

MOOD EXPRESSION BY SENIORS IN DIGITAL COMMUNICATION

Evaluative comparison of four mood-reporting instruments with elderly users

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Abstract: Elderly users have widely adopted digital communication. Digital communication is often text-only, e.g. instant messaging (IM) and e-mail. Text-only communication has been found less effective than communication that uses richer channels such as audio and video.

Mood expression instruments, such as emoticons, are used to increase the communication bandwidth and to compensate for the less-effective text-only communication. It is however unknown if elderly are able to express their moods using emoticons, nor what instruments they prefer.

In the present study, four mood-reporting instruments were evaluated by 38 senior participants. The tested mood reporting instruments were Emoticons, Self-Assessment Manikin (SAM), Pick-A-Mood (PAM), and a text-based variant of PAM. Each mood-reporting instrument was evaluated with four realistic scenarios, each representing a different basic mood type.

The study showed a significant preference for PAM and text compared to SAM and emoticons. Interestingly, emoticons were considered most difficult to use because most participants had difficulties recognizing the intended moods. Text was seen as clear and straightforward, though participants mentioned that PAM was more personal. The study suggests seniors can use text-only instruments for mood-reporting. However, if the communication channel allows for visual cues, PAM is a better alternative, as PAM increases the communication bandwidth.

Key words: *mood-reporting instruments, elderly users, evaluative comparison.*

1. Introduction

In 2011, six out of ten elderly people aged 65 to 75 in The Netherlands made use of the Internet. Furthermore, Internet use by elderly has doubled between 2005 and 2011 [1]. Examples of Internet use are communication and online shopping. An increasing number of elderly people now use the Internet to communicate with family and friends. With the increasing use of digital communication comes a growing need for communicating affective tone or 'mood state'. Currently, people use a variety of (elements of) mood-reporting instruments to express their mood or to add a mood 'flavor' to their communication. A well-known example is the use of emoticons (or smileys) in instant messaging (IM). Emoticons are used abundantly in many IMs to enrich digital communication whenever richer channels are unavailable [11,12]. The same instruments are used in research contexts for self-assessment of moods.

Various mood-reporting instruments can be used for adding mood information to digital communication. Some mainly use verbal items, such as PANAS [14] and POMS [8]. PANAS measures Positive and Negative Affect, using a scale of 20 items, split into 10 negative and 10 positive moods [14]. POMS makes use of 65 items representing a total of six mood states [8].

Other instruments use verbal items represented in a graphical scale. Mood Map and LEM fall within this category. The Mood Map used in a mobile phone application is based on the circumplex model of Russell [10] in which moods are represented in a two-dimensional graph using a negative-positive axis and a high-low energy axis. The instrument has been developed to be used for “emotional awareness and self-regulation” [9]. LEM is used to measure eight emotions that can be elicited by the “visual appeal” of websites [6]. This instrument represents dimensions of the circumplex model of Russell [10]. In LEM, every octant of the model is represented by two emotions.

The final category we observe uses pictorial representations of moods. SAM and PAM represent moods in a pictorial way. SAM is represented by a three dimensional scale, representing pleasure, arousal and dominance by the use of five manikins per scale [2]. PAM on the other hand makes use of the combination of both pleasure and arousal representing nine mood states using cartoon characters.

In short, various instruments have been designed to enable mood expression; it is however unknown to what extent elderly consider these easy-to-use and intuitive. Earlier research has shown that smileys are effective in IM settings, though it is unknown whether elderly are able to express their moods using smileys [5, 13, 15].

In this paper, we report a study that was designed to investigate what mood-reporting instrument best fits the needs for elderly people for expressing their moods in digital communication. The aim was to find out whether elderly are able to express their moods in a digital communication setting and how capable they feel they can express their mood using one of the four mood-reporting instruments evaluated. Do they find the mood-reporting instruments intuitive and easy-to-use? Which of the four tested mood-reporting instruments is preferred and why? These four different instruments were tested with the use of scenarios and interviews.

2. Method

In order to find out whether elderly can be helped in expressing their moods in instant messaging, four mood-reporting instruments have been evaluated with a questionnaire and interviews. Emoticons, SAM, PAM, and a text-based variant of PAM were evaluated using a paper mock-up of an instant messaging interface. Four scenarios covering the quadrants of the circumplex model of affect, were used as the basis of the conversations shown in the interface. In the following section we will elaborate on the participant selection, the four mood-reporting instruments, the scenarios used, the design of the questionnaire, and the interview.

2.1 Participants

In this study, 38 respondents (of which 27 female) participated (thirty-nine were invited but one dropped out because he did not understand the usefulness of the mock-up communication tool used in the questionnaire). All participants were Dutch-speaking, aged between 67 and 89, and lived in The Netherlands either independently or in a care facility. Not all respondents had experience with computers, smartphones or tablets.

Participants, who participated on a voluntary basis, were recruited in four different elderly gymnastic classes in Leiden and Sassenheim. During these classes, the researcher explained the goal and the procedure of the

questionnaire, and the seniors were invited to participate in a questionnaire and interview taking place in their own home. The participants were explained that the study aimed to find out how digital communication between elderly and their adult children can be improved. Participants were not paid, but after the interview they did receive a small gift.

2.2 Evaluated mood-reporting instruments

Four mood-reporting instruments have been selected based on their popularity, their diversity, and also on the time required to indicate a mood state. Because one should be able to report quickly in an instant messaging setting, we did not select instruments that contain extensive lists of verbal items. The selected instruments were Emoticons, SAM, PAM, and a text-based variant of PAM. All four are based on Russell's circumplex model of affect [10].

Emoticons

Emoticons have been developed as an instrument to facilitate "rich synchronous text-based communication" [11]. In this study we used a subset of the emoticons developed by Sanchez et al. [12]. This set has been developed on the basis of the 28th moods of the circumplex model of affect [10]. As a basis for the design of these emoticons, the Facial Action Coding System (FACS) was used. FACS connects specific facial expressions to specific moods, which is represented in 28 emoticons [4].

SAM

The Self-Assessment Manikin (SAM) is a pictorial instrument for the assessment of moods with a dimensional approach. SAM uses three dimensions: pleasure, arousal and dominance. Bradley [2] assumes that moods can be represented using three different dimensions. Every dimension is represented in a separate mood scale, each consisting of five manikins. Users of SAM report their mood by selecting one manikin of every dimension scale, the combination of which represent their mood state [7]. In most applications, only two dimensions of SAM are used, namely valence and arousal. Therefore those two dimensions have been used in the current study.

PAM

Pick-A-Mood (PAM) is a cartoon-based pictorial character which was recently developed to enable people to unambiguously and visually express their mood in a rich and easy-to-use way. PAM can be used for both mood assessment as well as mood communication [3]. PAM is represented in three different characters, a male, a female and a robot character. These three different characters each consist of eight mood states, fitting in the four main mood categories: energized-pleasant (excited and cheerful), energized-unpleasant (irritated and tense), calm-pleasant (relaxed and calm), and calm-unpleasant (bored and sad) of the PANAS model [3, 13]. These eight mood states are developed based on a discrete approach assuming that moods are not expressed in separate dimensions but in a combination of dimension.

Text

Verbal mood-reporting instruments generally contain extensive list of moods. Within an instant messaging interface tools need to be quick and intuitive. It was therefore decided to define a text-based tool with a limited set of mood states. The eight mood states of PAM were represented in a verbal way.

2.3 Approach

Five scenarios were used for the evaluation of the four different mood-reporting instruments. These scenarios were explained to the user as well as represented in a conversation in the interface. Four of the five scenarios, excluding the example scenario, were designed to cover moods in all four quadrants of the circumplex model of affect [10]. The four selected moods were: irritated, sad, relaxed, and excited. In the example scenario, the mood bored was selected. For each select mood, a scenario was created based on Internet forum posts by elderly. These scenarios are the most likely scenarios to fit the target group in their daily life. Every mood-reporting instrument was evaluated using these five scenarios, thus in total 20 different interfaces are used. Table 1 shows the scenarios with the corresponding mood. The scenarios were read to the participants each time a new evaluation assignment was presented.

Table 1. Scenarios used (originally in Dutch)

Mood	Explanation
Bored (the example scenario)	You have had a cold for several days, therefore you feel quite tired. Your daughter sends you a message asking how you are feeling. You respond explaining you still have a cold and feel quite tired
Irritated	You decided to go to a show in the theatre. You took the train. Unfortunately the train got delayed. Therefore you arrived late for the show and were not allowed to enter the show. Your daughter knew you were going to the theatre and asks if you enjoyed the show. You respond explaining you were late due to the delayed train and were not allowed to enter the show.
Sad	Your daughter sends you a message asking how you are feeling. You explain that you could not fall asleep yesterday night and therefore had a restless night.
Relaxed	After many days of rain, the sun is shining again. You decided to go out for a walk in the park, you enjoyed the beautiful weather. You decide to send you daughter a message telling her how much you enjoyed the nice weather and asking her how she is doing.
Excited	Your daughter sends you a message from the hospital telling you that the birth went well and that your grandchild Feline is healthy. You respond with a congratulation message, indicating you would like to visit them to see Feline.

2.4 Questionnaire design

A questionnaire was used to evaluate the four mood-reporting instruments. Participants were explained that there are no right or wrong answers and that they are welcome to comment on the design as well as the mood-reporting instruments. To make sure that participants did not hesitate when commenting it was made clear that the researcher was not connected to any of the instruments in the study.

The four mood-reporting instruments were evaluated using paper-based mock-up interfaces, two examples are shown in Figures 1 and 2.



Figure 1. Mock-up instant messaging interface with PAM. Participants were asked to tick the mood they feel fits best the scenario.



Figure 2. Instant messaging interface with SAM. Participants were asked to tick the figure they felt best fit the scenario for each dimension.

2.5 Semi-structured interview

In a semi-structured interview, the participant was asked several general questions regarding mood-reporting instruments. The four different instruments were shown next to each other, and the following questions were asked (originally in Dutch): (1) Which of the four variants do you prefer? Why? (2) Which of the group of images or text do you least prefer? Why? (3) Which of the variants comes second and which third? Why? (4) Do you feel you can express your mood with these images/text? (5) Which of the variants did you found most easy to use? (6) Would you like to use such an interface on a tablet in which you would send messages to your son or daughter? Why (not)?

2.6 Procedure

At the start of the questionnaire, the participant was walked through the example scenario. This scenario was explained to the participants after which they were able to read the conversation shown in the interface. After introducing the example scenario, the mood-reporting instrument was explained by naming the meaning of every mood of the mood-reporting instrument. The participant was asked to envision him/herself being in the scenario and having received and sent the messages shown in the interface. He/she was asked how he/she would feel in that scenario and to tick with a pencil the mood he/she feels fits best the scenario. The next interface paper was shown with a different mood instrument; again the example scenario story was explained to the participant after which the second instrument was explained. The example scenario as well as the mood-reporting instrument was explained in the next two interfaces. Once the participants walked through the example scenario the next four

scenarios were shown with the four mood-reporting instruments. This time the participant did not receive explanation on the mood-reporting instrument. The participants always received the example scenario first, though the four moods-reporting instruments of the example scenarios are shown in a random order. The next four scenarios with its four corresponding moods-reporting instruments were shown in a random order.

3. Results

Text was preferred by most participants (53%), followed by PAM (34%) and Emoticons (11%), as can be seen in Table 2. Least preferred was SAM (3%). A Friedman test (One-Way Repeated Measures ANOVA analysis for non-parametrical data) showed a significant difference ($p < .05$) in preference between the preferences. Friedman test (with Bonferroni correction) for the tools in pairs, showed significant differences ($p < .05$) between two groups PAM & Text versus SAM & Emoticons. No significant differences were found between PAM and Text, and between SAM & Emoticons. This indicates that the preference for PAM and TEXT is significantly higher than the preference for SAM and Emoticons. In order to understand these differences, comments of the respondents about strengths and weakness of each tool were analyzed. Below, these results for each tool are reported.

Table 2. First preferences. Due to rounding differences, the total sum exceeds 100%.

tool	Number of respondents ($N = 38$)	Percentage of respondents	Mean ranking (1 = highest preference; 4 = lowest preference)
Emoticons	4	11 %	3.26
SAM	1	3 %	3.21
PAM	13	34 %	1.97
Text	20	53 %	1.55

Emoticons

Emoticons were selected as first preference by four participants (11%). Thirty-one participants (82%) hesitated during the selection of the emoticon. Fourteen participants (37%) mentioned they found there were too many options to choose from, and nineteen (50%) found little difference between the different emoticons. In twenty cases (53%) the participants asked for confirmation of the moods they selected, whether it was indeed the mood they expected it to be. Three participants (8%) found the emoticons ‘childish’, and found it something they would only use when contacting their grandchildren. The four participants (11%) who did select emoticons as their first preference, indicated that they appreciated the high number of options to choose from.

SAM

SAM was selected as first preference only by one participant (3%). Twenty participants (53%) hesitated during the selection of the arousal dimension. Ten participants (26%) asked more than once for confirmation for the meaning of the two dimensions, two participants (5%) mentioned they wanted the meaning of each dimensions shown next to it. Nine participants (24%) perceived the arousal dimension as negative. In three cases (8%) the participants had difficulties understanding the difference in the pleasure scale of SAM. Five participants (13%) mentioned they found that SAM did not express anything. In seven cases (18%), the participants mentioned that they found SAM ‘childish’.

PAM

PAM was selected as first preference by thirteen participants (34%). Eight participants (21%) asked for confirmation of the meaning of the PAM mood states, four (11%) of which selected the mood state and asked for confirmation afterwards. While the other four participants (11%) were more hesitant and asked the meaning of some of the mood states before making a decision. Two participants (5%) mentioned they found little difference between the mood-states neutral, sad and calm. Four participants (11%) mentioned that the human figure helped recognizing the intended mood. Five participants (13%) found PAM more personal than the other three mood-reporting instruments.

Text

Twenty participants (53%) selected text as their first preference. Text was considered to be more accurate as compared to Emoticons, SAM and PAM. The participants mentioned that if they wanted to explain whether they felt sad they just chose “sad” while when using one of the three other instruments they first needed to find which of the moods shown corresponded to sad. Two participants (5%) hesitated when using text. Five (13%) of the participants mentioned they want to choose two moods when using text or something in-between the two different moods.

To explore the differences between PAM and Text, two correspondence analyses were performed with two factors: Scenario (4 levels; each level representing a scenario) and Mood (9 levels; each level representing a mood). The correspondence analyses create visual representations of the relationship between the scenarios and the reported moods, see Figures 3 and 4. The images indicate that whereas PAM differentiates more for the positive moods, Text differentiates more for the negative moods.

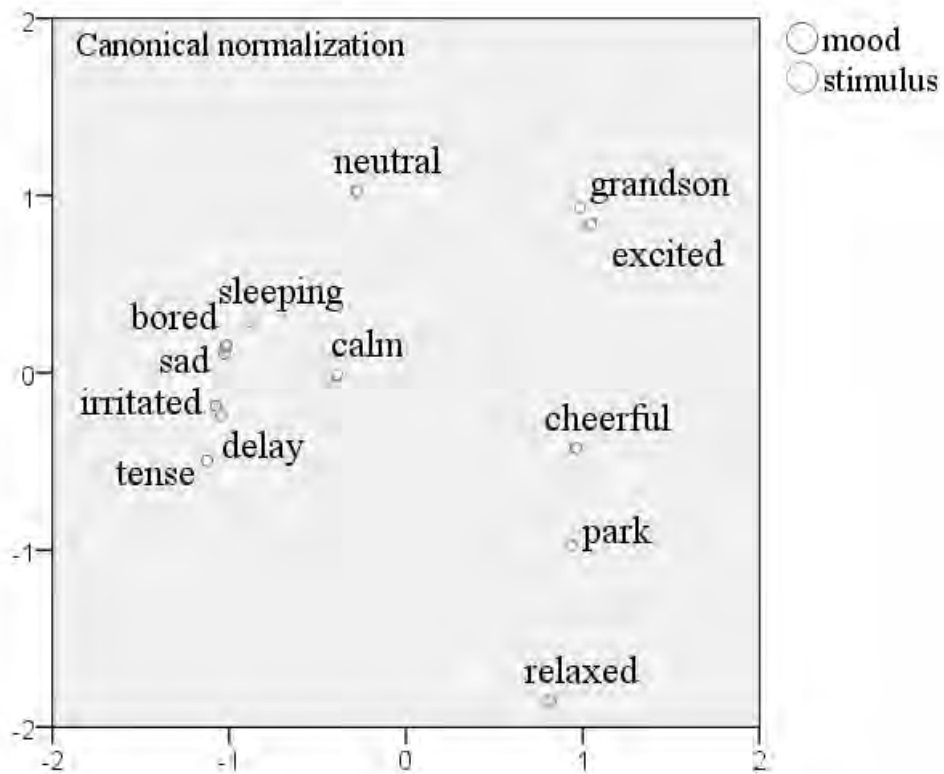


Figure 3. Correspondence analysis of the stimuli and the reported moods using text-reporting.

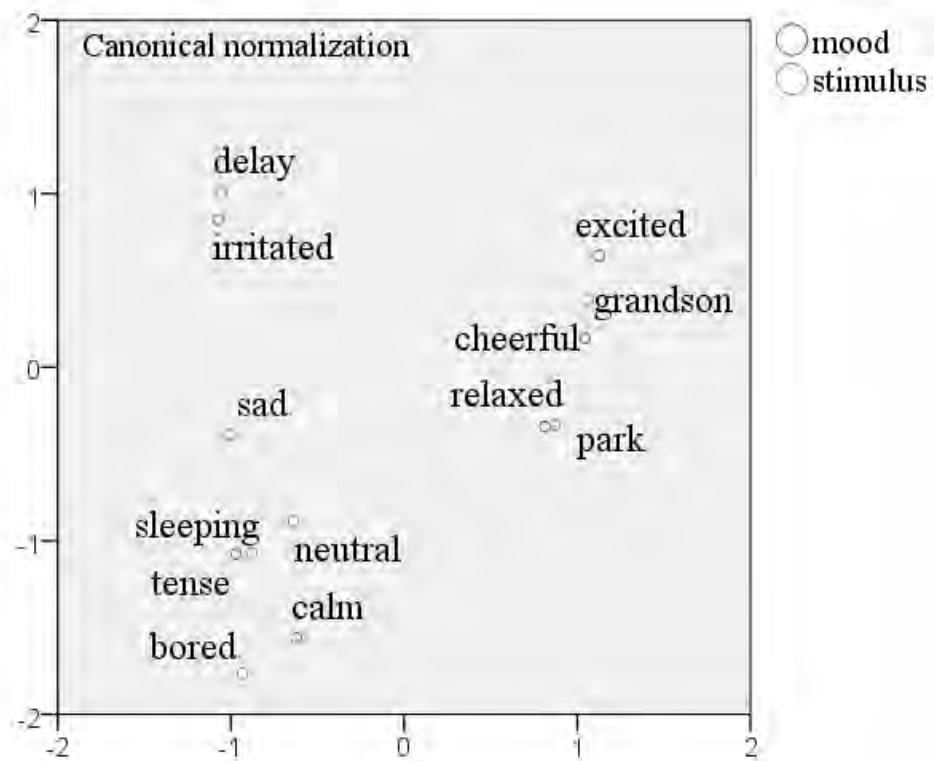


Figure 4. Correspondence analysis of the stimuli and the reported moods using PAM.

4. Additional findings

All participants mentioned they felt capable expressing their mood using the mood-reporting instrument of their choice. The participants got accustomed during the use of the mood-reporting instrument, choosing the moods became more fluent towards the end of the questionnaire. Six participants (16%) asked for confirmation during the overall questionnaire. Thirty participants (79%) were able to map the scenarios to their own life. They remembered the day the scenario was applicable to their life and explained what happened on that specific day. Nine participants (24%) mentioned they would not communicate negative moods to their children. Six of these participants explained they did not want their children to be concerned. Three participants mentioned they preferred to be positive and therefore did not communicate negative moods.

Twenty-three participants (61%) mentioned they would not use such an instant messaging interface on a tablet. Twelve participants (32%) mentioned they would like such a device, two of which mentioned they would only want such a device if their children would want them to have one. Fifteen participants (40%) participants had a laptop or computer at their home and had access to Internet, three of which mentioned they already used email to keep in contact and therefore would not be interested in such an instant messaging interface.

5. Conclusions and discussion

In this study, four different tools for communicating moods were evaluated. The results clearly indicate that some tools were preferred more than others: text (pre-defined mood labels) and PAM (mood-pictograms) were preferred over Emoticons and SAM. An interesting finding is that pictorial tools (i.e. emotion cartoons) were not necessarily liked or disliked as such. Participants liked pictorial tools but only if they are clear, holistic (i.e. not representing dimensions but holistic affective states) and not too 'childish.' This should be taken into account when applying pictorial tools for mood reporting with an elderly target group. PAM being a human figure helped the participants to recognize the mood state. Text was perceived more accurate as PAM even though they both represented the same nine moods. PAM differentiates more for the positive moods, text differentiates more for the negative moods.

Participants were capable of expressing their moods using their preferred mood-reporting instrument. They felt their preference was not only the best they could express their mood with, but also the most easy to use. Once the participants were accustomed to the mood-reporting instrument, the choice making was more fluent.

The participants felt able to apply the scenarios to their own life and therefore were able to empathize in the specific situation, which made it easy to determine the specific mood that corresponded to the scenario. The participants preferred to express positive moods and found it easier to choose a positive mood. The participants felt more confident when choosing for the scenario of having a grandchild than scenarios as having a bad night's sleep. Furthermore, scenarios as having a bad night's sleep happened more often and therefore were less worth mentioning.

Elderly are able to express their moods in a verbal way when using the mood-reporting instrument text. Text seemed more accurate and gave little room for interpretation. Though, PAM has as an advantage that the user does not need to verbalize their mood. Furthermore PAM can increase the communication bandwidth during an instant messaging communication whenever richer channels such as video or audio would not be available. In case the communication channel does allow visual cues, PAM seems to be a better alternative.

The findings do suggest that PAM could be improved by increasing the differentiation between moods, mainly in low arousal-negative affect mood states. Furthermore, it might be better not to force users to select a single mood state, but rather to allow them to combine mood states that together best reflect their mood.

This study gave insights in the preferences of senior participants. The next step would be to test the mood-reporting instrument in real life within a realistic digital communication setting. The mood-reporting instruments could then be tested using the moods corresponding to the daily life of the seniors.

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