Expressing Well-Being Online: Towards Self-Reflection and Social Awareness

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ABSTRACT
Medicine, psychology and quality of life literature all point to the importance of not just asking 'how are you?', but assessing and being aware of self and others' well-being. Social networking has been shown to have a variety of uses and benefits, but does not currently offer explicit expression of a well-being state. We developed and deployed Healthii, a social networking tool to convey well-being using a set of pre-defined discrete categories. We sought to understand how communicating this in a lightweight fashion may be used and valued. Using a hybrid methodology, over five weeks ten participants used the tool on Facebook, Twitter, or on the desktop, and in group meetings discussed the affect and effect of the tool, before a final individual survey. The trial showed that participants used and valued status expression for its support to convey state, and for self-reflection and group awareness. We discuss these findings as well as future opportunities for awareness visualization and automatic data integration.

ACM Classification Keywords
H1.2 Models and Principles: User/Machine Systems. H5.3. Information Interfaces: Group and Organisation Interfaces.

General Terms
Design, Experimentation, Human Factors

Author Keywords
Well-being, self-reflection, group awareness, experience, social networking, mixed methods.

INTRODUCTION
"*Hi! How are you?*"

"*As compared to what? Am I asked to compare myself to how I felt yesterday, to my usual state, to how I was a month or a year ago, to my health as a youth, to Arnold Schwarzenegger, to my friends, to some ideal state?*" [20]

If this were the response we got when asking people how they are, we probably would not bother. Yet the simple act of asking how someone is feeling has complex importance, in phatic communication (social small talk) [15], medicine [6], and (as in our opening quote) a reference point for health-related quality of life [20]. Further, psychology research has suggested that personally, assessing subjective well-being may improve actual well-being [7], and socially, awareness of others' well-being may aid in collective welfare within a group [4].

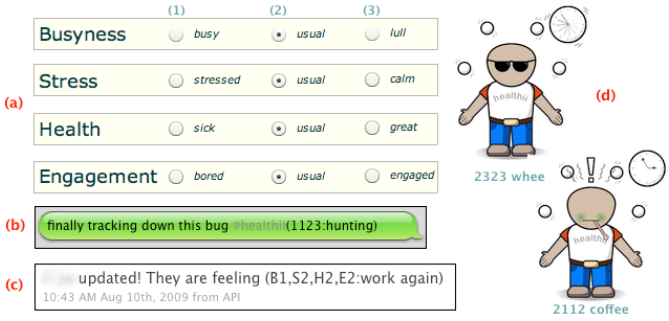

Figure 1. Well-being input and output examples using Healthii tool (first iteration). (a) Four input dimensions. (b) Text update via Twitter. (c) Notification of update via Twitter. (d) Two examples of state with avatar and numeric description.

In current online practice, we are able to portray simple mood, expression or availability through emoticons or 'busy/away' settings in instant messaging tools. Social networking encourages us to share what we are doing or thinking for a variety of uses and gratifications [10]. These practices have been shown to increase connectedness [19] and fulfil the role of social small talk [15]. Social networking updates may be personally related [18]; concerning an activity, a location, or a mood.

To explore the (aforementioned) potential benefits of well-being expression, we were interested in augmenting current status sharing practice in social networking tools with a simple, consistent and subtle way to convey a richer well-being status. Unlike current practice, to ensure consistency and comprehension we chose to constrain well-being expression to a set of pre-defined and discrete categories. Such categories are able to be encoded easily, potentially also aiding in character limits, as well as social stigma (or unwillingness) in discussing emotion [6].

We wished to explore two research questions: 1) whether the concept of sharing well-being would be used, understood, and considered valuable; and 2) how that value would be perceived and experienced. We imagined several benefits from being able to express well-being, both in being able to ask new questions about the well-being of the group for awareness, as well as in personal reflection over time. We were particularly interested in a workplace setting, with management literature discussing the importance of connectedness in the workplace [14].

iConference 2011, February 8-11, 2011, Seattle, WA, USA

Though we made some fundamental design decisions (pre-defined discrete categories of well-being), drawing from recent affective computing work [24],[27] we were less interested in evaluating a clearly-defined task or the tool itself, but rather in an exploration of the *experience* around the concept of sharing well-being. To explore our research questions, we developed Healthii—a lightweight way to convey self-status that complemented current status update practice. Healthii was usable through two social networking mechanisms: 1) a Facebook application that let participants select well-being status over four dimensions (busy-ness, engagement, stress and health), by choosing one of three states (positive, neutral, or negative) in each dimension; and 2) participants could also skip the application and simply use a text code to add to a Twitter or Facebook message. The application tracked status updates and provided a group view of colleagues' states and a temporal overview of past statuses.

In the remainder of this paper, we detail more of the work informing our approach; describe our design and rationale; and our methodology to assess experience. We present our results against our initial questions about individual and social awareness, and conclude with a discussion of the deeper questions about communication and design opportunities that our trial highlights for future work.

RELATED WORK

There is a long history of awareness in the workplace in various forms and types of content [22]. Healthii uses an explicit (though encoded), manual update of content not usually tackled in workplace awareness: personal well-being. Such intangible or ephemeral content is normally explored outside of workplace interactions, and is focused on connectedness: "*maintaining and enhancing human social relationships*" [12]. In these systems, simple and subtle connectedness is conveyed through, e.g., the sound of a heartbeat [8], the evocation of intimate reactions through abstract representations such as a floating feather [26], or a glowing circle on a desktop [11] to convey the message 'I am thinking of you.'

Rather than friends or family outside the workplace, Healthii is focused on fostering awareness of colleagues within the workplace. Management literature has discussed the importance of such connectedness, highlighting the vital roles that informal awareness, a sense of community, and interpersonal relationships play in the workplace, as well as in performance and work satisfaction [14]. As Gaver [8] proposes, we are interested in moving beyond workplace systems that focus on rational, measurable efficiency, to exploring the potential of the workplace for connectedness and casual sociality.

Concerned with workplace or mobile settings, and the full role of emotion in design, two systems in particular are relevant. Affector [24] is a video window between the neighbouring offices of two friends to communicate their moods, the images distorted based on sensor readings (e.g., movement in the office) and user mappings. The eMoto [27] system is designed for expression of affect in mobile phone text messages, allowing users to alter the background colour and pattern of their message with gestures, conveying how the sender is feeling through pressure, movement patterns, or pace. Both studies found that more than just conveying a simple emotion at a specific time, the open-ended expressions allowed creative use and emotional meanings to emerge over the course of interaction, with the relationships outside of the system putting meaning to and affecting the implications within the system. Healthii similarly targets the experience and emerging meaning of captured and communicated mood, but uses a pre-defined and discrete set of categories. We compare the use of ambiguity and clarity in our design rationale.

Recent years have seen an examination of affect in social networking as a type of awareness. The main beneficial traits this research has suggested are encouraging feelings of intimacy and connectedness between colleagues [19], social networking sites strengthening 'weak ties' [25], and the role of Twitter in phatic communication - the equivalent of a "Hello!" in the hallway [15]. We were interested in integrating with social networking sites to take advantage of this existing network, and exploring beyond current uses of updates to explicit and consistent representation of personal states and well-being.

Websites such as Daytum.com and Grafitter.com are personal informatics tools for examining your "life and habits." Grafitter records arbitrary tags and values through Twitter or instant message, e.g., #happy(7), or #recycled(glass), for later visualization. Healthii has a similar goal of exploration and communication of one's life, but focuses on identifying a core set of pre-defined categories to communicate well-being.

In summary, Healthii differs or extends related work by examining *well-being in the workplace*; exploring a *pre-defined set of discrete categories* for mood communication through social networking; and investigates the effect on *reflection and awareness* of self and colleagues.

DESIGN

In order to explore if an explicit representation of well-being status would enhance awareness of self and others, we had to address a set of challenges. First, create an artefact to conceptualize and deliver the experience we wanted to explore. Second, constrain the experience to focus on well-being status. We detail our rationale for the content, dimensions and visual design below, before explaining the Healthii application, usable through Facebook, Twitter, or on the desktop.

What is to be Represented?
(or, Why a Reductionist Approach is Sometimes Okay)

Our main design decision in Healthii has been to use a set of four discrete dimensions, and three finite values within those dimensions to reflect personal well-being. Figure 1 shows the status input interface, and below we describe the rationale for the dimensions.

Our goal has been to see how concision and constraints on expressing complex internal states via a specific vocabulary of terms such as 'bored; sick; busy; great' can be used functionally. Such discrete dimensions are distinct from recent work in emotional computing, which has a similar goal to Healthii of understanding, reflection, and awareness of a variety of mood and emotion. While work in this area has encouraged flexible interpretation of mood and emotion [24],[27], such ambiguity of expression is mostly used in a rich 1-to-1 context, where choice of a certain word or colour carries personal connotation. Where there has been an appeal to a wider group, more interpretive methods tend to focus on encouraging the reflection of the individual, and in some cases ambiguity in public/group scenarios has led to a misunderstanding of the original meaning [3]. It is less clear how

to harness concepts such as ambiguity in the case of trying to allow some assessment of 'group mood' unless there were to be some emergent group conventions.

The pre-coded answers that we use trade off individual expressive flexibility for ease of group comprehension, maintaining a level of global consistency and transparency. Constrained discrete dimensions also meant we could take advantage of embedding an encoded textual status into social networks. By using these simple discrete scales early on, we can reduce the drain on 'emotional effort' incurred when being thoughtful about representing oneself [5], and perhaps move to more complex representations as people develop suitable self-expression skills [12].

Once we reasoned to use pre-defined dimensions, their selection became an evolving process. To establish a base set for initial evaluation, we looked at what mood and emotion is currently expressed on the Web: studying one thousand recent Facebook updates (from the authors' friends), using wefeelfine.org's programmatic interface to scrape 'I feel [mood]' from blogging sites, and research in mood classification from blog posts [17]. This resulted in a list of around twenty commonly occurring moods, some of which overlapped (e.g., sleepy and tired).

To further understand what states people would want from a tool such as Healthii, we informally interviewed six of our group members who regularly use social networking services, querying how they would describe how they were feeling today, and what they might want others to know about their state. It became apparent that in a work-focused environment being busy, or stressed, or neither, were critical dimensions. It also became clear that there is interplay between these dimensions: that there is a difference between having a lot to do (busy-ness) and how engaged one is or not with a given action or task. Tiredness and happiness were also both mentioned a number of times. Finally, health was an important attribute, or rather, a lack of it. The ability to say "I am feeling a bit under the weather" was seen as important to both express (the reason for working from home today, or just for sympathy), and see expressed by others (to offer support, or to stay away so as not to catch a cold).

Dimensions and text annotation. From our understanding of the literature, our Web mood analysis and our informal discussions, we chose four attributes: busy-ness, stress, engagement, and health. Each of the four attributes has three levels: a positive, a neutral, and a negative. These attributes reflect what can be found in the well-being literature, that, among many other variables, health and working conditions are important [15]. Initially we also considered allowing an extra mood to be expressed via colour, but in early testing these extra moods were rarely used. Instead, testing suggested that a space for clarification of the state or an overall message was considered desirable, and so a (10-character limited) text box was provided: "deadline!" might explain a current busy status.

Visual Design

In earlier work [1] we compared several ways to enable rapid capture of current state, and support simple interpretation of individual and group states. Despite quantitative differences, qualitative measures show a clear preference for anthropomorphic avatars to represent personal state.

In early testing, we also discovered a desire for input from services such as Twitter, meaning a way to represent state with a number or letter code was required. This allowed us the benefits of integrating with existing practice, as well as being able to examine whether well-being expression would be a primary activity (a message comprised solely of a Healthii code), or used to augment a message (added to the end, as in regular conversation where one's words may be underlined with body language).

Combining these desires for avatars and integration with microblogging sites, ultimately allowing participants the benefits of two representations, we chose both anthropomorphic and numerical representations for state. We describe the medium for input and representation of states in the next section. Figure 1 shows the input interface and associated representation. Figure 2 details the visual differences in each dimension, and Figure 3 shows an example group view. (We acknowledge our avatars are male-centric, and in future studies will allow a choice of gender representation.) Though the states may seem simplistic relative to the nuanced complexity of one's emotional life, as we will describe later in the paper, participants' feedback indicated that they found value using the tool.

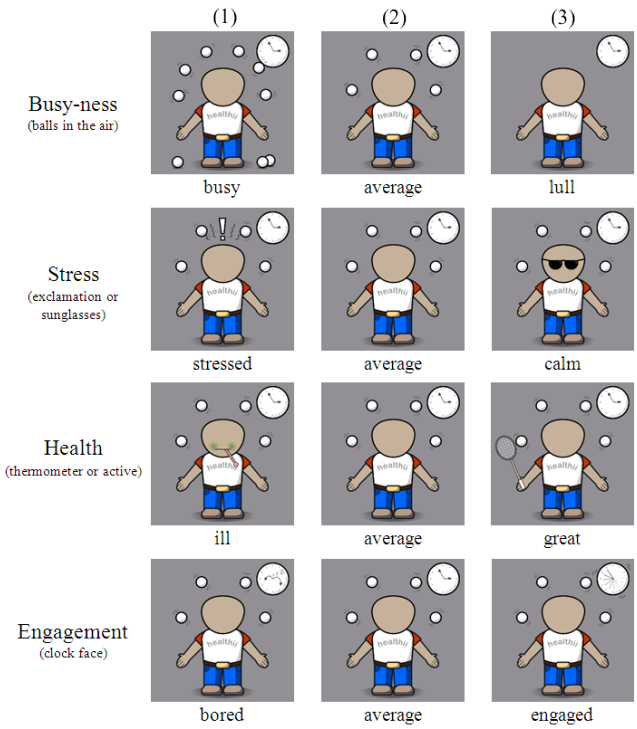

Figure 2. The visual representation of each dimension, at each of the three levels. To emphasise the visual changes for each dimension, the dimensions not being shown are set to 'average'. There are 81 possible states in all.

How to use Healthii

The three ways to use Healthii—Facebook or desktop application, and Twitter—are described below.

Facebook. Updating through the Healthii Facebook application is via radio button, as seen in Figure 1. Opening the application to enter a new update, one would simply change the radio buttons from the last saved update. Each dimension has three levels, corresponding to both a number (1, 2, or 3) and a state of the

avatar (e.g., 'busy' corresponds to the number of balls in the air, 'stress' is an exclamation mark for stressed, nothing for usual, or sunglasses for calm). Thus, a person's state is represented through a four digit number (e.g., 1323), and an avatar. As desired in early design reviews, the optional (10-character) textual addition is also entered here through a textbox.

Viewing states using the Facebook application is achieved through a list of past states, and a group view of both avatar and numeric form, as displayed in Figure 3.

Desktop. A desktop application replicated the Facebook application, but also enabled persistent (or peripheral) status awareness on the desktop.

Twitter. Updating via Twitter involved adding the hashtag #healthii, and then encoding one's state into the numerical representation, for instance #healthii(1222:paper!) would represent 1=busy, the three 2's for 'usual' stress, health and engagement, and "paper!" as the reason. Participants initially had a 'cheat sheet' containing the numbers, which they discarded once they learned the encodings.

One's followers on Twitter would see updates, and the Facebook application would reflect the Twitter update. The Healthii bot also re-tweeted when a participant updated from the Facebook application to encourage awareness.

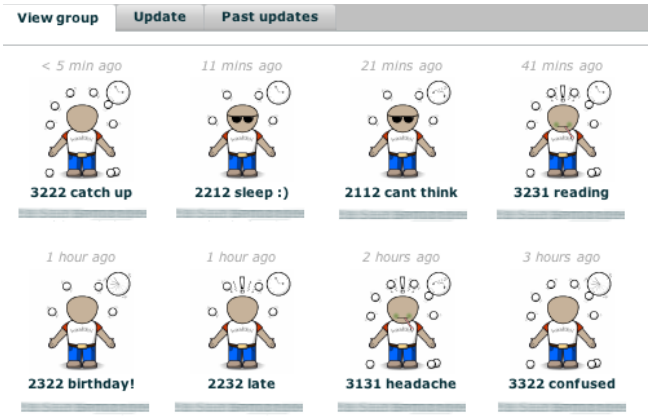

Figure 3. An example of a group view of participants, showing both numeric and avatar view, ordered by last update. (names redacted)

EVALUATION

As shown in related work, supporting self and group awareness can have positive effects. We designed Healthii therefore to support explicit expression and awareness of personal and group well-being with the goal of enhancing, if even on a micro-scale, quality of life. In our evaluation, we wanted to investigate: 1) whether people would use, understand and find the tool useful as part of their social networking lives; and 2) how that utility was perceived: in the ability to express well-being, in self-reflection, in group awareness, or all (or none) of the above.

Our focus on the *experience* of use—through user feedback, discussions, and trials, rather than evaluating a clearly defined task or artefact—is similar to the 'third wave' of HCI [3],[24],[27]. We base our methodology on the influential Technology Probes paper [9]; simple, flexible, adaptive technologies with three goals: the social science goal of understanding the needs and desires of users in real-world settings, the engineering goal of testing the technology, and the design goal of inspiring users and researchers to envision new technology.

Methodology

We chose a small group of participants (six men and two women), all graduate students, who were friends or colleagues frequently co-located and who already used social networking tools. This helped to ensure that we were not creating a new friend group and could concentrate on the effect of Healthii. Participants were given the Healthii tool, and asked to use it over the course of five weeks. During those five weeks, we would meet as a group once a week to discuss how people were using the tool, share experiences or anecdotes, and positive or negative aspects. To facilitate an optimal experience for the participants, we were open to refining the tool based on feedback, and testing those changes during the trial.

As part of the study, we also tracked each participant's use of the tool via logging. The logs let us see frequency of use, most frequently changed parameter and trends. We concluded the study with an online survey to canvas individual examples of context of use and value, and a few follow up interviews motivated by comparing the survey results with log analysis of use.

In the first week of the study two ex-colleagues said they found the tweets about Healthii interesting, and asked if they could be involved. Interested to gain a perspective from geographically disparate people, we were delighted to involve them, raising the number of participants to ten. Participants received a 15 USD gift voucher.

In addition to the small-scale study, we also considered a larger-scale deployment of Healthii across Facebook. However we decided that the quality of experience discussion we would have from a smaller group meeting weekly, who were happy to work with the prototype specifically to focus on awareness *with* the tool, rather than on an analysis *of* the tool itself, outweighed the benefits of a large scale deployment at this time.

Methodology Discussion

Sample size and composition. In these kinds of closely-observed and frequently-interviewed studies, ten participants is a reasonable number to be able to explore in-depth individual and group experience. We asked participants who were already colleagues or friends to participate. We believe that this resembles a real-world usage scenario—randomly sampling participants would not create the same effect you might see if a group of colleagues in a workplace began using such a tool.

Weekly group meetings. Because the tool was inherently social, and participants saw and interacted with all the available data and even saw each other socially, we felt it was not a problem to discuss the tool as a group. Indeed, we considered it a benefit. We feel that the group meetings allowed an open and in-depth discussion of experience, with anecdotes or suggestions sparking other people's imaginations or memories. We suggest that in these sorts of affective computing scenarios, as Technology Probes states, these artefacts reject the strategy of collecting 'unbiased' ethnographic data, but we reap the benefits of collecting data in-situ. Although there may be a fear that some people may dominate or lead discussion, as far as we could tell this was not the case,

and participants were given the chance for individual feedback with the final survey.

Design refinements. Although discrete well-being representation was a design decision, it was the concept or idea we were testing, not making claims about a particular embodiment. We were instead focused on the effect on users, so that we may understand if there was interest and value in the concept. We recognise that changing the tool affected the experience, but the changes were refinements to the existing idea, not altering the overall concept we were interested in, and by only refining the design based on feedback and consensus, it allowed us to explore what the users really wanted of such a system, and how they used it.

Design Refinements Made During Study

In this section we discuss the rationale and result of three changes we made to the artefact during the evaluation.

Use of letters and numbers. In the first few weeks, there was much discussion around the understanding of the avatars and numbers. There was divided opinion on whether either were easy or hard, as well as which of the two was the easiest or hardest to interpret. To explore whether prefixing the numbers with the associated letter would make it easier to associate the number to a dimension, the Healthii bot was changed to re-tweet, e.g., "X is feeling (B2,S1,E1,H2)." Participants' responses were mostly positive, with the majority of participants saying that this change either made the update easier to understand, or they could parse it just as easily as before.

Engagement or enjoyment. Three weeks into the trial, there was a lot of discussion about the engagement dimension, and its interplay with busy-ness. There was a sense that being engaged was too work-related, that although it made sense to be busy and enjoying it, thus engaged, it made no sense to not be busy and be engaged. Thus concepts of work, busy-ness, and enjoyment became confused. It emerged that participants still wanted to express the concept of being busy and enjoying a task, but also of not being busy but enjoying that too – relaxing on a day off for example. Changing the dimension of 'engagement' to 'enjoyment' solved this problem.

Meaning of numbers. As participants became familiar with the tool, they switched from learning and thinking about *how* to express a state, to really considering *what* they were stating and how it was perceived. Thus, in week three there was significant discussion over the perception of good or bad states, and parsing the associated numbers.

We had originally chosen to order the levels of each dimension with the potentially 'bad' connotation on the left, and the 'good' connotation on the right (see Figure 2), e.g., the three levels of the dimension *stress* were: stressed (1), usual (2), calm (3), and *health* was ill (1), usual (2), great (3). Group discussion revolved around the meaning, perception and interpretation of these dimensions. For example, either extreme of busy (very busy, or in a lull) may be perceived positively or negatively, and a busy (1) would mean very busy, but an engaged (3) would mean very engaged. Eventually, the group decided that these issues may be confounding, and that instead a more simple 'not, some, very' scale could be used for all dimensions, with the higher the response rating, the more of that dimension one is feeling (e.g., a busy (1) means not busy, and stress (3) means very stressed).

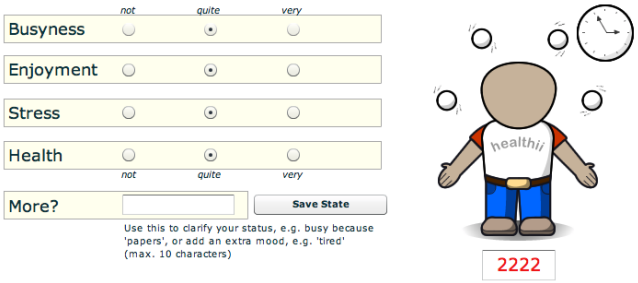

Figure 4. The input of Healthii after the change of the scales of the dimensions (see Figure 1(a) for 'before').

These issues partly arose due to the choice of words for scales, but also because attributes such as busy are not inherently positive or negative. Though this potentially raised other issues (no longer could we see at a glance that 1111 was 'looking negative', or 3333 was 'mostly positive'), the group hypothesized that over time this design would make more sense.

At this point, we also rearranged the dimensions to create the (tenuous) acronym BESH (Busyness, Enjoyment, Stress, Health), to aid people in remembering the order. We thus changed from a set of input dimensions as in Figure 1(a), to a set of dimensions shown in Figure 4.

FINDINGS

Usage Data

There were 358 updates over five weeks, an average of 36 per person, or roughly one update per person per day. However, people's individual use varied widely, the least frequent person updating 9 times, the highest 61.

Examining the textual accompaniment to an update, we largely see a split between four categories: *mood* (tired, lethargic, bored); *feeling or emotion* (run down, rested); *activity* (meeting, coding, swim, dentist); and some we are classifying as *statements* ("*toomuchpie*", "*post-hol*", "*lots to do*"). The first two categories are about the person's internal state, the second two seem to be about the reason for that state. Strictly speaking, they may be coincidental to the state, but by putting them in the text field the implication is that there is a causal link. 85% of the status updates contained a text update, of which 71% were activities or statements, and 21% were moods or emotions. The remaining 8% were more creative uses of the text field, for instance 10 updates in a row to create a sentence, testing Unicode characters, or embedding a link.

Participant Sessions and Individual Survey Responses

The value of running the study for five weeks became particularly apparent when by week three participants moved from talk of how each were using the tool to the meanings being conveyed in the dimensions. We had wanted to probe this level of experience rather than the artefact. The longer study time allowed the tool to become transparent enough to focus on that experience.

Methods of Use

Twitter was used most often to *update* status, though followed closely by both the Facebook and desktop applications. To *view* status, multiple mediums were used, mostly because the Facebook and desktop applications allowed a simple group and historical view of updates.

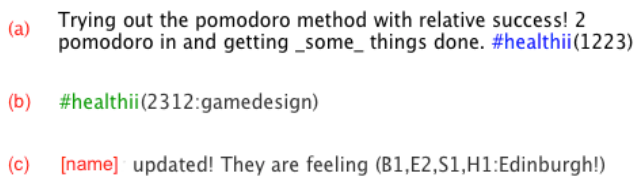

Figure 5. (a), (b) Examples of updates via Twitter. (c) An example of an update from the Facebook application re-tweeted by the Healthii bot.

Participants who used Twitter generally updated by adding a #healthii update to the end of their tweet. Sometimes the update reinforced but added extra information, e.g., "*stress stress. ugh. but in [location] for a couple of days #healthii(1113)*" (very busy, stressed, sick and engaged). Other times it was clearly related to the content of the message, especially when indicated via the text annotation, e.g., "*finally tracking down this bug #healthii(1123: hunting)*" (very busy, stressed, average health, very engaged). And at other times it was just seen as additional well-being information for an otherwise unrelated message "*is heading into uni #healthii(2121)*" (somewhat busy, very stressed, average health, bored). Feedback indicated that the stream or 'popup' of information from Twitter aided in group awareness, and that it also prompted others to think about how they were, and perhaps update their own status.

Self-Awareness in the Moment and on Reflection

In the final survey, five (of ten) participants said they felt that their self-awareness increased. This was explained in terms of assessment of past state; a number of comments centred around seeing "*I am rarely calm*", or "*proof that I have been busy recently*." One participant said she was more aware that she was "*not enjoying [her] work to the maximum, instead doing it out of necessity, which was a little depressing in itself.*" A more positive example came from a participant who used his past updates especially to monitor his health, saying it gave a more accurate picture than his memory, and that he could no longer "*fool himself about how he felt a couple of days ago.*" It has even encouraged him to monitor his health in a more controlled and systematic manner outside of Healthii.

The above comments concentrate on awareness and reflection of *past* states. Two other participants commented that the self-awareness value they got from Healthii was less to do with past reflection but instead saying that at the time of update, "*being forced to think about [those dimensions] makes you more aware of how you're feeling, which is something we don't actually consider enough in daily life.*" In particular, the comparison to existing social networking statuses was interesting, highlighting the importance that participants ascribed to clarifying their thoughts and having some time to think about oneself, as well as having a condensed way to codify their state:

> "*My status can be long and meandering... Healthii gave me opportunities to summarise my thoughts*."

> "*It made me think about how I was feeling, whereas Twitter makes me think about how others would get value from my [tweet] or whether they might find it amusing*."

Group Awareness

The majority of participants (eight of ten) reported that their awareness of other group members increased. This was evident in specific instances, such as one participant noticing her husband was feeling ill, when "*[she] wouldn't have otherwise known!*" The text also served as an awareness or motivator, one participant was reminded to go to the gym after noticing a colleague had gone swimming. There were a couple of instances of seeing a status and following up either virtually (messaging to enquire after a particularly busy and stressed update) or face-to-face (asking if the person was ill after seeing a low health update). Twitter was especially convenient, with a clear alert when others updated, as opposed to having to manually check the Facebook or desktop applications.

Where status ambiguity may have been felt, as reported in a previous section, participants consistently used the 10 character textbox, commenting they mainly used it to add nuance or reason to their emotional state, or to explain a causal or unrelated activity.

Assessment of Impact

To encourage assessment of how Healthii fit into people's lives, at the end of the five week trial we made Healthii unavailable, and in the final survey asked people how they felt it had impacted their lives, if they wished to continue using it, and how it could be improved for future use.

Of the ten participants, five said they missed Healthii and wanted it back, mainly citing the loss of awareness of colleagues that would result, though one participant felt the self-reflection would be the part she missed most. Interestingly, there were conflicting opinions from the two geographically separate participants. One stated they would miss Healthii and peoples' updates, while the other felt they would not miss much from a group perspective, since being far away meant they felt detached and wished a more local group of colleagues were using it. Both of these participants used Twitter, although the former also used the desktop application as a form of peripheral awareness of the group. We see that the utility of the same application depends on the personal circumstances (and maybe even personality) of the users, highlighting that individual differences and context are perhaps even more important for affective applications than more task-oriented ones.

Representations of State

Only one participant desired more analogue control over the degrees within the dimensions; the rest felt the discrete values were sufficiently granular. In discussion no-one expressed that the four dimensions were insufficient, hence the discussion at week three to ensure that they were as clear and effective as possible. One participant described a desire for "*abstract but clearer*" visualizations of group status in particular, expressing a preference for such visualizations to be based on the pre-defined categories.

The final survey revealed preference differences between the avatar and the numbers. This is a further argument for pre-defined categories, as this allows for multiple visualisations or techniques, based on the same data, to suit individual preferences. Although there seemed to be richer anecdotes surrounding self-awareness, the group awareness was perceived as equally important yet perhaps harder to quantify. The majority of participants

understood and liked recording their state quantitatively, and many suggestions focused on retaining existing views and enhancing with the option of more detail on a given status, as well as more ways to interrogate and visualize self and group state. There is a rich area of future work in considering the best ways to represent group status over time, considering grouping, common moods, outliers, etc. In the following section, we discuss broader findings and questions that the study raised, highlighting the potential for future work.

DISCUSSION & FUTURE WORK

Encoding as a Resource for Design

Throughout the trial, it became evident that the encoding of dimensions to numbers was not just a shortcut, but was providing a way for people to express "I am ill", or "I am busy!" without either the stigma attached to complaining, or expressly saying it. Our participants confirmed that this was the case, allowing a sort of graceful communication of moods that otherwise would not be expressed, yet as we saw above, that expression lead to value for both self and group.

> *"I wouldn't normally tell people I was ill or busy. But 'hiding' it behind a number, and it being a dimension people were expecting to see reported, meant I didn't have a problem with it."*

This also has implications in a health related quality of life sense. In patients' discussions with oncologists, it was found [6] that 25% of patients would only discuss important emotional and daily life issues at initiation from the physician. Perhaps an encoding of such a state would allow people to communicate more freely.

The indirect nature of Healthii may also contribute to more honest appraisal of feelings. When providing information on personally sensitive conditions, Peiris [21] found that patients gave more honest answers when filling out a computerised form compared with giving answers face-to-face. This effect was despite the fact that the patients knew that the answers would be available to the doctor in a subsequent face-to-face consultation.

In speech act theory and other linguistic analyses [23] there is a difference between the propositional content of a statement "it's feeling cold", and the meaning it implicitly carries "please shut the door". However, this is also related to the fact that the utterance is made, the very fact one has said something carries meaning - it is not just *what* you say, but *that* you say it at all. In contrast, in Healthii all four values have to be reported every update. This means that there is no significance in reporting any particular one, even if there is significance to the value which is reported for it - the one important one may be masked by the rest. There is ambiguity that allows a level of privacy and defence, whilst in other ways being open. To be useful such masking should be ambiguous but decipherable.

We have also considered how an update may be considered explicitly, or refer to the previous update highlighting what has changed since last time. This relates to both the above discussion on significance of a value, and our opening quote regarding a reference point. A more nuanced update may say "compared to yesterday I am feeling more ill, but otherwise the same". In group discussion we talked about when and why people would update (when something significant happened, when the person had not updated for a while), and how people modulated their usage over time, starting off updating lots, but then perhaps only twice a day when they wished to communicate a significant event.

Automation in Expression and Interpretation

In discussing Healthii with colleagues not involved in the study, the most asked question has been "how could we automate status detection?" A clear pushback from the participants has been that the act of creating (externalising) the Healthii status has value - the self-reflection over a constrained set of dimensions that really forces one to evaluate at that point in time. Automation of such a status, we hypothesize, would remove this key value.

Where we do see a role for automation is considering what is not currently captured that we would like to know. In discussing what would be of value in future use, there was interest in tools for visualizing and interrogating statuses for further detail. The potential for automation, then, is more directed collection of associated information to inform *why* this current state, perhaps similar to wefeelfine.org's mashup of emotions and weather, or the data collected in previous systems [2], e.g., location, e-mail activity. For example, a manager looking at a group may enquire 'why was everyone unhappy at this point?', and be directed to a collection of explicit extra detail from participants, or implicit automated detail such as e-mails around that time, hours worked, calendar items, etc. It seems that in contrast to the importance of *expression* of state, the self- and group-awareness are more about *interpretation*.

CONCLUSION

In this paper we have presented our exploration of the use of discrete dimensions and values for the expression of well-being status in social networking sites. In our study we were less focused on evaluating the Healthii application as the optimal design for conveying status, but instead used it to explore the perceived value and use of encoding status into social networking sites. Our mixed-methods (five-week longitudinal, ten-participant, participatory field) study yielded several contributions:

- *Discrete well-being status valued.* We found that introducing discrete well-being status into social networking sites was perceived as useful. The value is in immediate reflection at the moment of expression, the opportunity to reflect on states over time, and in awareness of group members.
- *Self-reflection aid.* We saw reflection over time practiced regularly and reported as a key feature. Importantly, this use of status logs for self-reflection on well-being is something only possible with a tool that records state over time. Thus the tool offers a valued augmentation not available in non-virtual communication.
- *Encoding as subtle communication.* Encoding well-being has advantages for being perceived as a graceful and non-explicit way to augment status updates. And also to convey information that was considered useful by sender and recipient but may otherwise have a social stigma (e.g., consistently explicitly saying "I feel ill!").
- *Dimensions and discrete values effective.* The use of the four pre-defined dimensions with their discrete values was perceived as functional and effective for conveying one's current well-being, and for perceiving one's colleagues' states. These were also perceived as sufficiently nuanced to be able to support deeper post-hoc reflection on one's own practices.

- *Desire for further group awareness.* The desire for richer representations of group state over time suggests both interest in greater group well-being awareness, and offers opportunities for design.
- *Manually externalising status important.* The act of setting state manually was perceived as important. This finding suggests that our future work in automation would be better focused on information to supplement both self and group reflection of state/well-being, rather than on trying to capture automatically what one's state might be.

With these findings that suggest multiple benefits for the expression and communication of well-being, we hope that we have shown reason to design more tools to take advantage and explore the space further. There remain open questions for the long-term. One goal is to tie reflecting about personal and group state to attributes of better quality of life in a work environment, for example, increased productivity or job satisfaction, and decreased sick days and stress. Another is to consider the value and impact for different work or social relationships: acquaintances, colleagues, or friends. We hope to inspire designers to not only explore well-being attributes in social networking applications, but further to consider the potential for well-being measures across human-computer interaction.

ACKNOWLEDGMENTS

We thank all participants involved in the study, colleagues for the various discussions regarding Healthii, and anonymous reviewers for their helpful comments on earlier aspects of this work.

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