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The Same Person Is Never the Same: Introducing Mood-Stimulated Thought/Action Tendencies for User-Centered Design

Abstract How people think and act is influenced by their transient mood state. Different moods stimulate different (thought/action) tendencies, such as the tendency to be attentive (when cheerful), to be cautious (when anxious), or to be impatient (when agitated). To support an understanding of how mood can inform user-centered design, this paper reports an exploratory study that revealed the diverse scope of these mood-stimulated human tendencies. The questionnaire study (N = 43) examined the relationships between 20 moods and 68 distinct tendencies. Significant mood effects were found for all tendencies, indicating that different moods are associated with different tendencies. A Correspondence Analysis generated a visual overview of these relationships. In addition, a Factor Analysis found nine generic dimensions of mood-stimulated tendencies. In user-centered design, these results can support communications about user mood with team-members, end-users and other stakeholders. Based on the study results, a creative design tool is introduced. It aims to enable designers and service providers to become better aware of, and adequately respond to, the dynamics of mood-stimulated user preferences, feelings, and actions during the design process.

1 Stephen W. Draper and Donald A. Norman, introduction to *User Centered System Design: New Perspectives on Human-Computer Interaction*, ed. Donald A. Norman and Stephen W. Draper (Hillsdale: Erlbaum, 1986), 2–3; Donald A. Norman, *The Design of Everyday Things* (New York: Doubleday/Currency, 1990), 1–8.

2 John Pruitt and Tamara Adlin, *The Persona Lifecycle: Keeping People in Mind Throughout Product Design* (San Francisco: Morgan Kaufmann, 2006), 11.

3 Mary Beth Rosson and John M. Carroll, "Scenario–Based Design," in *Human-Computer Interaction: Development Process*, ed. Andrew Sears and Julie A. Jacko (Boca Raton: CRC Press, 2009), 146–47.

4 For a review, see Meryl Paula Gardner, "Mood States and Consumer Behavior: A Critical Review," *Journal of Consumer Research* 12, no. 3 (1985): 283–90, DOI: https://doi.org/10.1086/208516; Joseph P. Forgas, "Mood Effects on Cognition: Affective Influences on the Content and Process of Information Processing and Behavior," in *Emotions and Affect in Human Factors and Human-Computer Interaction*, ed. Myounghoon Jeon (Orlando: Academic Press, 2017), 95–103.

5 Pieter M.A. Desmet, "Design for Mood: Twenty Activity-Based Opportunities to Design for Mood Regulation," *International Journal of Design* 9, no. 2 (2015): 2–5, available at http://www.ijdesign.org/index.php/IJDesign/article/view/2167.

Introduction

A design activity is *user-centered* when it gives explicit attention to the end-users and their needs, expectations, values, skills, and limitations during every stage of the design process. The ultimate goal of user-centeredness is to ensure that the resulting designs are useful, usable, meaningful, enjoyable, or otherwise appropriate to the user. In the 30 years since Donald Norman coined the term — inspired by his observation that even simple products can be surprisingly non-intuitive or frustrating to use[1] — user-centered design has gained wide acceptance as a standard for good design practice and is now taught in design schools across the globe.

To design in a user-centered manner, the team needs a comprehensive understanding of the target users. A variety of research methods have been introduced to obtain such user-relevant information, such as observations, interviews, experience sampling, focus groups, diary studies, and cultural probes. The raw user data acquired through these methods must be synthesized to offer a holistic understanding of the user in the context. Several effective techniques have been developed for this purpose, of which two are widely used: personas and usage scenarios. Personas are "fictitious, specific, concrete representations of target users."[2] These invented users serve to communicate a wide range of demographic and personality characteristics, including age, gender, cultural background, educational level, occupation, personality type, needs, goals, desires, concerns and values. User scenarios are narratives that describe how these users might interact with the design in the (social and physical) context of use. They provide a chronological overview of all the things that may happen in the usage situation.[3] Scenarios communicate *situational* user insights — what users tend to think, judge, value, and feel, and how they tend to behave in the particular situation of user-design interaction. These situational insights may also include information about the expected user's mood state. For example, when developing a new airport check-in procedure, the user scenario may mention that some people arrive on the scene in an anxious or stressed mood, and others arrive in a cheerful or relaxed mood. Since mood affects preferences, experiences, and behavior, this information can inform the user-centered design process. In the case of the check-in procedure, the design team can aim to develop a desk and procedure that accommodates the needs of users who are in an anxious mood, those who are in a relaxed mood, or both. In this paper, we zoom in and focus on *user mood state* as a salient ingredient of situational user profiling. Research has shown that people's perceptions, behaviors, and preferences are influenced by their momentary mood state.[4] Little is known, however, about the nature of these influences. Some studies have investigated a few generic influences exerted by positive versus negative moods,[5] but a clear overview of the diverse influence of human moods on user preference and behavior, is not available. As a consequence, it is currently not clear how knowledge about the user's momentary mood state can support design ideation and evaluation — even when we know that users are expected to be anxious, cheerful, relaxed, or gloomy, we do not know how to make use of that information in the design process.

To overcome this knowledge gap, we report a questionnaire study that was designed to map out the landscape of mood-stimulated human thought/action tendencies. The outcome is a detailed overview of the relationships between moods and thought/action tendencies, and a list of nine basic mood-stimulated tendencies. First, we introduce the concept of thought/action tendencies as a means to operationalize the pervasive influence of mood on a person's preferences, thoughts and actions. Next, we report the main study and discuss the results and implications. To illustrate design opportunities, we present a creative design tool that aims to enable designers to become aware of mood-stimulated tendencies. In the general discussion section, we reflect on the implications of the findings and provide ideas

on the ways the landscape of mood-stimulated tendencies can serve as a valuable resource for user-centered design.

Mood and Thought/Action Tendencies

Moods are low-intensity, diffuse (pleasant or unpleasant) feeling states that typically last for hours or days.[6] The palette of human moods is diverse. We can, for example, be cheerful, grumpy, calm, nervous, relaxed, excited, glum, or irritable. These moods can be categorized and studied as discrete states with distinct prototypical features and effects. At the same time, our mood is constantly changing from one state to another. These mood dynamics are influenced by our general bodily condition (for example energy vs. tiredness, tension vs. calmness),[7] our activities and the situations we encounter, our daily hassles and uplifts (a delayed train, running into an old friend, or a sunny day, for example), as well as our previous experiences and anticipated (future) events.[8] Moods have a pervasive influence on people's perceptions and behavior.[9] For example, when in a good mood, people are kinder to others (and to themselves), more generous and willing to lend a helping hand, more inclined to accentuate the positive aspects of ambiguous situations, more open to new activities and ideas, and more creative than when they are in a bad mood.[10] Likewise, in human–product interactions, mood influences which products people choose to interact with,[11] how they want to interact with these products,[12] which interaction possibilities they explore,[13] and what kinds of information they process during interaction.[14] These influences are explained by the dispositional theory of mood, which proposes that moods are best seen as temporary heightened dispositions to perceive and react to multiple objects in particular ways.[15] For example, a person who is in an irritable mood has an increased tendency to react angrily to other people who cross her path. This tendency is essentially temporary (and mood-specific) because she would have reacted very differently to the same people had she been in a cheerful or relaxed mood.

Based on the idea that different moods dispose people to different (re)actions, we suggest that user-centered design ideally involves an explicit awareness of the variety of moods that end-users may bring into the usage of a product or service. Moreover, we argue that mood-specific human dispositions can offer a terminology to operationalize the broad cognitive, affective, and behavioral influence of different mood states for design professionals. In the current study, we adopted the concept of *thought/action tendencies* to explore and specify these effects of user moods.

The term "action tendency" was popularized by Nico Frijda to discuss the diverse behavioral urges that accompany affective states. Action tendencies are states of readiness to engage in behavior of a particular kind.[16] Examples are the tendency to flee (fear), to attack (anger), or to sulk (grumpiness). Barbara Fredrickson broadened the concept by expanding the term to "thought/action tendency," highlighting that mood- and emotion-stimulated tendencies can also be mental, such as the tendency to be open to new experiences, or the tendency to savor an experience.[17] In line with the dispositional theory of mood, thought/action tendencies are seen as temporary dispositions to think, act and respond in a certain way. Hence, mood-stimulated tendencies[18] are not thoughts or actions in themselves – they are *inclinations* to certain types of thought and behavior. For example, when in a grumpy mood, we generally tend to be more closed-minded and reluctant to participate socially than when in a cheerful mood. Conversely, when in a cheerful mood, we more readily take risks and engage in new experiences. These examples illustrate that mood-stimulated tendencies are pervasive: they are not directed at a specific person or object, but toward anything or anyone we happen to encounter. Compare this to emotions, which are directed at a particular cause or object of the emotion,[19]

6 William N. Morris, *Mood: The Frame of Mind* (New York: Springer-Verlag New York Inc., 1989), 1–3.

7 Robert E. Thayer, J. Robert Newman, and Tracey M. McClain, "Self-Regulation of Mood: Strategies for Changing a Bad Mood, Raising Energy, and Reducing Tension," *Journal of Personality and Social Psychology* 67, no. 5 (1994): 911, DOI: https://doi.org/10.1037//0022-3514.67.5.910.

8 For a detailed review of how major life events and daily hassles and uplifts influence moods, see Allen D. Kanner et al., "Comparison of Two Modes of Stress Measurement: Daily Hassles and Uplifts versus Major Life Events," *Journal of Behavioral Medicine* 4, no. 1 (1981): 20–22, DOI: https://doi.org/10.1007/BF00844845; Darryl J. Maybery et al., "The Positive Event Scale: Measuring Uplift Frequency and Intensity in an Adult Sample," *Social Indicators Research* 78, no. 1 (2006): 61–64, DOI: https://doi.org/10.1007/s11205-005-4096-8.

9 Scott W. Kelly and K. Douglas Hoffman, "An Investigation of Positive Affect, Prosocial Behaviors and Service Quality," *Journal of Retailing* 73, no. 3 (1997): 422–23, DOI: https://doi.org/10.1016/S0022-4359(97)90025-7; William N. Morris, "The Mood System," in *Well-Being: Foundations of Hedonic Psychology*, ed. Daniel Kahneman, Ed Diener, and Norbert Schwarz (New York: Russell Sage Foundation, 1999), 171–72.

10 Alice M. Isen and Paula F. Levin, "Effect of Feeling Good on Helping: Cookies and Kindness," *Journal of Personality and Social Psychology* 21, no. 3 (1972): 387, DOI: https://doi.org/10.1037/h0032317; F. Gregory Ashby, Vivian V. Valentin, and U. Turken, "The Effects of Positive Affect and Arousal on Working Memory and Executive Attention: Neurobiology and Computational Models," in *Emotional Cognition: From Brain to Behaviour*, ed. Simon C. Moore and Mike Oaksford (Amsterdam: John Benjamins, 2002), 245–48; Sonja Lyubomirsky, Laura King, and Ed Diener, "The Benefits of Frequent Positive Affect: Does Happiness Lead to Success?," *Psychological Bulletin* 131, no. 6 (2005): 840, DOI: https://doi.org/10.1037/0033-2909.131.6.803.

11 For example, see Soussan Djamasbi and Diane M. Strong, "The Effect of Positive Mood on Intention to Use Computerized Decision Aids," *Information & Management* 45, no. 1 (2008): 43, DOI: https://doi.org/10.1016/j.im.2007.10.002; Soussan Djamasbi, Diane M Strong, and Mark Dishaw, "Affect and Acceptance: Examining the Effects of Positive Mood on the Technology Acceptance Model," *Decision Support Systems* 48, no. 2 (2010): 391–93, DOI: https://doi.org/10.1016/j.dss.2009.10.002.

12 For example, see Stephan Wensveen, Kees Overbeeke, and Tom Djajadiningrat, "Push Me, Shove Me and I Show You How You Feel: Recognising Mood from Emotionally Rich Interaction," in *DIS '02 Proceedings of the 4th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques* (New York: ACM, 2002), 337, DOI: https://doi.org/10.1145/778712.778759.

13 For example, see Viswanath Venkatesh and Cheri Speier, "Computer Technology Training in the Workplace: A Longitudinal Investigation of the Effect of Mood," *Organizational Behavior and Human Decision Processes* 79, no. 1 (1999): 23, DOI: https://doi.org/10.1006/obhd.1999.2837.

14 For example, see Mimi Zhang and Bernard J. Jansen, "Influences of Mood on Information Seeking Behavior," in *Proceedings of the CHI '09 Extended Abstracts on Human Factors in Computing Systems* (Boston, MA: ACM, 2009), 3395. DOI: https://doi.org/10.1145/1520340.1520492.

15 Matthias Siemer, "Mood Experience: Implications of a Dispositional Theory of Moods," *Emotion Review* 1, no. 3 (2009): 257, DOI: https://doi.org/10.1177/1754073909103594.

16 Nico H. Frijda, *The Emotions* (Cambridge, UK: Cambridge University Press, 1986), 71.

17 Barbara L. Fredrickson, "What Good Are Positive Emotions?," *Review of General Psychology* 2, no. 3 (1998): 303, DOI: https://doi.org/10.1037/1089-2680.2.3.300.

18 We will use the word "tendencies" as a shortened form of "thought/action tendencies" in the rest of the paper.

for example, when we are angry, we are angry with *someone*, and when we are afraid, we are afraid of *something*. Humans have a wide repertoire of thought/action tendencies, such as the readiness to be defensive, offensive, agreeable, mindful, or impulsive. Because the concept of thought/action tendencies offers a clear terminology to operationalize the broad impact of mood on humans, with the present research we sought to generate an overview of mood-simulated thought/action tendencies.

Main Study: Mood-Stimulated Thought/Action Tendencies

This study includes a list of 20 different mood states, which, in a series of mood granularity studies, were found to represent a broad overview of the human mood repertoire: *miserable, sentimental, gloomy, lethargic, grumpy, agitated, anxious, stressed, serious, boisterous, rebellious, vigorous, giggly, amiable, cheerful, relaxed, dreamy, peaceful, productive, and jubilant*.[20] Elaborate descriptions of these moods can be found in an online typology.[21] This typology is currently, to our knowledge, the most detailed mood categorization available in the literature. The study aim was to investigate which tendencies are associated with these 20 moods. The overall objective was to obtain an overview of the variety of tendencies, that is, to determine the landscape of mood-related tendencies. More specifically, we investigated (research question 1) whether these tendencies differentiate between the 20 mood states, and (research question 2) whether generic dimensions of mood-related tendencies can be identified.

Method
The study examined the associations between 68 distinct thought/action tendencies and 20 moods in a controlled online study. For each of the 1360 mood × tendency combinations, participants rated the likelihood that that particular tendency would occur when in that particular mood using a three-point scale (1 = no, does not occur; 2 = can occur, but not necessarily; 3 = yes, does occur).

Respondents
Forty-three second-year Master's students at Faculty of Industrial Design Engineering, Delft University of Technology participated in this study. Of these, 27 were female. They represented eight different nationalities (of which 21 were Dutch). Participants were recruited from a design course. They volunteered to participate and were given a gift (a booklet) in return for their participation.

Material
Cognitive emotion psychologists have extensively studied emotion-relevant thought/action tendencies, resulting in various lists and overviews. We first examined whether these emotion-related tendencies are also applicable to moods. We started with a published overview of 40 tendencies, which was assembled on the basis of an elaborate review of emotion literature.[22] A pilot study explored the degree to which the various tendencies apply to the 20 moods. The results indicated that many of these tendencies are emotion-specific and cannot be applied to moods because they imply a focused subject–stimulus relationship. We therefore decided to develop a set of mood-specific tendencies. This set was based on data obtained with an elaborate phenomenological mood inquiry and the resulting holistic mood typology.[23] First, each author independently formulated a longlist by extracting tendencies from the rich descriptions provided for each of 20 mood states. The procedure was to read the data transcripts and extract all words (or word combinations) that refer to mental or physical actions or tendencies. Combining the

three longlists enabled us to generate an inclusive list of thought/action tendencies associated with the variety of moods. The second step was a discussion in which we compared, clustered, and reformulated the items to reach a similar level of abstraction, resulting in a list of 80 initial thought/action tendencies. Then, over a period of a month, the authors independently rated the 1600 mood × tendency combinations (20 moods × 80 thought/action tendencies), with three options: (1) this mood stimulates this tendency; (2) this mood does not stimulate this tendency; (3) this mood may, but does not necessarily, stimulate this tendency. The results were analyzed and discussed in four workshops, each lasting approximately four hours. Rating disagreements were discussed until reaching consensus. Subsequently, tendencies were omitted from the list of which authors agreed that they are not expected to be influenced by any of the moods. These workshops resulted in a refined set of 68 distinct thought/action tendencies (see Table 1).

Procedure

The questionnaire was divided into ten parts to prevent fatigue-induced validity issues. Participants filled out a maximum of one part per day during a two-week period. Each part included two mood states, in which both mood order and tendency order were randomized between respondents. The first part introduced the study, explaining the aim and procedure. In the ensuing parts, each mood was introduced with a formal definition and four images that illustrated/represented the mood, drawn from the holistic mood typology.[24] In line with a standard procedure for this kind of questionnaire, respondents were asked to first recall (and write down) an occasion in which they vividly felt the given mood, before filling out the questionnaire.[25] In order to familiarize them with the scale, they were asked to fill out a short exercise questionnaire in a group setting. The results were discussed with and among the group members, ensuring that all participants sufficiently understood the task. Next, respondents filled out the first part of the questionnaire while a researcher was present in the room, giving them the opportunity to ask questions during and after filling out that first part. The remaining nine parts were filled out online, at a time and place convenient to the participant. Each day, every participant received a personal code which gave them access to the study interface, in which they could fill in the questionnaire at their own pace. Most respondents completed the ten questionnaire parts in a period of two to three weeks; some took an additional week to complete the task.

Results

An overview of the seven tendencies that were rated highest for each of the various moods can be found in Appendix A. Only the first seven are reported here to balance between overview and completeness; the complete overview is available from the corresponding author. To study the associations between tendencies and mood states, a (one-way) repeated measures ANOVA was conducted for each tendency, with Mood (20 levels) as a within-participants factor and the Thought/Action Tendency as the dependent variable. These analyses showed a statistically significant main Mood effect for all Thought/Action Tendencies (F (19, 830), $p < 0.001$), which indicates that all tendencies differentiated mood states from one another (Research question 01). Test values are shown in Appendix B.

To obtain an overview of the landscape of mood-stimulated tendencies, and to answer the second research question (i.e. whether generic dimensions of mood-stimulated tendencies can be identified), we used two exploratory methods: Correspondence Analysis (CA) and Factor Analysis (FA). Both techniques decompose the variance in a model into lower-dimensional representations, aiming to identify a reduced number of factors that can explain most of the variability in the model.[26]

19 For example, see Brian Parkinson et al., *Changing Moods: The Psychology of Mood and Mood Regulation* (London, UK: Longman, 1996), 7–8; Nico H. Frijda, "Mood," in *Oxford Companion to Emotion and the Affective Sciences*, ed. David Sander and Klaus R. Scherer (New York: Oxford University Press, 2009), 258.

20 Haian Xue, Pieter M.A. Desmet, and Steven F. Fokkinga, "Mood Granularity for Design: Introducing a Holistic Typology of Twenty Mood States" (unpublished manuscript available upon request, last modified January 27, 2019).

21 Pieter M.A. Desmet, Haian Xue, and Steven F. Fokkinga, "Twenty Moods: A Holistic Typology of Human Mood States" (unpublished manuscript available upon request, last modified January 27, 2019).

22 Johnny J. R. Fontaine and Klaus R. Scherer, "Emotion Is for Doing: The Action Tendency Component," in *Components of Emotional Meaning: A Sourcebook*, ed. Johnny J. R. Fontaine, Klaus R. Scherer, and Cristina Soriano (Oxford: Oxford University Press, 2013), 172–74.

23 Xue et al., "Mood Granularity for Design."

24 Desmet et al., "Twenty Moods."

25 For an example of this procedure, see Marcel Zeelenberg et al., "The Experience of Regret and Disappointment," *Cognition & Emotion* 12, no. 2 (1998): 225, DOI: https://doi.org/10.1080/026999398379727.

26 Sten-Erik Clausen, *Applied Correspondence Analysis: An Introduction* (Thousand Oaks: Sage, 1988), 23.

27 For a discussion, see Laura Doey and Jessica Kurta, "Correspondence Analysis Applied to Psychological Research," *Tutorials in Quantitative Methods for Psychology* 7, no. 1 (2011): 6–7, DOI: https://doi.org/10.20982/tqmp.07.1.p005.

28 Ibid., 6.

29 For example, see Michelle Yik, James A. Russell, and James H. Steiger, "A 12-Point Circumplex Structure of Core Affect," *Emotion* 11, no. 4 (2011): 706, DOI: https://doi.org/10.1037/a0023980; and James A. Russell, "A Circumplex Model of Affect," *Journal of Personality and Social Psychology* 39, no. 6 (1980): 1167, DOI: https://doi.org/10.1037/h0077714.

These exploratory methods are especially valuable for large data tables like the one generated in this study.[27] The methods have different advantages. CA provides a direct visual overview of associations among the variables, which is particularly useful for the study's aim of gaining insights into the scope of mood-stimulated tendencies. FA collapses a large number of variables into a few interpretable underlying factors, which is particularly useful for the study's second aim of exploring whether generic dimensions for mood-stimulated tendencies can be identified.

Analysis Step 1: Correspondence Analysis

A CA was performed (with SPSS Statistics software) with two factors (symmetrical normalization): Mood (20 levels) and Thought/Action Tendency (68 levels). The two-dimensional solution (Figure 1) visualizes the associations between mood states and reported tendencies. Moods that are plotted close to each other stimulate similar tendencies. The goal of CA is to explain the most inertia (or variance) in the model with the least number of dimensions.[28] The two dimensions in Figure 1 respectively account for 82 per cent of the total inertia: 58 per cent by the horizontal (inertia = 0.36) and 24 per cent by the vertical axis (inertia = 0.39; a third dimension would contribute an additional 8 per cent). The distance between points in the biplot is an expression of the similarity in their patterns, which applies for both the mood states and the thought/action tendencies.

Corresponding with similar multidimensional scaling analyses in affect studies, the biplot shows the two basic affect dimensions valence (left is positive, right is negative) and arousal (bottom is low activation, top is high activation).[29] The left side of the biplot shows tendencies that are typically associated with positive mood states, such as the tendency to be interested, enthusiastic, creative, carefree, and open-minded. The right side of the biplot shows action modes that are typically associated with negative mood states, such as the tendency to see the bad, to worry, and to be pessimistic. At the top, we find activated tendencies, such as the tendency to be loud, to act impulsively, and to move restlessly. In contrast, at the bottom, we find deactivated tendencies, such as the tendency to engage in calm activities, to save energy, and to move calmly.

The moods show a nice distribution in the biplot, indicating a broad differentiation in terms of associated action modes, one that is more granular than described with the basic positive-negative and activated-calm dimensions. In agreement with the table in Appendix A, the biplot indicates that that different moods are associated with distinct profiles of tendencies. The biplot also indicates that some of these profiles are more similar to each other than others. For example, the profile of tendencies associated to Amiable is more distinct from the profile of Miserable than from the profile of Cheerful. In other words, when we are cheerful, we have tendencies that, to some degree, are similar to the tendencies that we have when we are amiable, but very different from those we have when we are miserable. Some moods are positioned close together: (1) Relaxed, Peaceful, and Dreamy; (2) Gloomy and Lethargic; (3) Jubilant and Giggly. This may indicate that their profiles of thought/action tendencies cannot be distinguished from each other. To examine whether and how their tendency profiles differ, repeated measures ANOVAs were conducted for each tendency, with Mood as the within-participants factor and the Thought/Action Tendencies as dependent variables.

Gloomy and Lethargic: The ANOVA found an overall significant main Mood effect (F (15, 68) = 3.13, $p < 0.001$), indicating that Gloomy and Lethargic have different tendency profiles. Significant differences were found for seven tendencies (F (1, 82)): Compared to Lethargic, the tendency profile of Gloomy includes higher levels of tendencies to "worry" (0.62; $F = 14.68$, $p < 0.01$), "have meandering thoughts" (0.60; $F = 14.01$, $p < 0.01$), "contemplate" (0.57; $F = 10.08$, $p < 0.05$), "be pessimistic" (0.50;
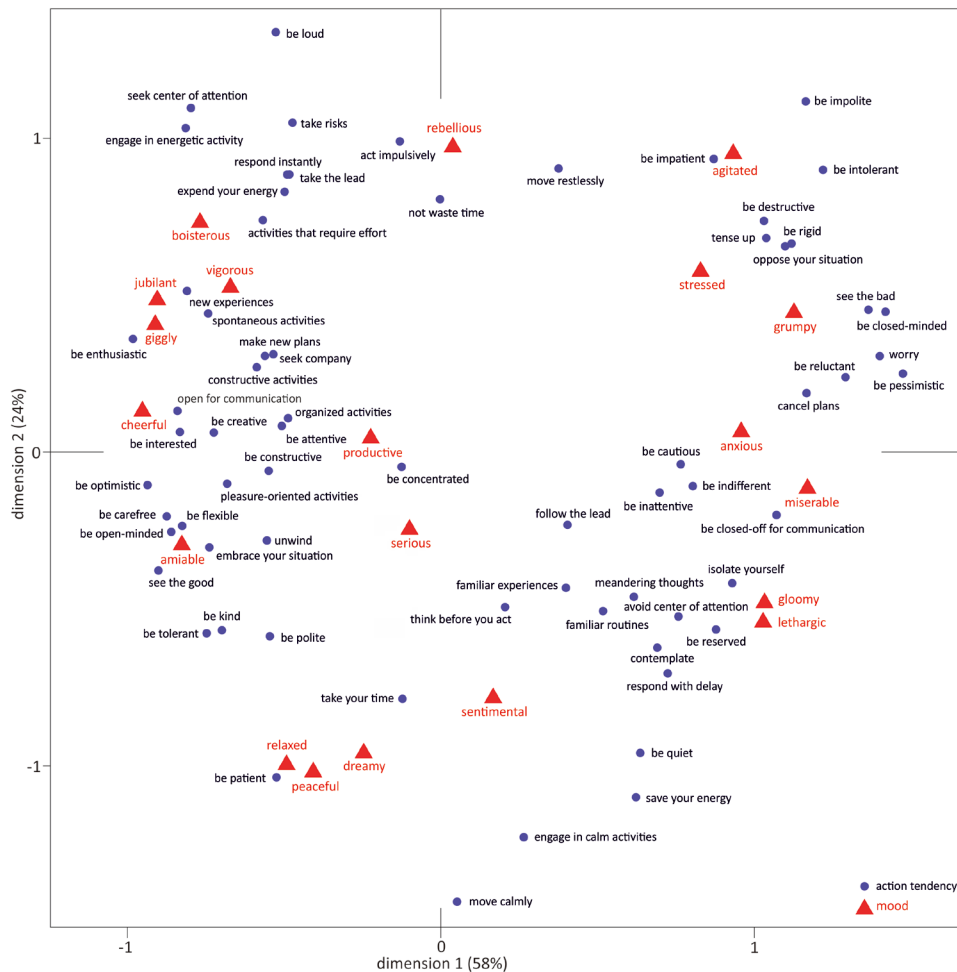
Figure 1 Mood tendency space (correspondence biplot of mood states and thought/action tendencies). © 2019 by Pieter M. A. Desmet.

$F = 11.10$, $p < 0.01$), and "be polite" (0.36; $F = 5.45$, $p < 0.05$), and lower levels of tendencies to "be indifferent" (–0.36; $F = 6.40$, $p < 0.05$) and "unwind" (–0.36; $F = 4.12$, $p < 0.05$).

Jubilant and Giggly: The ANOVA did not find an overall significant main Mood effect ($F (16, 68) = 1.23$, $p = 0.34$), indicating that no differences were found between the tendency profiles of Jubilant and Giggly.

Relaxed, Peaceful, and Dreamy: The ANOVA did not find an overall significant main Mood effect for Relaxed versus Peaceful ($F (17, 68) = 1.07$, $p = 0.46$), or for Dreamy versus Peaceful ($F (16, 68) = 1.32$, $p = 0.27$). However, a significant effect was found for Relaxed versus Dreamy ($F (16, 68) = 2.08$, $p = 0.05$). Significant differences were found for 18 tendencies ($F (1, 83)$. Here we name the six tendencies on which the mood states differ most. Compared to Dreamy, the tendency profile of Relaxed includes higher levels of tendency to "be attentive" (0.73; $F = 19.41$, $p < 0.01$), "seek company" (0.69; $F = 24.75$, $p < 0.001$), and "be open to communication" (0.68; $F = 14.91$, $p < 0.001$). In contrast, the motivational profile of Dreamy includes higher levels of tendency to "be closed to communication" (–0.87; $F = 30.29$, $p < .001$), "be inattentive" (–0.83; $F = 25.96$, $p < 0.01$), and "be indifferent" (–0.63; $F = 16.13$, $p < 0.01$).

Analysis Step 2: Factor Analysis

FA uses inter-correlations among large numbers of observed variables in order to identify a smaller number of underlying factors. The underlying premise is that the observed variables have similar patterns of responses because they are associated with a latent – not directly measured – variable. In the present study, FA was used to identify underlying generic patters of mood-stimulated tendencies. We

Table 1. Factor loadings of the 68 action modes included in the study, including accounted variance in the data and eigenvalues. Extraction method: Principal Component Analysis. Rotation method: Varimax with Kaiser Normalization.

Thought/Action Tendencies. You tend to…	Factors (Pearson Correlations)								
	1	2	3	4	5	6	7	8	9
Be intolerant	0.73		−0.21						
See the bad	0.70		−0.28						
Be impolite	0.69								0.20
Be impatient	0.69		−0.23						
Be closed-minded	0.68		−0.24	0.22					
Be destructive	0.65								
Tense up	0.62		−0.25						−0.24
Be pessimistic	0.62		−0.26	0.24			0.25		
Worry	0.61		−0.29	0.21			0.27		−0.26
Be rigid	0.60								
Oppose your situation	0.58								
Be reluctant	0.54		−0.22	0.30			0.20		
Cancel plans	0.52			0.41					
Move restlessly	0.39	0.36							
Engage in energetic activity		0.74							
Seek out new experiences		0.70	0.25						
Take risks		0.65			0.23				
Expend your energy		0.62							
Engage in spontaneous activity		0.62	0.31						
Seek the center of attention		0.62							0.27
Act impulsively	0.31	0.62							
Be loud		0.60		−0.20			−0.34		
Make new plans		0.58	0.22				0.28		
Be enthusiastic	−0.35	0.57	0.33				−0.21		
Engage in pleasure-oriented activity	−0.28	0.50	0.46						
Seek the company of others		0.49	0.25	−0.23		0.34			
Respond instantly		0.47		−0.31	0.27		−0.22		
Be creative	−0.26	0.43	0.34		0.26				
Be kind	−0.35		0.76						
Be tolerant	−0.33		0.70						
Be polite	−0.21		0.69		0.22				
Be open–minded	−0.37	0.31	0.66						
Be flexible	−0.24	0.32	0.63						
See the good	−0.46	0.24	0.63						
Be patient	−0.23	−0.21	0.62						0.25
Be optimistic	−0.46	0.37	0.56						
Open up to communication		0.43	0.52	−0.28				0.22	
Embrace your situation	−0.47	0.27	0.51						
Be carefree	−0.31	0.42	0.47		−0.21				0.23
Unwind		0.29	0.45						0.42
Take your time			0.43	0.31					0.39

Table 1. (*Continued*)

Thought/Action Tendencies. You tend to…	Factors (Pearson Correlations)								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Seek to isolate yourself	0.26			0.72					
Be quiet		−0.36		0.67			0.21		
Respond with delay				0.66					
Close off to communication	0.37			0.66				−0.24	
Be reserved	0.22	−0.27		0.63					
Avoid the center of attention	0.20	−0.33		0.56					
Save your energy		−0.30		0.51	0.23				
Be cautious	0.28			0.31	0.26	0.23			−0.27
Concentrate					0.72				
Engage in productive activity		0.31			0.66				
Be constructive			0.29		0.65				
Not waste time					0.60				−0.20
Engage in activities that require effort		0.50			0.52				
Take the lead		0.45			0.49				
Engage in organized activities		0.27			0.47	0.32			
Think before acting				0.23	0.46	0.24	0.36		
Seek out familiar experiences				0.20		0.71			
Follow the lead of someone else						0.68			
Follow familiar routines		−0.21		0.38		0.66			
Have meandering thoughts	0.24			0.28			0.64		
Be contemplative				0.30			0.61		
Be attentive to what's going on		0.26	0.31					0.70	
Be inattentive to what's going on	0.24			0.42				−0.61	
Be interested in what's going on		0.34	0.42					0.60	
Be indifferent about what's going on	0.27			0.38				−0.59	
Move calmly	−0.25	−0.33	0.25	0.31			0.26		0.48
Engage in calm activities		−0.32	0.23	0.34	0.30	0.30			0.37
Percentage of Variance	11.9	11.4	9.7	7.4	5.4	3.4	3.1	3.1	2.4
Eigenvalue	16.9	7.6	5.0	3.2	2.0	1.3	1.3	1.2	1.1

performed an exploratory factor analysis (with SPSS Statistics software), which is suitable when there is no pre-formulated hypothesis about the nature and number of underlying factors. We used principal components extraction and Varimax rotation. Bartlett's test of sphericity, which tests the overall significance of all the correlations within the correlation matrix, was significant (χ^2 (2278) = 31992.8, $p < 0.001$), indicating that it was appropriate to use the factor analytic model on this set of data. The cut-off point was based on eigenvalues (> 1), which resulted in nine factors. Table 1 shows the factor loadings of the tendencies (loadings of 0.2 or higher are shown). The factor loadings are the correlation coefficients between the measured tendencies and the factors. The first factor was robust, with a high eigenvalue of 16.8, and it accounted for 11.9% of the variance in the data. Factor two had an eigenvalue of 7.6 and accounted for a further 11.4% of the variance. The eigenvalues for factors three up to nine ranged between 5.0 and 1.1, together accounting for a further 34.5% of the total variance.

30 For example, see Randy J. Larsen and Edward Diener, "Promises and Problems with the Circumplex Model of Emotion," in *Review of Personality and Social Psychology: Emotion*, ed. Margaret S. Clark (Thousand Oaks: Sage, 1992), 25–59; David Watson and Lee Anna Clark, *The Panas-X: Manual for the Positive and Negative Affect Schedule—Expanded Form* (Iowa: The University of Iowa, 1994), DOI: https://doi.org/10.17077/48vt-m4t2.

The factor analysis revealed that nine factors were sufficient to explain the underlying structure of thought/action tendencies associated to mood states. Factor one, which was labeled as the **tendency to be critical**, consists of 14 tendencies, and is mainly defined by the tendencies to see the bad and be intolerant, impolite, and inpatient. In addition, it includes the tendencies to worry and tense up. Factor two was labeled as the **tendency to be impulsive**. This factor is mainly defined by the tendencies to engage in energetic activities, seek out new experiences, and take risks. In addition, it has a pleasure focus, represented by the tendencies to be enthusiastic and engage in pleasure-oriented activity. Factor three was labeled as the **tendency to be easy-going**. It includes the tendencies to be kind, tolerant, polite, and open-minded. In addition, it is defined by the tendencies to be carefree and optimistic and to embrace one's situation. Factor four was labeled as the **tendency to seclude**. It is defined by the tendencies to seek isolation, be quiet, close off from communication, and save one's energy. Factor five was labeled as the **tendency to be diligent**, including the tendencies to be concentrated and constructive. In addition, it includes the tendencies to take the lead and engage in activities that are organized and require effort. Factor six was labeled as the **tendency to prefer the familiar**, including the tendencies to prefer familiar experiences, follow the lead, and adhere to familiar routines. Factor seven was labeled as the **tendency to be pensive**, represented by having meandering thoughts, being contemplative, and being quiet. Factor eight was labeled as the **tendency to be present**. The positive pole is defined by the tendencies to be attentive to and interested in what's going on around one, and the negative pole is defined by the tendencies to be inattentive and indifferent. The ninth and final factor was labeled as the **tendency to be serene**, including the tendencies to unwind, take one's time, and move calmly.

Initial Conclusions and Discussion

The aim of this study was to uncover the landscape of mood-stimulated thought/action tendencies. The results demonstrate that this landscape is both diverse and distinct, as shown in Figure 1. It is diverse because it includes a wide variety of tendencies — to take risks or be careful, to embrace one's situation or oppose it, to be open to communication or closed off — and many more. The first research question asked whether these tendencies differentiate between mood states. Significant mood effects for all 68 tendencies indicated such differentiation. In other words, these tendencies are not random — different moods are associated with different tendencies. We found that each of the 18 (out of 20) mood states represents a unique and distinct constellation of tendencies (except for Relaxed & Peaceful and Jubilant & Giggly). The results of the study reveal that mood-stimulated tendencies are much more diverse than they are generally assumed in affective studies, which focus mostly on two, or in some cases three, affect dimensions.[30] The second research question asked whether it is possible to identify generic dimensions of mood-stimulated tendencies. The factor analysis (Table 1) identified nine basic response tendencies.

While the relationship between emotions and thought/action tendencies has been widely studied, this is the first study that also finds a clear indication that there is a similar relationship with moods. We anticipate that both the detailed overview in Figure 1 and the reduced list of nine key mood-related tendencies can be used as resources to describe and understand the user's situational state in experience-focused design projects. The nine general tendencies can be used to explicitly include and operationalize mood in personas and/or user scenarios. For a given design brief, combinations of these tendencies can be used to describe the particular user's situational mind-set. We can illustrate with the example of

the airport check-in procedure that was mentioned in the introduction. One user group is expected to enter the scene with an anxious or stressed mood, and another group with a cheerful or relaxed mood. From the study results, we can infer that the first group will have the general tendency to prefer the familiar and be pensive. This means that they may like to be "taken by the hand" so that they know exactly what will happen, where they should go, and what they need to do next. Moreover, they tend to be absent-minded, which can be taken into consideration when developing interaction protocols. The second group (cheerful), tends to be easygoing and present. We can therefore expect them to be attentive, open to communication, and tolerant to their situation. Obviously, these different tendencies call for different product features and interactions. If we optimize a design only for people who are cheerful, it may not be enjoyed by those who are in an anxious mood, and the other way around. Depending on the required degree of granularity, both the nine basic tendencies and the mood tendency space in Figure 1 offer a direct entry point into the thought/action tendencies that are associated with different moods.

Mood-Empathy Game for Designers

With the study results at hand, we were curious to see how designers could make use of the generated knowledge. As a first exploration, we introduced the mood tendency space (Figure 1) to a group of design students. They were invited to take the image as a source of inspiration and to creatively explore design opportunities. Here, we report one of the design outcomes, which was developed by design student Amy den Dekker: the *Mood-Empathy Game for Designers*. This game is a tool-supported creative session facilitator. It was designed to inspire designers and support an increase in their general understanding of the mood phenomenon (Figure 2). The game-based sessions can be used in the context of design education and design studios. Designers (or design students) are guided through a playful group activity that stimulates them to empathize with the variety of thought/action tendencies that are associated with different moods. With dynamic enactments, they explore how mood influences people's motivations, behaviors, perceptions, and preferences, and how this can affect human-product interactions. Ultimately, the session helps the designers to explore how these insights can inform their design efforts.

The tool consists of a tube that contains a white ball, a colorful mood palette visual, and three kinds of playing cards: 20 mood cards (see Figure 3 for examples), three role cards, and five step cards. The game is played with four to seven designers who focus on a given design project (design goal, context, user). The session consists of five steps, as explained by the five consecutive step cards (Figure 4).

- Step 1, getting started: Players open the tube and explore the material.
- Step 2, selecting moods: Together, players select three or four moods from the mood palette visual. They can select moods from the user scenario for the design task at hand, or use other criteria to select moods, such as inspiration or simple diversity.
- Step 3, deciding roles: Players divide up the three roles (observer, listener, actor), keeping in mind that the session needs at least one observer, one listener, and two actors. The assignments for the different roles are explained by the three role cards.
- Step 4, empathize: This is core of the session. The actors decide in which order they will act out the moods. For each mood, they carefully read the representing mood card. Next, they stand up and behave as if they are in that mood by means of explorative improvisation. They can interact with each other and/or with the white ball. The watcher and listener carefully observe and can ask questions to encourage the actors to further explore the mood's

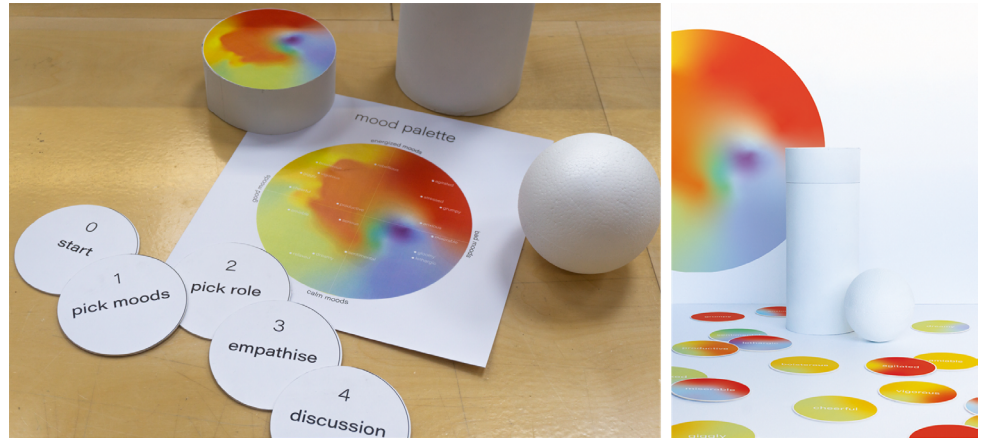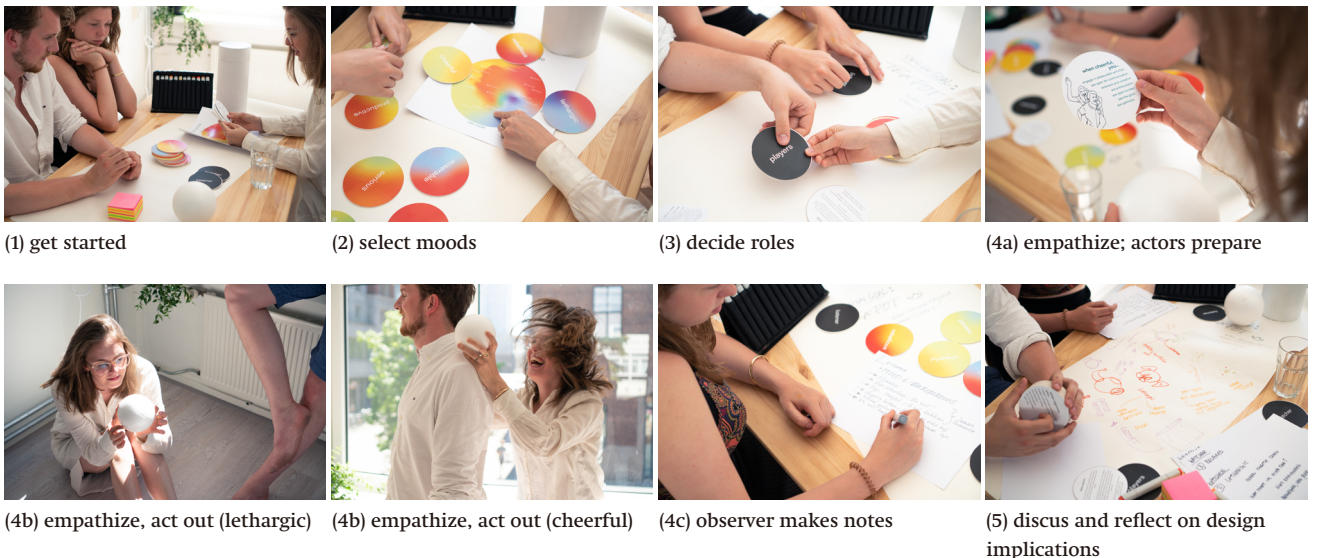**Figure 2** The Mood-Empathy Game for designers. © 2019 by Amy den Dekker.

Figure 3 Six examples of mood cards (front and back). © 2019 by Amy den Dekker.

Figure 4 Scenario for playing the Mood-Empathy game for designers. © 2019 by Amy den Dekker.

(1) get started

(2) select moods

(3) decide roles

(4a) empathize; actors prepare

(4b) empathize, act out (lethargic)

(4b) empathize, act out (cheerful)

(4c) observer makes notes

(5) discus and reflect on design implications

effects. This process is repeated for all the moods the players have selected.

- Step 5, discussion: In the final step, players share experiences and observations, focusing on response tendencies, body postures, and other expressions, interactions, and perceptions associated with the selected moods. The aim is to explore how these observations can inform the design process, that is, what kind of design qualities can be meaningful or relevant for the given mood-associated tendencies.

We foresee this game (or similar games and tools) serving several purposes. First, role-playing and active improvisation can support creativity and empathy with users. Second, the collaborative effort stimulates an understanding of

mood-stimulated thought/action tendencies that is shared among team members. Third, game-based learning can reach design students who may not be directly inspired by the text-based forms of knowledge-transfer.

General Discussion

This study revealed a notable variability of mood-influenced thought/action tendencies. This variability implies that *the same person is never the same*: any person's thought/action repertoire is not static but constantly moving around the mood tendency space (Figure 1). In other words, people's momentary moods frame their preferences and states of readiness to think and (inter)act with people, environments, and objects in a particular way. In line with the findings of our study, we propose that mood information can make a relevant contribution to the practice of user profiling (in terms of personas and user scenarios). At first sight, the suggestion may sound counterintuitive, because a user cannot be characterized in terms of being in particular mood. Our moods are constantly changing, evolving from one state to another. While an intended user may be gloomy today, she may just as well be cheerful, grumpy, relaxed, or anxious tomorrow. Nonetheless, for some design briefs it may be possible to formulate profiles of *probable* user moods. For example, in the earlier-used airport example, we might expect that a sub-group of customers would be stressed or anxious (late check-in), and another sub-group of customers who are cheerful (leisure travelers with ample time), or another, serious (business travelers). Given this notion of probable moods, the design team can choose a strategy. They can, for example, decide to accommodate for all three moods, or diversify by providing different design options that cater to the different sub-groups. Either way, the mood tendency space and other study results can help them understand the temporal dispositions of their intended users. To give an example, the study results show that stressed users tend to be impatient, impolite, and rigid — information the design team could probably use in some way. We envision that the study results can also be used as a means for evaluating existing designs or design ideas. For example, the design of a primary school classroom can be evaluated in terms of "mood-flexibility," that is the degree to which it functions as a safe and functional space for students in various moods. According to Figure 1, we can infer that children who are in a gloomy mood will likely have the tendency to avoid being the center of attention, whereas children who are in a boisterous mood will have the tendency to seek attention. Does the classroom sufficiently accommodate these passing tendencies? And should it? In other words, gaining greater insight into the diverse nature of mood-stimulated thought/action tendencies can enable design teams to include considerations about user mood in the formulation of their design intentions.

Mood-stimulated thought/action tendencies bear some resemblance to the personality construct. Personality traits can be loosely defined as "forces that influence how we think, act, and feel"[31] or "average tendencies to behave in certain ways."[32] This means that our baseline or set-point disposition is not neutral, it depends on our personality. Zajenkowski and colleagues examined the variability of the relationship between personality and mood in different situations. They concluded that personality may be less static and more influenced by mood than is postulated in personality studies: "In empirical studies it is usually assumed that personality influences mood, however one may wonder whether the correlations could be interpreted in the opposite direction. Namely, it would be interesting to determine whether the self-report personality measure is partially contaminated by mood experienced in particular situations."[33] This statement is supported by our study findings and also resonates with our intuitive understanding of personality. It seems too restrictive

31 Randy J. Larsen and David M. Buss, *Personality Psychology: Domains of Knowledge About Human Nature*, 3rd ed. (New York: McGraw Hill, 2008), 9.

32 Ibid., 108.

33 Marcin Zajenkowski, Ewa Goryńska, and Mikołaj Winiewski, "Variability of the Relationship between Personality and Mood," *Personality and Individual Differences* 52, no. 7 (2012): 861, DOI: https://doi.org/10.1016/j.paid.2012.01.007.

34 For a review of the "Big Five" personality traits, see Oliver P. John and Sanjay Srivastava, "The Big Five Trait Taxonomy: History, Measurement, and Theoretical Perspectives," in *Handbook of Personality: Theory and Research*, 2nd ed., ed. Lawrence A. Pervin and Oliver P. John (Amsterdam: Elsevier, 1999).

35 Lewis R. Goldberg, "The Development of Markers for the Big-Five Factor Structure," *Psychological Assessment* 4, no. 1 (1992): 27, 41, DOI: https://doi.org/10.1037//1040-3590.4.1.26.

36 Marc Hassenzahl, "The Thing and I: Understanding the Relationship between User and Product," in *Funology: From Usability to Enjoyment*, ed. Mark A. Blythe, et al. (Dordrecht: Kluwer Academic Publishers, 2003), 39, DOI: https://doi.org/10.1007/1-4020-2967-5_4.

37 Marc Hassenzahl, Robert Kekez, and Michael Burmester, "The Importance of a Software's Pragmatic Quality Depends on Usage Modes," in *Proceedings of the 6th International Conference on Work with Display Units* (WWDU 2002), ed. H. Luczak, A. E. Cakir, and G. Cakir (Berlin: ERGONOMIC Institut für Arbeits- und Sozialforschung, 2002), 275; Hassenzahl, "Thing and I," 39–40.

38 Hassenzahl, "Thing and I," 39–40.

39 William N. Morris, "A Functional Analysis of the Role of Mood in Affective Systems," in *Review of Personality and Social Psychology*, ed. Margaret S. Clark (Thousand Oaks: Sage Publications, 1992), 256.

to qualify a person in terms of, for example, the degree to which he or she is open to new experiences (one of the Big Five personality traits) because this degree may be as dynamic as the person's mood.[34] Our study predicts that someone will not be open to new experiences when in an anxious mood, while the same person will be open to new experiences when in a jubilant mood. In fact, the mood tendency space in Figure 1 shows a remarkable overlap with the five-factor model of personality: (1) openness to experience — being open to new experiences, seeking spontaneous activities, being enthusiastic; (2) conscientiousness — concentrating, being constructive, seeking out organized activities; (3) extraversion — seeking the center of attention, engaging in energetic activities, taking the lead; (4) agreeableness — being tolerant, being kind, being polite, being open-minded; and (5) neuroticism — worrying, seeing the bad, being pessimistic, being cautious.[35] Our point is that since these thought/action tendencies represent qualities of interaction, they are important for design. We should therefore be very careful when including particular static personality qualities in user profiling because it would be like designing a broken clock — only showing the correct time twice a day.

The most advanced and influential understanding of within-user differences (i.e., how the same user might think, act, and feel differently) in the field of design is that of Marc Hassenzahl. Hassenzahl proposes that the same user is potentially in two general *mental states* or *usage modes*, namely *goal mode* and *action mode*.[36] In goal mode, users typically describe themselves as "serious" and "planning," and prefer pragmatic design features that efficiently help them achieve their goals. By contrast, in action mode, user goals are typically volatile — users describe themselves as "playful" and "spontaneous" and are more likely to prefer hedonic design features, and enjoy interacting with them as an end in itself.[37] As a complement, the study results that we have presented in this paper offer a dynamic and enriched understanding of within-user differences. First, Hassenzahl claims that "the particular usage mode is triggered by the situation itself."[38] This may be true in many cases. Understanding within-user differences through moods, however, suggests that the user's immediate situation may not always be the only influencing factor. One's mood changes constantly from one state to another, which is influenced by one's perceived overall balance between life demands and resources;[39] all the hassles and uplifts one has experienced in the recent past, is experiencing at the moment, or expecting to have in the near future can contribute to a greater or lesser extent to this perceived balance. In this sense, mood states can be neither directly pinpointed to a usage situation nor specified for a given design brief. We have to accept user mood dynamics and the variety of related thought/action tendencies as a universal component of user profiling. A person can be patient today but might just as well be impatient tomorrow — despite being in the same situation, doing the same task, or spending time with the same people. On one day a person might isolate herself, while on another day she may like being the center of attention. Second, while the goal-action dichotomy offers a concise and useful way to understand the within-user differences, because of its simplicity, much detailed information that may be very valuable for design is often ignored. Given the diversity presented in the results, two usage modes alone cannot always adequately inform designers. Thus, we expect the landscape of mood-related thought/action tendencies will offer designers an enriched and more specific guide for capturing within-user differences.

In addition, future research into these diverse mood-related thought/action tendencies may also be a rich source of inspiration for tangible interaction design. With the advancement of interactive technologies and tangible interaction design practices, the designer's form-giving efforts are going beyond creating beauty in terms of visual (or multisensory) qualities, and have moved into the aesthetics of interaction.[40] This is still relatively new, and thus new strategies are needed to help

designers continue the transition from traditional visual design aesthetics. One such strategy is to "design actions before products," where designers force themselves to be explicit about user actions before linking them to physical products to be designed.[41] We believe that these study results can further contribute to tangible interaction design in this sense as well. Designers who play the mood-empathy game – and using the white ball, especially – are more likely to focus on understanding and envisioning actions that users will consider desirable in different mood states before designing physical properties of the interactive systems, thereby creating a richer, more diverse, and more inclusive experience for users overall.

Mood awareness is especially relevant for certain types of design challenges where human-human interaction plays a significant role – for example in design related to public spaces and public transport, for environments such as schools and hospitals, and in sectors like entertainment and hospitality. Empathy has been widely recognized as a key factor of service quality.[42] In a study examining how service organizations can manage customer experiences that promote differentiation and customer loyalty, Leonieke Zomerdijk and Christopher Voss found that the interaction between front-line service employees and customers is one of the most important factors influencing the customer experience. At the same time, they found that design agencies and consultants rarely investigate how service employees navigate this in practice.[43] Experienced service employees likely know how to dynamically adapt their service style to the moods of their customers: grumpy customers will want efficient service, and cheerful customers might appreciate suggestions for new experiences. This is something we are all intuitively aware of, and we adjust our responses to situations like these in our daily interactions because it is part of our psychological makeup. Even though experienced service providers may be intuitively familiar the landscape of mood-stimulated thought/action tendencies presented in this paper, these findings can be of value to students who do not yet have the required experience, and enhance the development of empathy-building courses and workshops. Some have found that "a heightened awareness of the fundamental behavioral science principles underlying human interactions can be translated directly into service design."[44] We suggest that having a clear overview of how human mood affects a person's perceptions, thoughts, and actions, can ideally help designers and service providers recognize moods and develop an empathetic response repertoire.

The study reported here takes the first steps towards exploring how an understanding of mood dynamics can be of use to user-centered designers. We leave many questions unanswered, requiring additional research. For example, the participants in this study all had a similar age and level of education. Will the results be replicated for other populations? How do the generic thought/action tendencies manifest in human-design interaction? It is also not clear in what form and with what means the research results will be most useful for design practice – would a visual representation, as in Figure 1 be most useful? The nine generic dimensions that were found with the cluster analysis? Or some other, more practical application, such as the Mood-empathy Game? And most importantly, case studies will more appropriately explore whether, what, and how an increased understanding of mood-stimulated thought/action tendencies can contribute to design that is useful, usable, meaningful, and enjoyable.

Acknowledgments

40 Tom Djajadiningrat et al., "Tangible Products: Redressing the Balance between Appearance and Action," *Personal and Ubiquitous Computing* 8, no. 5 (2004): 296–97, DOI: https://doi.org/10.1007/s00779-004-0293-8.

41 Mads Vedel Jensen, Jacob Buur, and Tom Djajadiningrat, "Designing the User Actions in Tangible Interaction," in *CC '05 Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility*, ed. Olav W. Bertelsen et al. (New York: ACM, 2005), 13, DOI: https://doi.org/10.1145/1094562.1094565.

42 Anantharanthan Parasuraman, Valarie A. Zeithaml, and Leonard L. Berry, "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing* 64, no. 1 (1988): 23; Anantharanthan Parasuraman, Valarie A. Zeithaml, and Leonard L. Berry, "A Conceptual Model of Service Quality and Its Implications for Future Research," *Journal of Marketing* 49, no. 4 (1985): 47, DOI: https://doi.org/10.2307/1251430.

43 Leonieke G. Zomerdijk and Christopher A. Voss, "Service Design for Experience-Centric Services," *Journal of Service Research* 13, no. 1 (2010): 75, DOI: https://doi.org/10.1177/1094670509351960.

44 Lori S. Cook et al., "Human Issues in Service Design," *Journal of Operations Management* 20, no. 2 (2002): 159, DOI: https://doi.org/10.1016/S0272-6963(01)00094-8.

design students who developed mood-focused design projects based on the study results, and the editor and the anonymous reviewers for their valuable comments on an earlier version of this paper.

Appendix A: Thought/action tendencies with strongest associations with each of the 20 moods

Mood	Top seven though/action tendencies (Mean ratings)
Agitated	Tense up (2.9); be impatient (2.9); see the bad (2.8); be intolerant (2.7); act impulsively (2.7); be impolite (2.6); be closed-minded (2.6)
Amiable	Be kind (3.0); be optimistic (3.0); embrace your situation (3.0); be open-minded (2.9); see the good (2.9); be open for communication (2.9); be tolerant (2.8)
Anxious	Worry (2.9); see the bad (2.8); tense up (2.8); have meandering thoughts (2.6); avoid being in the center of attention (2.6); be pessimistic (2.6); be impatient (2.5)
Boisterous	Energetic activities (3.0); expend your energy (3.0); be enthusiastic (2.9); be loud (2.8); be optimistic (2.8); engage in pleasurable activities (2.8); act impulsively (2.8)
Cheerful	Be open-minded (3.0); be optimistic (3.0); embrace your situation (3.0); see the good (3.0); be enthusiastic (3.0); be open for communication (3.0); engage in pleasurable activities (3.0)
Dreamy	Take your time (2.9); move calmly (2.9); embrace your situation (2.9); be quiet (2.9); see the good (2.8); be care-free (2.8); be open-minded (2.7)
Giggly	Be enthusiastic (3.0); be open for communication (2.9); be optimistic (2.8); embrace your situation (2.8); see the good (2.8); be open minded (2.8); seek company (2.8)
Gloomy	Be quiet (2.9); be pessimistic (2.9); meandering thoughts (2.8); worry (2.8); see the bad (2.8); be reserved (2.7); isolate yourself (2.7)
Grumpy	Be impatient (2.8); see the bad (2.8); be closed-minded (2.8); be intolerant (2.8); tense up (2.7); be pessimistic (2.6); be impolite (2.6)
Jubilant	Be optimistic (3.0); be enthusiastic (3.0); be open-minded (3.0); see the good (2.9); embrace your situation (2.9); engage in pleasurable activity (2.9); be open for communication (2.9)
Lethargic	Be quiet (2.9); be indifferent (2.8); respond with delay (2.8); close off to communication (2.8); save energy (2.8); be reluctant (2.7); cancel plans (2.7)
Miserable	Pessimistic (2.9); meandering thoughts (2.9); worry (2.9); close for communication (2.9); see the bad (2.9); isolate yourself (2.8); be quiet (2.8); be reserved (2.8)
Peaceful	See the good (3.0); embrace your situation (3.0); take your time (2.9); be kind (2.9); be quiet (2.9); engage in calm activities (2.8); move calmly (2.8)
Productive	Be concentrated (3.0); engage in productive activity (2.9); not waste time (2.8); embrace your situation (2.8); be optimistic (2.7); be creative (2.7); be constructive (2.7)
Rebellious	Take risks (2.8); act impulsively (2.8); expend your energy (2.6); be impatient (2.6); take the lead (2.6); be intolerant (2.6); engage in energetic activities (2.5)
Relaxed	Take your time (3.0); see the good (2.9); embrace your situation (2.9); move calmly (2.9); be open-minded (2.9); be kind (2.9); be care-free (2.8)
Sentimental	Take time (2.7); be quiet (2.7); meandering thoughts (2.5); seek familiar routines (2.5); seek familiar experiences (2.5); avoid center of attention (2.5); contemplate (2.5)
Serious	Concentrated (2.9); think before act (2.8); be constructive (2.8); not waste time (2.6); embrace your situation (2.6); be polite (2.6); productive activity (2.6)
Stressed	Tense up (3.0); worry (3.0); be impatient (2.7); be rigid (2.7); see the bad (2.6); cancel plans (2.5); move restlessly (2.5)
Vigorous	Be optimistic (2.9); enthusiastic (2.9); activities effort (2.9); energetic activities (2.8); be concentrated (2.8); expend your energy (2.7); take risks (2.7)

Appendix B: F values for 68 mood-stimulated thought/action tendencies

Thought-action tendency	$F_{(19, 830)}$	p	Thought-action tendency	$F_{(19, 830)}$	p
Act impulsively	24.95	0.000	Embrace your situation	64.18	0.000
Avoid the center of attention	22.60	0.000	Engage in activities that require effort	29.63	0.000
Be attentive to what's going on	14.04	0.000	Engage in calm activities	34.18	0.000
Be care-free	51.82	0.000	Engage in energetic activities	54.47	0.000
Be cautious	13.50	0.000	Engage in organized activity	9.32	0.000
Be closed-minded	51.94	0.000	Engage in pleasure-oriented activity	31.17	0.000
Be constructive	19.44	0.000	Engage in productive activity	23.87	0.000
Be contemplative	16.40	0.000	Engage in spontaneous activity	27.00	0.000
Be creative	34.36	0.000	Expend your energy	29.40	0.000
Be destructive	24.08	0.000	Follow familiar routines	10.99	0.000
Be enthusiastic	81.99	0.000	Follow the lead of someone else	4.44	0.000
Be flexible	34.98	0.000	Have meandering thoughts	15.17	0.000
Be impatient	37.98	0.000	Make new plans	15.15	0.000
Be impolite	32.76	0.000	Move calmly	45.83	0.000
Be inattentive to what's going on	11.78	0.000	Move restlessly	16.77	0.000
Be indifferent about what's going on	15.12	0.000	Not waste time	21.04	0.000
Be interested in what's going on	31.16	0.000	Oppose to your situation	19.63	0.000
Be intolerant	44.81	0.000	Respond instantly	24.88	0.000
Be kind	41.85	0.000	Respond with delay	24.75	0.000
Be loud	46.57	0.000	Save your energy	25.74	0.000
Be open to communication	33.90	0.000	See the bad	90.77	0.000
Be open-minded	65.70	0.000	See the good	91.26	0.000
Be optimistic	108.25	0.000	Seek out familiar experiences	5.84	0.000
Be patient	33.91	0.000	Seek out new experiences	29.15	0.000
Be pessimistic	77.86	0.000	Seek the center of attention	20.15	0.000
Be polite	20.03	0.000	Seek the company of others	18.36	0.000
Be quiet	51.90	0.000	Seek to isolate yourself	37.02	0.000
Be reluctant	38.87	0.000	Take risks	27.79	0.000
Be reserved	28.92	0.000	Take the lead	30.03	0.000
Be rigid	27.64	0.000	Take your time	21.28	0.000
Be tolerant	37.46	0.000	Tense up	48.48	0.000
Cancel plans	30.20	0.000	Think before acting	10.8	0.000
Close off to communication	42.55	0.000	Unwind	19.78	0.000
Concentrated	18.08	0.000	Worry	73.18	0.000

Appendix C: Mean ratings of 20 moods for nine generic thought/action tendencies

Moods	The tendency to:								
	Be critical	Be impulsive	Be easy-going	Seclude	Be diligent	Prefer the familiar	Be pensive	Be present	Be serene
Agitated	2.54	1.68	1.23	1.78	1.60	1.81	1.86	1.50	1.71
Amiable	1.12	2.16	2.78	1.40	2.03	2.08	1.62	2.65	1.79
Anxious	2.46	1.44	1.39	2.40	1.66	2.50	2.56	1.76	2.37
Boisterous	1.42	2.68	2.37	1.15	1.85	1.69	1.27	2.11	1.20
Cheerful	1.17	2.60	2.79	1.21	2.08	1.99	1.45	2.68	1.50
Dreamy	1.13	1.65	2.62	2.25	1.53	1.83	2.38	1.55	1.96
Giggly	1.25	2.54	2.55	1.16	1.70	1.71	1.30	2.51	1.29
Gloomy	2.19	1.30	1.51	2.60	1.43	2.21	2.71	1.27	2.46
Grumpy	2.54	1.51	1.27	2.21	1.46	1.83	1.94	1.25	2.07
Jubilant	1.27	2.70	2.63	1.17	1.98	1.71	1.31	2.50	1.30
Lethargic	2.09	1.22	1.52	2.65	1.27	2.33	2.13	1.21	2.51
Miserable	2.48	1.34	1.39	2.64	1.31	2.16	2.71	1.28	2.45
Peaceful	1.13	1.65	2.73	2.14	1.74	2.07	2.09	2.36	2.10
Productive	1.51	1.97	2.17	2.04	2.65	1.91	1.71	1.64	1.83
Rebellious	2.16	2.35	1.71	1.45	1.92	1.47	1.74	1.99	1.61
Relaxed	1.11	1.75	2.80	1.93	1.65	2.27	2.08	2.20	2.21
Sentimental	1.49	1.58	2.09	2.19	1.54	2.29	2.50	1.70	2.02
Serious	1.53	1.65	2.10	1.96	2.61	2.10	1.98	2.17	1.89
Stressed	2.47	1.67	1.35	2.06	1.97	2.20	2.22	1.35	2.07
Vigorous	1.39	2.45	2.28	1.37	2.55	1.71	1.57	2.31	1.31

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