

Expressing Emotions as Emoticons for Online Intelligent Agents

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Without emotional annotation, online communication can be ambiguous and lead to misunderstandings. This paper addresses the questions of which emotions are commonly expressed online, how these emotions can be encapsulated in emoticons, and how people respond to different emotions. In 10 focus groups with university students we found that some emotions are not frequently expressed online (e.g. aggravation, alienation and torment), while many others were commonly used (e.g. enthusiasm, anger, amusement, amazement and disgust). Emoticons were drawn or described for nine commonly expressed emotions, and the response discussed. Audience was a key component in how people used emoticons, both for use and interpretation. Participants preferred to ‘defuse’ negative emotions such as anger and rage with light-hearted comments, supporting previous findings on a positivity bias on many social networks. These findings have implications for online communication and the design of intelligent virtual agents.

emotions, emoticons, affective computing, user-centered design, virtual agents, online communication

1. INTRODUCTION

Online messaging consists of text, which lacks emotional context. Without emotional annotation, online communication can be ambiguous and lead to misunderstandings (King and Moreggi 2007). This is the case for communication between people, but may be even more important when a virtual agent is communicating with a person.

One way to add this layer of emotional annotation is using emoticons. However, it is important to know what emotions people would like to express online, and how these emotions can be represented pictorially. This paper explores the culture of using emoticons – what emoticons to use when, and how to respond.

This work is part of a larger research project focused on developing an intelligent virtual agent to support informal carers (people who provide regular support for another person without formal payment, and who frequently report high stress levels). Good quality emotional support helps to reduce negative affect, potentially relieving stress (Smith et al. 2014); intelligent virtual agents (IVAs) can deliver this emotional support (Klein et al. 2002; Prendinger and Ishizuka 2005; Dennis et al. 2013)), e.g. providing

emotional support messages to carers experiencing different stressors (Smith et al. 2014).

While this paper is inspired by the challenge of supplying emotional support for carers, understanding how emoticons are used online is relevant to many other domains where it is important to communicate emotions, including personal virtual agents in other stressful domains and in assistive technology (e.g. for communication aids (Tintarev et al. 2014)).

2. RELATED WORK

Text lacks the emotional context of face-to-face interactions – for example, different vocal pitching can change a sentence from genuine to sarcastic (Cheang and Pell 2008); putting emphasis on different words can change the meaning of a sentence (Scherer et al. 1991); different facial expressions can affect the emotional interpretation of a sentence (Massaro and Egan 1996); and simple hand gestures can convey the valence and intensity of an emotion (Sundström et al. 2005). This could lead to textual messages being misinterpreted or misconstrued (King and Moreggi 2007).

Emoticons are classically small pictures that represent facial expressions, that in turn represent

emotions. Originally, these were represented solely by punctuation (e.g. :-)), but currently there is mixed use of punctuation (which is sometimes automatically converted into an image by the text editor/application) and selection from an image set within the text editor/application. Standard emoticon sets have emerged from two cultures – the Western style that uses sideways faces with emphasis on the shape of the mouth, and Eastern emojis, with emphasis on the shape of the eyes (e.g. ^_^). While usage in 2013 of both styles of emoticon was dominant in their home culture when typed (Park et al. 2013), modern image sets in the UK tend to use eastern or hybrid styles (e.g. the font Segoe UI Symbol).

Classic studies have identified that 6 emotions can be universally recognised from facial expressions - these are fear, surprise, disgust, anger and happiness (Ekman et al. 1987). There is clear guidance as to what these facial expressions look like, and as such they could be (and have been) converted to emoticons relatively simply. However, Shaver et al. (1987)'s linguistic analyses of emotion words in English suggest that there are twenty-five basic categories of emotion commonly expressed in language, that fall under six rough groupings of 'love', 'joy', 'surprise', 'anger', 'sadness' and 'fear' (disgust falling under the super-category of anger). Today's emoticon selection emerged from both the ease of using punctuation to display a face and requirement to distinguish joke from seriousness (e.g. :-)) (Hogenboom et al. 2013), and through the non-scientific observation of a Japanese mobile internet developer (Nakano 2016); thus an emoticon lexicon that depicts emotions that people want to express is sorely needed.

There has been growing interest in how emoticons are used to express emotion. Lo (2008) showed that using an emoticon can add emotional context to ambiguous messages and shift the interpretation of messages; Thompson and Filik (2016) found that certain emoticons (;) and :P) are associated with sarcasm, while :) is associated with praise; Derks et al. (2008) found that emoticons were used more with friends than with strangers, and were more likely to be used in positive contexts than negative; and Derks (2007) found that sympathy can be expressed in emoticons by reflecting the emotion back at the user.

Facial emoticons have been found to be processed by the brain similarly to faces (Churches et al. 2014), making them a good candidate for conveying emotion. However, more recently, actions (e.g. dancing) and objects (e.g. a rain cloud) are in common use (Ruan 2011). As pictorial images of

objects can evoke similar affective and visceral reactions to the real objects (Lang et al. 1993), using representations of things that are associated with different emotions (in addition to faces) should be an effective way of conveying emotion online.

Much work has explored how emoticons effect the emotional content of a message. Walther and D'Addario (2001) found a small effect for simple text emoticons – negative emoticons caused the message to be interpreted more negatively. In our previous work, we have found that graphical gift emoticons, such as flowers, improved the support of an emotional support statement. Participants reported that the emoticon was sympathetic and represented an effort to cheer the carer up (Smith 2015). Yuasa et al. (2006) found that the use of emoticons can help convey the emotional context of a message and Derks et al. (2007) found that emoticons are used to strengthen or adjust it. Tintarev et al. (2014) found that emotive annotations of statements (e.g. a smiley about eating spaghetti meant that it was tasty) were important in an assistive and augmented communication aid, and that participants felt emotional annotations were missing when personal stories (about a child's day at school) were generated without them.

3. METHODS

The aim of this study was to identify the emotions that people expressed online and explore how they could be encapsulated in an emoticon. Additionally, we wanted to explore how people respond to expressions of emotion online, and how that response could be depicted in an emoticon. To do this, we chose to run focus groups with participants familiar with using emoticons.

3.1. Participants

Ten focus groups were held with 3-6 participants in each group. Participants were recruited from the University of Aberdeen, the majority being European. Participants were primarily recruited from first and second year computer science classes, but post-graduate research students and students from other disciplines also participated. Participants were all over 18, but further demographic data was not collected.

3.2. Materials

A list of 24 emotions were taken from Shaver et al. (1987) (see Table 1). 'Arousal' was excluded from this list as it was agreed that this was not appropriate to be discussed in a classroom setting. Common emoticons were taken from Skype (circa November 2013), MSN Messenger (2010),

Wordpress (2014), and from the typeface 'Segoe UI Symbol'. Participants were provided with coloured pens and A3 paper to draw on.

3.3. Procedure

Step 1. Participants were told the purpose of the group was to identify images or emoticons that are appropriate to use to express different emotions in social networking, online messenger chat and email. They were each given a list of 24 emotions (see Table 1) and asked to circle which emotions they thought were frequently expressed online, and if any others should be added to the list. Each emotion was then discussed one by one, and the group decided by a majority decision which emotions were commonly expressed online.

Step 2. The group collectively selected one emotion to discuss. Next, participants were provided with the scenario "A friend has just told you about a situation they were involved in. They are feeling (emotion)." The group were asked to come up with an example of what may have happened to their friend that would have caused this emotion. They were then asked to draw, describe, or select images to answer these questions:

- What image or type of image could their friend use to best express this emotion? Why?
- What image would you use to respond to your friend's emotion? Why?

Groups explored 1-3 emotions in this way.

Step 3. Participants were invited to share any other thoughts they had on how emoticons were used to express emotions online.

3.4. Analysis.

For Step 1, the results were compiled into Table 2. Emotions that groups claimed were not expressed online were scored -1, and emotions that groups thought were expressed online were scored 1. Where there was disagreement, the emotion was scored 0. A threshold of 3 was selected for emotions that were important to express online.

For Step 2, each emotion with a score of greater than 3 is described in detail (the discussions of emotions that did not reach the threshold of 3, e.g., dismay are not described in this paper) – the examples that groups thought of that depicted the emotion, the features of the emoticon that they thought expressed that emotion, and the emotion and features of emoticon that would be appropriate to use when responding to someone expressing that emotion. For each emotion, images are displayed

Table 1: Twenty-four emotion words taken from Shaver et al. (1987)

Emotion Words			
Adoration	Aggravation	Agony	Alarm
Alienation	Amazement	Amusement	Anger
Anxiety	Contentment	Depression	Disgust
Dismay	Eagerness	Enthrallment	Enthusiasm
Envy	Exasperation	Guilt	Longing
Pity	Pride	Relief	Torment

that were drawn or pointed at during the focus group, or have been compiled from their description after the Focus Group took place. These are not meant to be a finished emoticon set, but an indication of the features that participants thought were important for each emotion.

Groups discussed 1-3 emotions each. As the emotions were chosen by each group as ones they were interested in discussing, three emotions were discussed twice and one emotion (anger) was discussed three times.

For Step 3, a thematic analysis was performed and several important themes discussed.

4. FINDINGS

In this section we identify the subset of emotions participants would expect to see expressed online; discuss in detail how different emotions are expressed, and how participants would respond to them; and finally, highlight more generally overarching themes of the use of emotions online.

4.1. Step 1: Emotions Commonly Used Online

Participants unanimously agreed that enthusiasm was expressed online, while most groups agreed that anger, amusement, amazement and disgust were also expressed online. Alarm, anxiety, eagerness and relief were selected by 3-4 groups. For each of aggravation, alienation and torment, 4 groups agreed that these emotions were not expressed online. For the remaining emotions, groups did not have a strong view on whether they were commonly expressed online (see Table 2).

4.2. Step 2: Emotions discussed in detail

Here we describe the nine emotions that were selected to discuss in greater detail, and scored 3 or higher in Step 1.

Anger. FG2, FG8 and FG5 discussed anger. The examples they gave were buses that do not turn up, internet trolls, and having failed a test. FG8 agreed that the emoticon should be a face with eyebrows

Table 2: Emotions that each focus group claimed were commonly expressed online. 'Expres'd online': number of groups that felt that this emotion was expressed online. 'Not Expres'd': number of groups that did not think this emotion was expressed online. For many emotions, participants did not agree/were not sure.

* In addition to the emotions suggested (c.f. Table 1), Sadness, Flattery, and Happiness were added by the participants.

	Adoration	Aggravation	Agony	Alarm	Alienation	Amazement	Amusement	Anger	Anxiety
Expres'd online	2	0	3	4	0	8	9	7	3
Not Expres'd	2	4	3	0	4	0	0	0	0
Total	0	-4	0	4	-4	8	9	7	3
	Contentment	Depression	Disgust	Dismay	Eagerness	Enthrallment	Enthusiasm	Envy	Exasperation
Expres'd online	2	2	6	2	3	2	10	2	1
Not Expres'd	0	2	0	2	0	2	0	1	0
Total	2	0	6	0	3	0	10	1	1
	Guilt	Longing	Pity	Pride	Relief	Torment	Sadness*	Flattery*	Happiness*
Expres'd online	2	2	2	2	4	0	2	2	2
Not Expres'd	2	2	2	0	0	4	0	0	0
Total	0	0	0	2	4	-4	2	2	2

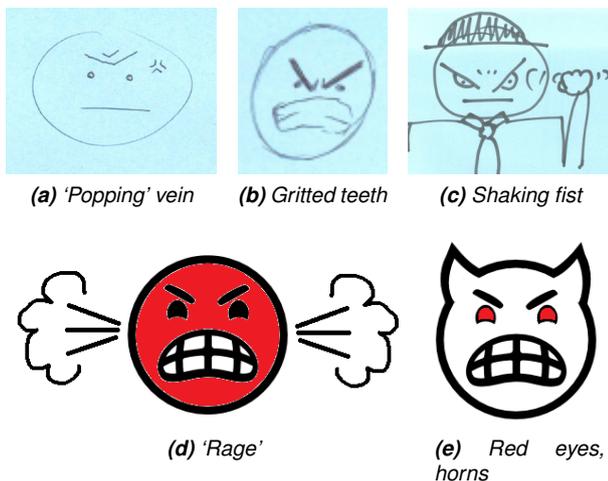


Figure 1: Emoticons for anger by FG2, FG5 and FG8

tilted inwards, red eyes, devil horns, down-turned mouth and bared teeth. FG5 selected a similar emoticon, with a red face and steam coming out of the ears to depict 'rage' rather than anger. FG2 proposed gritted teeth, a furrowed brow, popping vein on forehead and shaking fist (see Figure 1).

Response to anger. Participants delineated rage from anger. If a friend expressed rage, they would use a 'pat-pat, calm down' emoticon, or a winking face. Groups suggested that they would not take rage seriously and respond with humour. If genuine anger was expressed, participants felt that a confused, worried or 'supportively sad' face would be appropriate - for example, the confused 'S' face (:S) or slanted mouth (:/). One participant suggested a surprised face to encourage the friend to reply

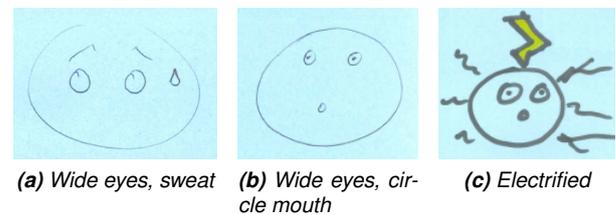


Figure 2: Emoticons for alarm drawn by FG2

so they could find out why they were angry, while another suggested distracting them with a joke.

Alarm. FG2 discussed alarm in detail. They gave examples such as 'Game of Thrones' has been canceled, a lovable celebrity is a paedophile, and a friend has been in a car accident. Participants agreed that the emoticon should be a face with large staring eyes, and with a circle mouth - either a tiny dot or a gaping 'O'. They also suggested sweat on the brow and electricity (see Figure 2). Alternatively, participants thought shock could be expressed by giant punctuation e.g., exclamation mark or question mark and exclamation mark ('?!').

Response to Alarm. The group wanted to differentiate between scenarios - 'surprising' alarm and 'upsetting' alarm. For surprise, the group felt that the correct response was to mirror the shocked face. For upsetting alarm, the face should be worried or fearful but similarly to surprise, participants wanted to 'share their emotion'. Participant thought an animated emoticon shaking with shock would be effective.

Amusement. FG3 and FG8 discussed amusement in detail. The examples they gave were seeing a

funny video on the internet and preparing to go to a party. Both groups agreed that the emoticon should have a big grin with teeth, crinkled eyes and tears of laughter (for extreme amusement). FG8 suggested that animated laughing would be suitable, or 'Peace' fingers (see Figure 3).

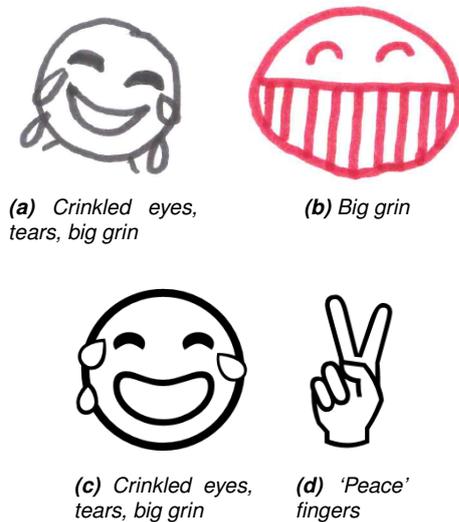


Figure 3: Emoticons for amusement chosen by FG3 and FG8

Response to Amusement. Both groups thought responding with the same 'amusement' emoticon was appropriate. FG8 suggested you should respond depending on how amusing you felt it was - from an animated laughter emoticon to an 'okay' or 'like' hand emoticon. Both groups suggested that if the situation was 'silly' or 'not funny', a deadpan face, such as raised eyebrows or glancing sideways scowl was appropriate to express slight disapproval.

Amazement. FG10 discussed amazement in detail – for example, seeing a beautiful sunset in a spectacular place, or discovering you have succeeded in a test. They thought amazement should be like 'happy shock' – raised eyebrows, wide eyes, open mouth (similarly to alarm). They also thought that emoticons that match the context of amazement were appropriate - for instance, flowers and rainbows for a beautiful landscape, holding a trophy up for success (see Figure 4).

Response to Amazement. Most participants thought a simple 'like' (thumbs up) would be an appropriate response, or a simple happy face (:)). They thought that a short message to show that 'I'm happy for you' would be good. Depending on context, one participant suggested a wide-eyed surprised face.

Anxiety. FG4 and FG7 discussed anxiety in detail. Both groups identified job interviews and exams as

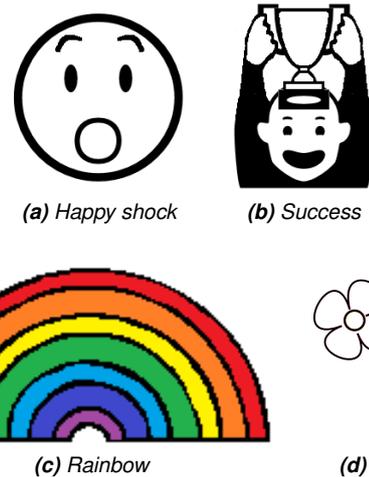


Figure 4: Emoticons for amazement chosen by FG10



Figure 5: Emoticons for anxiety chosen by FG4 and FG7

examples of anxiety. Both groups thought the 'S' face (:S) was appropriate for anxiety. They identified other symptoms of anxiety to add to the face e.g., green sickened face, sweat beads on the forehead. Group FG4 thought the 'slant face (:/) also conveyed anxiety, similar to the 'worried' emoticon that group FG7 chose. FG 7, however, thought that anxiety didn't have to have a downturned mouth and proposed a 'nervous smile' (see Figure 5).

Response to Anxiety. There were many different approaches to responding to anxiety. FG4 suggested that to 'give them space' you should not bother them with replies. Alternatively, you could respond with humour to 'make light' of the situation and make them smile. One member advised not to be disingenuous, as they will have already such platitudes as 'it will be fine', 'thumbs up'; these imply you don't really care. They advised expressing empathy with a message such as 'I feel what you are going through.' FG7 thought a 'hugs' emoticon would be appropriate. They wanted to encourage their friend to perform well with a 'good luck' or 'be cool' sunglasses emoticon (B). They also wanted an emoticon that expressed sympathy and positivity. They suggested emoticons that represented rewards (e.g., money, holiday, aeroplane) might incentivise

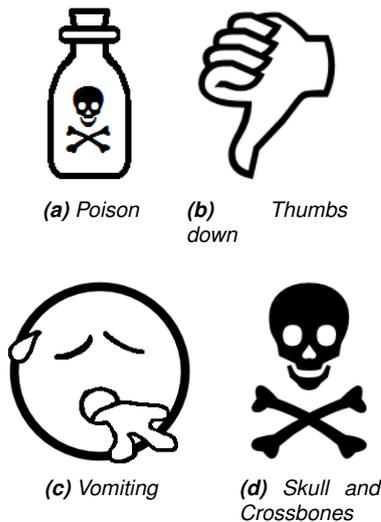


Figure 6: Emoticons for disgust chosen by FG1 and FG7

their friend. Unlike FG4, they thought the ‘like’ or ‘okay’ hands would be suitable.

Disgust. FG1 and FG7 discussed disgust. They gave examples such as: disliked politicians, lies about something that you disapprove of and not cleaning up after your dog. Both groups proposed emoticons that were not simply disgust: ‘use emoticons for connected emotions’ – e.g. frustration and anger. They suggested ‘disgust’ would be very context dependent - disgust in mouldy food differs from disgust at someone’s opinions. Other than faces that represent connected emotions (anger, frustration, disbelief), FG7 proposed a vomiting face or a skull and crossbones. FG1 suggested a ‘thumbs down’ hand or a poison bottle (see Figure 6).

Response to Disgust. FG1 thought ‘disgust’ stimulates a written response and thought a basic smiley might be shallow. They suggested appropriate responses would mirror the disgust response, before adding an understanding message e.g., ‘Yuck! That sounds horrible, are you okay?’ They suggested an accompanying comforting emoticon (e.g. heart, hug, or sad face) would be appropriate. FG7 thought that you should ‘potentially mirror it, assuming you agree,’ using a similar emoticon.

Eagerness. FG1 discussed eagerness in detail, using examples of anticipating holidays or looking forward to a party. They thought eagerness should be associated with a sense of time – so an hourglass or a countdown clock would represent part of the emotion. They also felt the emotion should be associated with the subject of eagerness, e.g. sun and aeroplane for a holiday (see Figure 7).

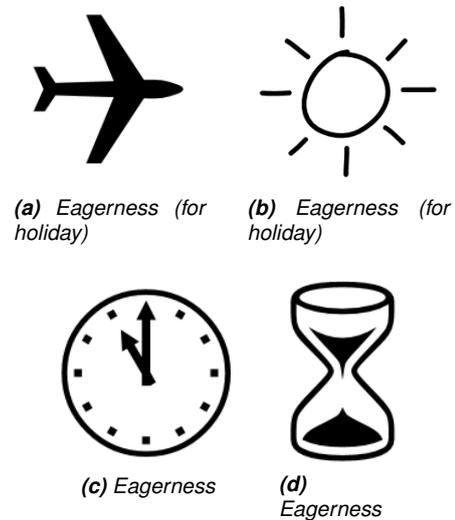


Figure 7: Emoticons for eagerness chosen by FG1

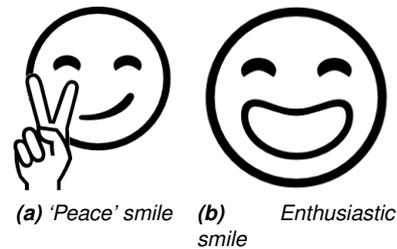


Figure 8: Emoticons for enthusiasm chosen by FG10

Response to Eagerness. The group felt a good response would be a grin or simple smile (:D or :)), or thumbs up. They also felt that mirroring the emoticon would be appropriate.

Enthusiasm. FG10 discussed enthusiasm, giving the example of setting up a business. They thought enthusiasm could be expressed with a big smile, or with a face and ‘okay’ or ‘peace’ hand (see Figure 8).

Response to Enthusiasm. The group thought that an appropriate response would be a grin, thumbs up, handshake or ‘bro-fist’. They suggested that a brief message such as ‘well done’ or ‘wow’ would fit with this. They wanted to convey the attitude that they were empathising by ‘sharing the achievement’.

Relief. FG10 discussed relief, using the examples of ‘exams are over’ and ‘I found something that I thought I had lost.’ They highlighted several ways of conveying this, e.g. praying hands to express ‘Thank God!’, a party hat to convey celebrations or a relaxed expression. They proposed an emoticon wiping a hand over the forehead to remove sweat, expressing ‘Phew!’, with closed eyes and smile (see Figure 9).

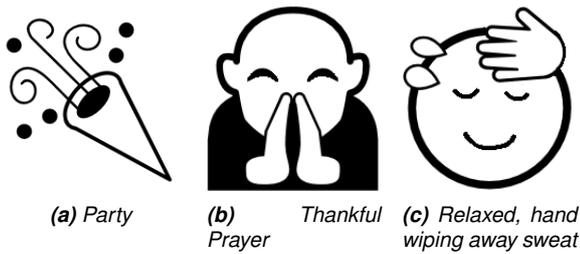


Figure 9: Emoticons for relief chosen by FG10

Response to Relief. The group felt a thumbs up or okay sign would be a good response. They also suggested that you could use an emoticon to offer a reward e.g., a cup of tea or party emoticon (the reward would depend on what you thought the friend would like). They also thought that they should be conveying celebration as relief provokes celebration, so an animated dancing emoticon would fit.

4.3. Step 3: Overarching themes

Throughout the focus groups, participants commented on how they use emoticons and what they think about how other people use them. A thematic analysis of this revealed the following themes:

Audience. Several groups highlighted audience's importance. For instance, one participant described using an animated GIF of an actor when they were messaging a group of friends, as it had become an in-group 'meme' of someone who had pulled through. They would not use this outside the group as it would not make sense to others. This was a common observation, even when participants were selecting emoticons from the example sheet when they did not understand what some faces were meant to convey – 'faces can only mean what you understand them to mean,' or have their own meaning within your own group culture.

Social proximity. Several groups thought you should use emoticons less frequently with people you don't know, as excessive use seems insincere or 'High Schooly' though non-use seems unfriendly or formal. When responding to emotions, friendship distance was an important theme. Participants thought the intensity of the emotion should be moderated by how close you are to the person; e.g. a 'like' for a distant friend, a message and grin for a close friend.

Purpose. Participants thought that emoticons were good for conveying emotion in textual messages as 'it is artificial not to smile in a conversation.' They thought that emoticons were usable as a 'mood filter' to change the tone of the conversation and prevent messages from being misinterpreted. However,

participants also highlighted that emoticons are used to 'lighten' the mood and make serious messages more 'light-hearted' e.g., an angry face represents annoyance not real anger. They also serve to make messages less formal.

Extreme emotions. Participants thought some emotions, e.g. torment and agony, are too extreme to express online and are experienced 'in the moment'. This means messages sent online are likely to be 'after the event' – when the user is no longer experiencing such an extreme emotion. Participants also thought others may not want to express negative emotions e.g., envy, guilt online.

Other ways of expressing emotion. Participants highlighted that emotion can be implied through the use of punctuation (e.g. ? or !) and capital letters.

5. DISCUSSION AND CONCLUSION

Participants identified nine emotions that they felt were important to be able to express online – these are Anger, Alarm, Amusement, Amazement, Anxiety, Disgust, Eagerness, Enthusiasm and Relief. For some of these, there is a clear relation to Ekman et al. (1987)'s descriptions of emotion – for alarm there is a distinctive widening of eyes and raised eyebrows; for anger the brows are drawn down and together; for amusement and enthusiasm (happy emotions), eyelids are tightened and mouth is upturned (Ekman and Friesen 1975). Participants used the term 'shock' to refer to both alarm and amazement, producing a similar emoticon for both emotions – this is interesting, as literature does not suggest that they are similar emotions ((Shaver et al. 1987)), though their facial depiction are quite similar. Although disgust is also a universally facially recognisable emotion, groups did not chose to depict a face with raised lip, wrinkled nose and raised cheeks - these features are perhaps too difficult to encapsulate in a simple line drawing.

For several emotions, participants chose to depict an associated object rather than a face. This is supported by Ekman et al. (1987) – only 6 basic emotions can be interpreted by facial expressions alone. There is a clear influence of culture on participants' choices of representation, e.g. using a 'peace' sign or a skull and crossbones, which may have different meanings in other cultures. For other choices, participants did not always feel that they could isolate an emoticon to depict the emotion outwith the context of the scenario: eagerness and relief are always about something.

There was a marked difference in the way participants chose to respond to positive and negative

emotions. For relief, amazement, eagerness and enthusiasm, participants proposed simple positive responses e.g. 'like' or simple smile. This was slightly different for amusement; this may be because someone expressing amusement invites others to evaluate the source and express their own response e.g. reacting directly to a funny video rather than reacting to the person's amusement. Participants more frequently wanted to respond to negative emotions using a short message, or a message accompanied by an emoticon. In previous work, we have created a supportive message set for an IVA to use when carers experience different types of stress (Smith et al. 2014) - we hope to combine these with the emoticons we have identified to provide personalised support.

Participants commented that emotions expressed online are unlikely to be strong and raw, as by the time they are typing it the emotion will have defused a bit. Thus depictions of extreme emotions e.g., torment, rage were either not seen, or treated as comical. Indeed, participants commented that part of the purpose of emoticons is to 'lighten' the emotionality of the message. There may be an interpretation problem here that could lead to poor emotional support – real anger expressed using a 'rage' emoticon might be laughed at, rather than sympathized with. This 'lightening' effect of using negative emoticons supports the idea of positivity bias in Social Media users, i.e. the tendency for users to prefer positive presentations of themselves (Reinecke and Trepte 2014).

It is important for an emotional support agent to correctly interpret the situation (including stressor type and affect) for a user, in order to offer optimal support. Emoticons are a rich medium for emotional cues and as such can be used effectively in sentiment analysis (Hogenboom et al. 2013). By providing a richer emoticon lexicon, an Intelligent Virtual Agent (IVA) will have better information on the user's situation, leading to better emotional support. Furthermore, by exploring how people respond to these emotions, we have identified the potential types of emoticon that are suitable for an IVA to use to accentuate emotional support when reacting to these emotions.

We note also that this work was carried out prior to 'Reactions' being added to the popular social network site Facebook. In addition to a thumbs-up 'like', Facebook users are now able to react with an image depicting 'love', 'haha', 'wow', 'sad' and 'angry' (Frier 2016). This is good progress, as the participants in our focus groups highlighted that for negative emotions they would not respond with a thumbs up. This study however highlights a

richer, but still manageable, vocabulary of expressing supportive emoticons.

While this work is a step forward in improving support messages, we caution that they are not a replacement for text message or other kinds of support: participants in our study thought for some emotions, just offering an emoticon could be seen as shallow, especially to a close friend. Using emoticons is not always sufficient when responding to a friend.

Future work should focus on elaborating on our proposed emoticon set, especially the more complex emotions e.g. anger and alarm. It may be appropriate to offer different levels of emoticon to encapsulate different intensities of emotion. We will also explore further how personality, age, gender and culture impact upon emoticon use. The resulting emoticons can then be integrated into a computer-mediated communication system or an IVA that reacts to a user's emotions (using e.g. affect analysis to detect their emotions Subasic and Huettner (2001)).

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