, 1–4.
- [18] April Tyack and Elisa D. Mekler. 2020. Self-Determination Theory in HCI Games Research: Current Uses and Open Questions. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–22. DOI: <http://dx.doi.org/10.1145/3313831.3376723>
- [19] Evan Weingarten, Qijia Chen, Maxwell McAdams, Jessica Yi, Justin Hepler, and Dolores Albarracín. 2016. From primed concepts to action: A meta-analysis of the behavioral effects of incidentally presented words. *Psychological bulletin* 142, 5 (2016), 472.
- [20] Verena Zimmermann and Karen Renaud. 2021. The Nudge Puzzle: Matching Nudge Interventions to Cybersecurity Decisions. *ACM Trans. Comput.-Hum. Interact.* 28, 1, Article 7 (Jan. 2021), 45 pages. DOI: <http://dx.doi.org/10.1145/3429888>