User's acceptance of an AI-based software to promote attention control

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Motivation

- Novel AI-based technologies can support everyday tasks related to work and study in many ways
- People often hesitate using such technologies due to unclear challenges and benefits
- *Unified Theory of Acceptance and Use of Technology* (UTAUT) explains factors contributing to technology use [1]
- Concrete example of AI-based software focUS for promoting attention control
- Evidence on benefits of using focUS related to task-specific performance, motivation, and self-control [2]

Research questions

- *Do expected performance gains, invested effort, and affinity for technology predict the intention of using focUS?*
- *Do demographic characteristics and affinity for technology exert moderating influences on the intention of using focUS?*

Software focUS

- Metacognitive operations of goal setting, formative feedback, and summative feedback form core functionality (see **Fig. 1**)

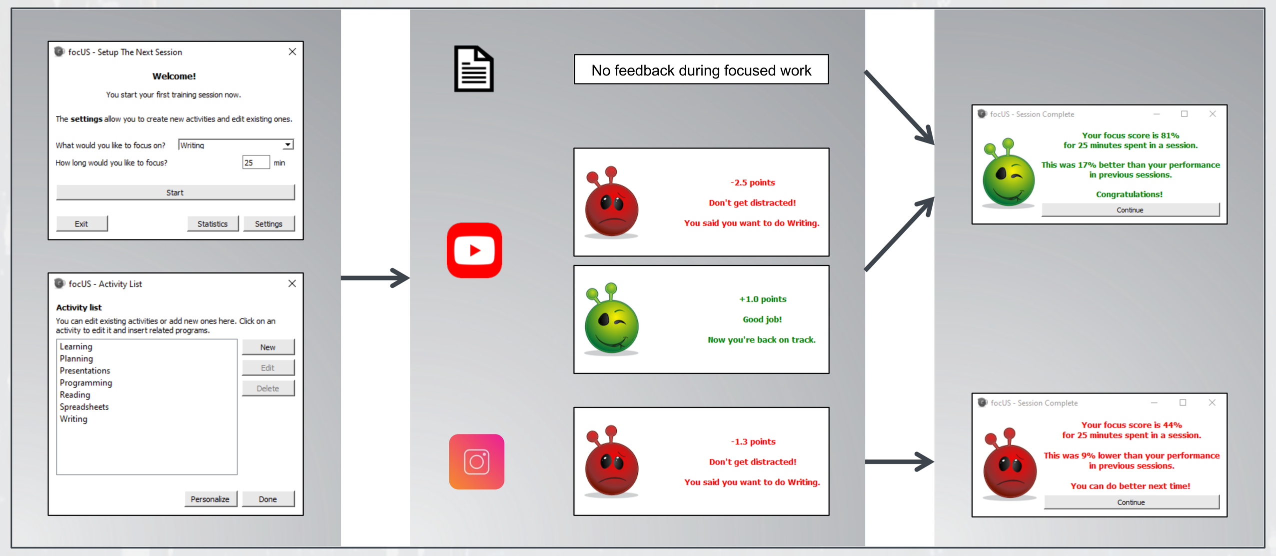

Fig. 1: focUS goal-setting (left), formative feedback (middle), and summative feedback (right).

- Feedback mechanism translates evidence on expected value of cognitive control [4] into training framework [5]
- Kalman filter [6] accounts for random fluctuations in focus performance

Results

- Multiple linear regression model to explain intention of use by predictors and moderating factors (R^2 = .694)
- Summary of effects (see **Fig. 4**) highlights performance expectancy as main predictor ($t(59) = 3.15$, $\beta = 1.24$, $p = .03$)
- Lack of significant effects of effort expectancy, affinity for technology, and moderating variables

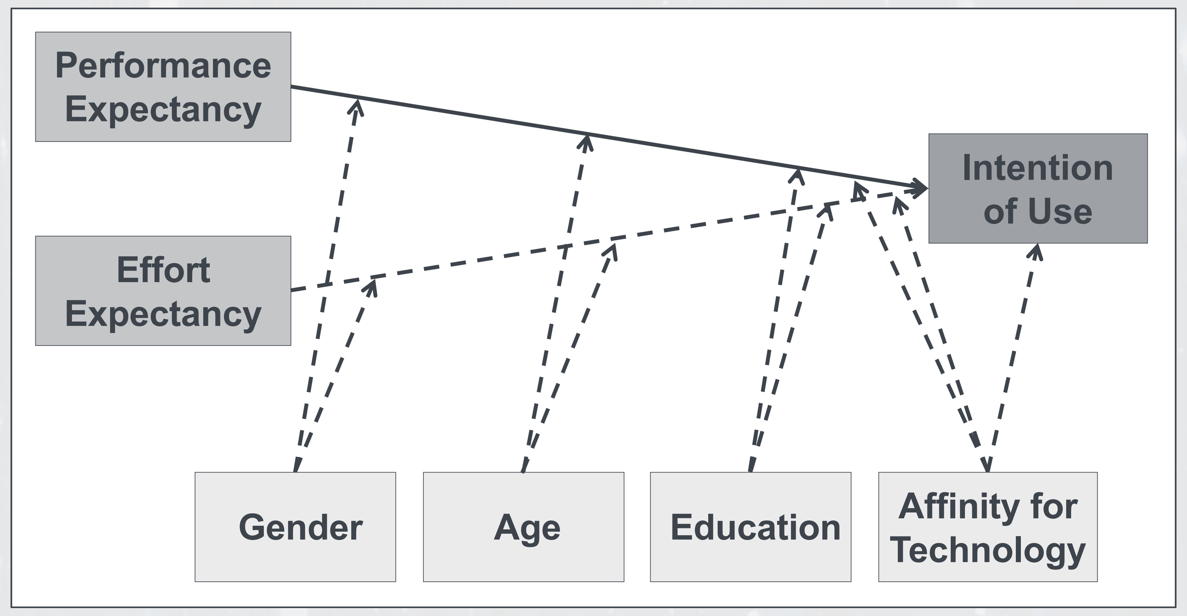

Fig. 4: Model summary with significant (bold line) and non-significant (dashed lines) effects.

Sample

- N = 71 participants (44 female, M_{age} = 34.20 years, SD_{age} = 14.42, range = 18-68 years, 65 living in Germany)
- 62% held a university degree, 42% were employed, 35% were studying
- 52% had prior experience with software to support studying and/or working (e.g., timer, pomodoro apps, office software)

Design

- Criterion variable: intention of using focUS (rating question with slider)
- Predictor variables: UTAUT dimensions of performance and effort expectancy [1], affinity for technology [3]
- Moderating variables: gender, age, education, affinity for technology [3]

Procedure

- Pre-assessment of prior experiences with assistive software and affinity for technology [3]
- Presentation of introductory video clip about software focUS (duration of 08:32 min)
- Post-assessment of selected UTAUT dimensions [1], demographics, and intention of using focUS

Video clip

- Focused introduction of core functionality and goals of software focUS
- Concise language and structure ensures comprehensibility of scope of focUS for broad audience
- Mix of 2D animations and screencasts for neutral but appealing presentation (see **Fig. 2**)

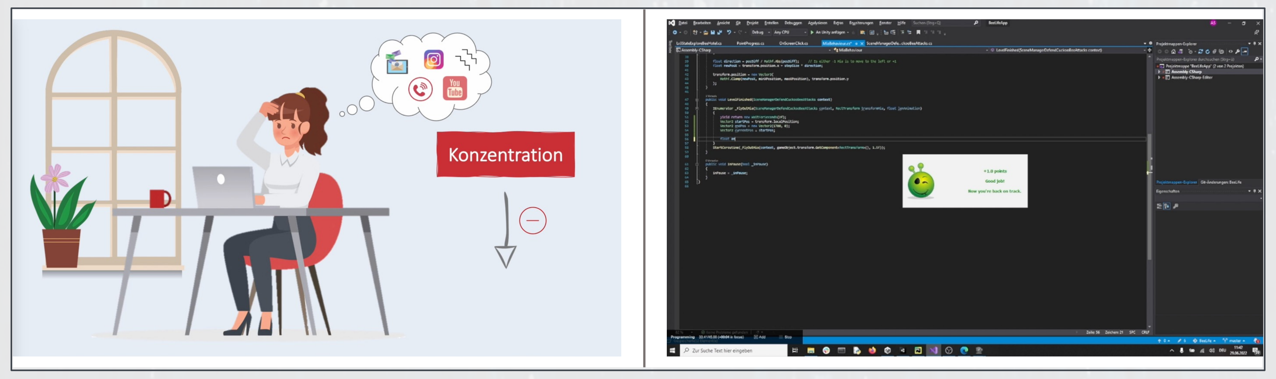

Fig. 2: 2D animation with virtual character (left) and screencast with feedback message (right).

- Storytelling approach includes virtual character Tina to capture and maintain recipients' attention (see **Fig. 3**)

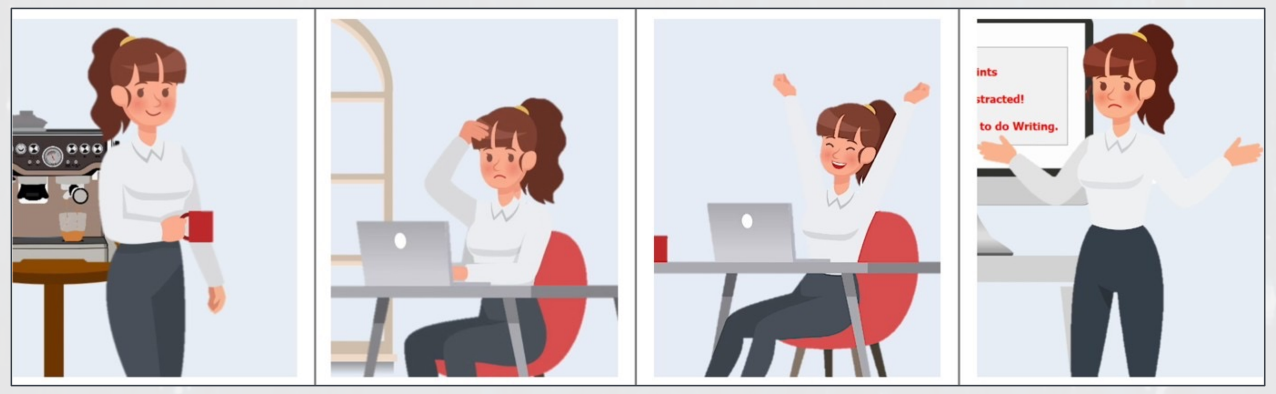

Fig. 3: Virtual character Tina with different facial expressions and poses across the video clip.

Discussion

- Motivating users to work with focUS requires to highlight individual performance gains
- Experience with focUS limited to reception of video clip instead of actual use
- Lack of validated German translation of UTAUT (own translation with α = .96 for performance expectancy)
- Generally moderate to high affinity for technology in inspected sample
- Adding gamified mechanisms (e.g., focus achievement levels) could further increase benefits of using focUS [7]

References

[1] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly, 27*, 425–478. https://doi.org/10.2307/30036540

[2] Wirzberger, M., Lado, A., Prentice, M., Oreshnikov, I., Passy, J.-C., Stock, A., & Lieder, F. (2022). Can we improve self-regulation during computer-based work with optimal feedback ? (Preprint). *Open Science Framework*. https://osf.io/8f6hx/

[3] Franke, T., Attig, C., & Wessel, D. (2019). A personal resource for technology interaction: Development and validation of the affinity for technology interaction (ATI) scale. *International Journal of Human–Computer Interaction, 35*, 456–467. https://doi.org/10.1080/10447318.2018.1456150

[4] Shenhav, A., Botvinick, M. M., & Cohen, J. D. (2013). The expected value of control: An integrative theory of anterior cingulate cortex function. Neuron, 79, 217–240. https://doi.org/10.1016/j.neuron.2013.07.007

[5] Callaway, F., Jain, Y. R., van Opheusden, B., Das, P., Iwama, G., Gul, S., Krueger, P. M., Becker, F., Griffiths, T. L., & Lieder, F. (2022). Leveraging artificial intelligence to improve people's planning strategies. *Proceedings of the National Academy of Sciences, 119*, e2117432119. https://doi.org/10.1073/pnas.2117432119

[6] Kalman, R. E. (1960). A new approach to linear filtering and prediction problems. *Journal of Basic Engineering, 82*, 35–45. https://doi.org/10.1115/1.3662552

[7] Sailer, M., & Homner, L. (2020). The gamification of learning: a meta-analysis. *Educational Psychology Review, 32*, 77–112. https://doi.org/10.1007/s10648-019-09498-w

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