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Experience of emotion in face to face and computer-mediated social interactions: An event sampling study

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ABSTRACT

The present study compared the experience of emotion in social interactions that take place face to face (FtF), co-presently, and those that take place online, in computer-mediated communications (CMC). For a period of ten days participants reported how intensely they experienced positive and negative emotions in CMC and in FtF interactions they had with persons from their social network. Results from factor analyses discerned a three factor emotion structure (positive, negative, and anxious emotions) that was largely shared between CMC and FtF social interactions. Multilevel analyses of emotion across modes of interaction found that in FtF social encounters participants experienced more positive and less negative emotion and higher satisfaction than in CMC; there was no difference in anxious emotion. Positive, but not negative emotions or anxiety partially mediated levels of satisfaction differences between interactions in CMC and those taking place FtF. The results point to similarities and differences in emotion experience in FtF and CMC, underlining in particular the affiliative function of positive emotion in peoples' encounters.

1. Experience of emotion in face to face and computer mediated social interactions: an event sampling study

In the era of the Web 2.0 people use the Internet every day to communicate with others in synchronous or asynchronous interactions. An important element of those online encounters is the emotions experienced and expressed. Research that has attracted attention recently, documents the contagious effects of emotion in online social networks (Kramer, Guillory, & Hancock, 2014) and the effects affective states of users in real life may have for emotion transmission online (Coviello et al., 2014). Other recent studies find that positive emotions are more prevalent than negative emotions when people are browsing the Facebook (Lin & Utz, 2015), a result that likely reflects the prevalence of positive over negative emotion in peoples' everyday lives (Diener, Kanazawa, Suh, & Oishi, 2015). These and other recent findings (e.g., He, Zheng, Zeng, Luo, & Zhang, 2016; Tang et al., 2012) suggest that emotional phenomena that exist in the real world, such as emotion contagion and

experience of emotion, can also transfer to the virtual world influencing computer mediated social interactions.

The admittedly limited existing research on emotion in online interactions has mostly looked at individual emotional reactions to online stimuli in the absence of interactants' reactions. Yet, many emotions, even those which are considered basic, are elicited in relation to other persons' behaviors (Berscheid & Ammazzalorso, 2001; Oatley & Duncan, 1994) and therefore the social context within which emotions are experienced and expressed can very much shape the emotion experience in those interactions (Hess & Hareli, 2012; Manstead & Fischer, 2008). Despite an increasing research interest in the functions of emotion in peoples' everyday social interactions (e.g., Nezlek, Kafetsios, & Smith, 2008; Parkinson & Simons, 2009), we know little about how emotion is experienced in computer-mediated encounters and especially how this compares to emotion in social encounters that take place co-presently (Parkinson, 2014).

Analyses on the topic have been, mostly, conceptual. A review on the role of emotion in CMC concluded that CMC can be equally emotionally engaging as FtF social interactions (Derks, Fischer, & Bos, 2008). This position partly reflects findings that college students evaluate online social interactions as high in quality (yet lower than face to face or telephone interactions; study 2, Baym,

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Zhang, & Lin, 2004). However, the functions of emotion in social interaction (Fischer & Manstead, 2008) as well as the motivations of the two interactants can render the emotion communication online and offline similar or different in various respects (Parkinson, 2014). Key factors that can influence the degree to which emotion is experienced and expressed between two people in CMC are the sociality, the richness, and the naturalness afforded by the medium (McKenna & Bargh, 2000; Short, Williams, & Christie, 1976).

Arguably, the perceived sociality of the interaction is lower in CMC than in interactions FtF and this can influence the levels of emotion expressed and experienced. Accordingly, Derks et al. (2008) argued that computer mediated communication and social interactions that take place online can lead to expressing (and thus experiencing) lower positive emotion than in FtF social interactions. They based this assumption on research linking sociality directly to the expression of -mostly- positive emotion (i.e., Fridlund, 1991; Hess, Kappas, & Banse, 1995) and the affiliative function of positive emotion in particular (Fischer & Manstead, 2008). Namely, lower positive emotion can be an indicator of the lower social presence in CMC compared to FtF social interactions. The same may not apply, however, to negative emotions. Experimental evidence suggests the expression of extreme negative emotion is facilitated in CMC compared to FtF interactions (Siegel, Dubrovsky, Kiesler, & McGuire, 1986). The expression and experience of negative emotion may be facilitated by CMC since, among other reasons, CMC provides a less threatening environment to express negative emotions (Bargh & McKenna, 2004).

One other key factor to be considered is the richness of the medium. The interaction context provided by CMC is lower in social cues (verbal, vocal, gestural and facial) and this can influence the quality of the interaction (Short et al., 1976; Sproull & Kiesler, 1985). Related to medium richness, how natural is the interaction can also be a distinguishing factor that impacts experiencing emotion in CMC and in FtF social interactions (Kock, 2005). The richness in social cues during an interaction and the naturalness of the social interaction taking place online or offline can affect the intensity and valence of emotion experience. In that respect, positive and negative emotion in peoples' relationships can be considered as an indicator of social interaction quality (related see Hess, Kafetsios, Mauersberger, Blaison, & Kessler, 2016). Supporting this conjuncture, a self-report study found FtF interactions were preferred to CMC for the encoding of emotion information (Riordan & Kreuz, 2010). Finally, contextual factors such as the strength of the network tie, that is, the relational significance of the interacting partner can also affect the motivation to communicate emotionally online and offline (Zaalberg, Manstead, & Fischer, 2004).

2. The present study

The study aimed to empirically examine the experience of emotion in computer mediated social interactions compared to social interactions taking place FtF. The first research question (RQ1) asked whether the *structure* of emotional experience in social interactions that take place online is different than those taking place FtF. Previous conceptual analyses (Derks et al., 2008) concluded there were no reasons the basic structure of emotion would differ between CMC and FtF interactions yet the evidence base there is thin. Therefore in the present study we explored likely similarities or differences in the structure of positive and negative emotion in the two modes of interaction without a priori directional hypotheses.

The second research question (RQ2) concerned the extent to which positive emotions are experienced more or less intensely in FtF compared to computer mediated social interactions and how

satisfied people are, consequently, in the two modes of interaction (the quality of social interaction).

Based on existing research regarding the affiliative function of positive emotion in social interactions (e.g., Hess, Banse, & Kappas, 1995) and that emotions were examined in the context of interactions taking place FtF or in CMC, we hypothesized that positive emotion would be experienced more intensely in the former (FtF) than in the latter (CMC) form of interaction (*Hypothesis 1*).

Equally, based on previous research and theorizing (Bargh & McKenna, 2004; Siegel et al., 1986) we expected that negative emotion would be experienced more intensely in CMC than in FtF interactions (*Hypothesis 2*).

Finally, and given theories regarding the lower richness of the medium (Kock, 2005) we expected that participants would report higher satisfaction in FtF than in CMC social interactions as an indicator of quality of social interaction (*Hypothesis 3*).

In order to answer the research questions and test our hypotheses, we conducted an event sampling (diary) study of naturally occurring social interactions where participants reported on their day to day social interactions taking place co-presently, in encounters FtF, or in computer mediated communications for a period of ten days. Beyond allowing testing relationships between social interaction components (e.g., experience of emotions, perceptions, type of medium) this data intensive method has significant advantages over global, single-time assessments. Event sampling studies are characterized by high external validity (Bolger, Davis, & Rafaeli, 2003) and allow a more fine-grained examination of social interactions than summary retrospective self-reports (Reis & Gosling, 2010). Social interaction diary studies in particular, provide the opportunity to examine intricate processes regarding the dynamics of social contact (Nezlek, 2012). In the present study we assessed participants' overall satisfaction with the encounter and examined summative differences in positive and negative emotion as an indicator of the quality of their interactions.

3. Method

3.1. Participants

The sample comprised 163 Greek female participants[1] (mean age = 20.01, SD = 3.74) recruited from a university in Southern Greece through posters and announcements in lectures and participating for extra course credit. Participants were required to log-in a via the participant database which was located at the Informatics Department, Aristotle University of Thessaloniki specifically set up for the purpose of this study. The study was approved by the Psychology Department Research Ethics Committee.

3.2. Procedure

Participants arrived in the laboratory in groups of five where they were presented with the aims of the study ("How we communicate in everyday social interactions") and were informed about the privacy policy concerning their data and their anonymity. After providing informed consent, participants were instructed how to access and utilize the site where standard questionnaire completion and event sampling recording took place. Initially, participants individually completed a battery of standard personality questionnaires online through the website.[2] For the diary part

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[1] The sample also included 21 males and 1 participant with unknown gender (and 180 corresponding social interactions) which were removed from the analyses.
[2] The website was programmed by the second author and it was situated at Aristotle University Thessaloniki server.

of the study, participants had the choice of either downloading a mobile application on their smart phone or completing the diary on the web application after each interaction took place. After the pre-determined period of ten days, the system was automatically locked up.

3.3. Event sampling diary task

Participants were informed that this part of the study was about recording their emotion experience in everyday social interactions in interactions that took place FtF, via the Internet, or in conver-sations over the telephone.[3] They were instructed to describe every social interaction they had that lasted 10 min or longer for a period of 10 days. An interaction was defined as any encounter in which participants attended to one another and adjusted their behavior in response to one another (Kafetsios & Nezlek, 2002). Participants were asked to fill out the forms as soon as possible after an inter-action had taken place. For each interaction participants rated the extent to which they experienced a range of positive and negative emotions (happiness, anger, disgust, fear, sadness, surprise, inter-est, calm, enthusiasm, anxiety, nervous, shame, rejection) using 5-point scales (1, not at all to 5, very much). The emotions were selected based on previous research on social interactions FtF that has shown to capture interaction quality (Hess, Kafetsios et al., 2016; Nezlek et al., 2008). Participants also reported their general satisfaction with the interaction and the degree to which they have expressed emotion overall using a five-point scale (1 not at all, 5 very much). A translated description of the event sampling record is provided in the Appendix.

For each interaction, participants also described the relationship they had with the other person during the communication. For this, they used a 6-point scale reflecting ordinally scaled levels of in-timacy ranging from acquaintance to family member in line with Reis, Clark, and Holmes' (2004) proposal that the different types of relationships in a person's social network can be arranged into a hierarchy of perceived intimacy. Participants described 1731 in-teractions in FfF social interactions with acquaintances (12.8%), friends (19%), good friends (19.1%), best friends (19.7%), partners (14.2%) and family members (15.2%), (M = 8.63 SD = 6.33 for the period of 10 days). In CMC social interactions, participants described 685 interactions in total, with acquaintances (10.5%), friends (17.9%), good friends (19.8%), best friends (21.7%), and partners (15.6%) as well as with family members (14.6%), (M = 10.41, SD = 9.60 for the period of 10 days). The analyses described below did not include interactions with family members. We excluded interactions with family members for two reasons. First, interactions with parents or siblings may involve a qualita-tively different affective context. In Greece (as in other collectivistic societies) relationships with parents involve traditionally more hierarchically structured interactions and are potentially not comparable between groups (Realo, Allik, & Vadi, 1997). Moreover, the other categories represented co-interactants who were more or less peers. The final sample thus included 1468 interactions in FtF and 624 in CMC.

4. Results

The data analyses were conducted in three stages. In the first stage we conducted exploratory factor analysis (EFA) and then confirmatory factor analysis (CFA) in order to examine the under-lying structure of emotions reported during the two different

modes of interaction: FtF and CMC. Following that, we tested, through multilevel analyses, hypotheses 1 to 3, namely the extent to which positive and negative emotion and levels of satisfaction differed in CMC and FtF social interactions in the expected ways.

4.1. Exploring the factor structure of emotion in CMC and FtF social interactions

In order to explore the underlying structure of emotions expe-rienced during FtF and CMC interactions (RQ1), we conducted exploratory and confirmatory factor analyses (CFA) firstly ignoring the hierarchical structure of the data. Next, the within subjects correlation matrices were derived and their factorial validity was tested. Results from an EFA yielded a three factor solution with loadings ranging from 0.524 to 0.896 for emotion in CMC in-teractions explaining 68.41% of the total variance (Positive emotion 18.92%, Negative emotion 40.64%, and Anxiety 8.85%). With regards to FtF social interactions the same three factors emerged explaining 67.96% of the total variance (Positive emotion 21.38%, Negative emotion 37.00%, and Anxiety 9.57%) with loadings ranging from 0.481 to 0.946.

Based on the EFA, a three, correlated, latent factor model was postulated and tested. It was hypothesized that items designed to assess positive emotion (POS, enthusiasm, happiness, interest), negative emotion (NEG, anger, rejection, sadness), and anxiety (ANX. anxiety, fear, nervous), would have significant and substan-tial loadings on their corresponding factor and zero loadings on the other factors. Four emotions (disgust, calm, shame and surprise) were excluded from the analyses in order to improve the reliability of the factor solution. The three latent factors were allowed to correlate. We calculated social interaction level reliability of 0.65 for positive emotions, 0.54 for negative emotions and 0.57 for anxiety using three-level HLM latent variable analyses of scale scores (see Nezlek, 2012).

To increase our confidence on the postulated model two other alternative models were examined (a) an unidimensional model (M1), in which all items were hypothesized to be manifestations of one latent factor and (b) a two-factor model in which items designed to assess Negative emotion and anxiety were in fact represented in a single factor (M2).

All analyses were conducted using Mplus 7.3 (Muthén & Muthén, 2012). Given the ordinal nature of the data and the sig-nificant Mardia's coefficient of multivariate kurtosis for both data sets the MLR estimator provided by Mplus was employed. MLR is a rescaling-robust estimator and it can be used to deal with situa-tions in which data deviate from normality (Wang & Wang, 2012). Moreover, MLR can handle data with case missing completely at random and missing at random. Evaluation of model improvement was based on chi square difference ($\Delta\chi^2$). When the estimator used was MLR we followed the procedures outlined in Satora and Bentler (1999). In the case of summary data the ML estimator was employed and the standard procedures for evaluating the $\Delta\chi^2$ were followed (Wang & Wang, 2012). Apart from the chi-square the fit of the examined models was also evaluated using the root mean square error of approximation (RMSEA close to 0.06), the stan-dardized root-mean-square residual (SRMR close to 0.08), and the comparative fit index (CFI close to 0.95; Hu & Bentler, 1999).

Table 1 presents the results from a CFA on the emotions using the total variance-covariance matrix. Visual examination of the table shows that the three-factor model yielded a better fit to the data in comparison to the unidimentional model and the two-factor model. Despite that chi-square values were statistically sig-nificant, all other goodness-of-fit indices suggested an acceptable model fit to the data. Moreover, $\Delta\chi^2$ tests suggested that the three factor model had significantly better fit than the two or one factor

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[3] Information about telephone conversations were subsequently not used in the analyses.

Table 1
Goodness-of-fit indices for the underlying structure of emotions across the two types of social interactions, using the total variance-covariance matrix.

	χ^2	df	$\Delta\chi^2$(df)	CFI	SRMR	RMSEA	90%CI-RMSEA
FtF interaction							
M1	1007.95	27		0.561	0.130	0.170	0.161−0.179
M2	267.05	26	510.6(1)	0.892	0.061	0.086	0.077−0.095
M3	140.66	24	106.2(2)	0.948	0.043	0.062	0.052−0.072
CM interactions							
M1	323.21	27		0.665	0.112	0.148	0.134−0.162
M2	88.38	26	182.8(1)	0.929	0.056	0.069	0.054−0.085
M3	56.35	24	25.6(2)	0.963	0.044	0.052	0.034−0.070

Note: M1 = Unidimentional model, M2 = Two-correlated factors model, M3 = Three-correlated factors model.

models. Thus the three-factor model was accepted as the most viable for the present data. Items loading to their respective latent factors were statistically significant ranging from 0.575 to 0.770 for the FtF interactions and from 0.559 to 0.834 for the CMC interactions. Confirmatory factor analyses using the within subjects matrices revealed a similar pattern to analyses employing the total variance-covariance matrices (see Table 2). In particular, the three-correlated latent factor model yielded a superior fit to the data relative to the alternative models. Goodness-of-fit indices suggested an acceptable fit of the model to the data for both types of interaction. All loadings were statistically significant ranging from 0.493 to 0.792 for the FtF interactions and from 0.503 to 0.800 for the CMC social interactions. Associations among the three latent factors for both types of communication were statistically significant and in the anticipated direction.

Associations among the three latent factors for both types of communication are presented in Table 3. All correlations were statistically significant and in the anticipated direction. The strength of the association was weak to moderate between POS and ANX, moderate between POS and NEG and relatively high between NEG and ANX.

4.2. Testing differences between FtF and CMC social interactions

To test our Hypotheses we conducted a series of multilevel random coefficient analyses given that the data constituted a nested data structure in which interactions were nested within participants (see Nezlek, 2011). In the context of the current study we tested two-level models where social interactions were at level 1, nested within individuals who were at Level 2. Given the nature of the research questions, all statistical tests concerned relationships between predictors and outcomes at Level 1, the social interaction.

Initially, we tested unconditional models (Table 4), that is models without any predictors, and found that satisfaction with the encounter, positive and negative emotion and anxiety factors in

Table 2
Goodness-of-fit indices for the underlying structure of emotions across the two types ofsocial interactions, using the within subjects correlation matrix.

	χ^2	df	$\Delta\chi^2$(df)	CFI	SRMR	RMSEA	90%CI-RMSEA
FtF interaction							
M1	785.80	27		0.734	0.091	0.149	0.141−0.159
M2	350.57	26	435.2(1)	0.886	0.061	0.100	0.090−0.109
M3	194.89	24	155.7(2)	0.940	0.045	0.075	0.066−0.085
CM interactions							
M1	341.26	27		0.749	0.093	0.152	0.138−0.167
M2	157.04	26	184.2(1)	0.895	0.064	0.100	0.085−0.116
M3	85.48	24	71.56(2)	0.951	0.051	0.071	0.055−0.088

Note: M1 = Unidimentional model, M2 = Two-correlated factors model, M3 = Three-correlated factors model.

Table 3
Associations among emotions latent factors across the two types of interaction.

	Pos	Neg	Anx
Positive emotion	1.00	-0.182 (−0.490)	-0.366 (−0.589)
Negative emotion	-0.322 (−0.420)	1.00	0.745 (0.670)
Anxiety	-0.516 (−0.695)	0.811 (0.692)	1.00

NB: Correlations for the FtF interactions above diagonal and for the CMC below the diagonal. Values in the parentheses are correlations from the within subjects analyses.

Table 4
Multilevel descriptive statistics.

	Mean	Variance %	
		Within	Between
Satisfaction	3.732	82%	18%
Positive emotions	3.011	78%	22%
Negative emotions	1.331	82%	18%
Anxiety	1.464	72%	28%

social interactions had adequate variance at the two levels. We used a means-based calculation of the three emotion dimensions (POS, NEG and ANX) based on the results from the Confirmatory Factor Analyses.[4] Mode of interaction (FtF vs. CMC) was effect coded (CMC = −1 vs. FtF = 1) and was entered uncentered. Perceived relation was entered group centered.

(1) Level 1: $y_{ij} = \beta_{0j} + \beta_{1j}$ (CMC - FtF) $+\beta_{2j}$ (Relation) $+ r_{ij}$

Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$

$\beta_{1j} = \gamma_{10} + u_{1j}$

$\beta_{2j} = \gamma_{20} + u_{2j}$

Results from the multilevel analyses (Table 5) found a significant positive correlation between the type of medium variable and positive emotion ($\gamma_{10} = 0.105$, $t = 3.307$, $p < 0.01$, H1), and satisfaction ($\gamma_{10} = 0.102$, $t = 2.243$, $p < 0.05$, H3) a negative correlation with negative emotion ($\gamma_{10} = -0.054$, $t = -2.033$, $p < 0.05$, H2), and no relationship with the anxiety factor. In further analyses we also entered the positive emotion factor as a Level 1 predictor for satisfaction (Table 5, step 2). Consequently, the effect of the type of medium predictor became non-significant, whereas positive emotion was significantly related with satisfaction ($\gamma_{30} = 0.603$, $t = 17.431$, $p < 0.001$) suggesting that differences in positive emotion between real and virtual social interactions mediated respective levels of satisfaction. Negative emotion or anxiety did not alter differences in satisfaction levels found between CMC and FtF interactions. We formally tested random direct and indirect effects for level 1 mediation following Bauer, Preacher, and Gil (2006). The random indirect effect of the PA mediator did not reach significance ($z = 0.31$, *n.s.*) yet the random total effect was significant ($z = 2.21$, $p < 0.05$) suggesting partial mediation. We also tested whether the three emotion factors and satisfaction from the encounter differed in FtF compared to virtual social interactions as a function of relational intimacy but there was no evidence to that effect.

(2) Level 1: $y_{ij} = \beta_{0j} + \beta_{1j}$ (CMC-FtF) $+\beta_{2j}$ (Relation) $+ \beta_{3j}$ (POS) $+ r_{ij}$

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[4] We run the same analyses using the full spectrum of positive and negative emotions and we found meaningfully the same results.

Table 5
Positive and negative emotion and satisfaction as a function of Type of medium and perceived relationship closeness.

	Positive Emotion	Negative Emotion	Satisfaction step 1	Satisfaction step 2
Intercept γ_{00}	2.720*** (0.048)	1.338*** (0.030)	3.701*** (0.056)	3.710*** (0.05)
CMC - FTF γ_{10}	0.105** (0.031)	-0.054* (0.026)	0.102* (0.045)	0.051 (0.041)
Relation γ_{20}	0.154*** (0.024)	0.017 (0.016)	0.211*** (0.035)	0.103** (0.031)
Positive emotion γ_{30}	–	–	–	0.603*** (0.046)

NB: *p <0.05. **p < 0.01. ***p < 0.001. CMC = −1 vs. FtF = 1.

Table 6
Results from multilevel analyses that examine separate emotions experienced in online and offline social interactions.

	Enthusiastic	Happy	Interested	Calm	Angry	Anxious	Disgusted	Fearful	Nervous	Rejected	Sad	Shame	Surprise
Intercept γ_{00}	2.322*** (0.088)	3.234*** (0.078)	3.043*** (0.080)	2.398*** (0.094)	1.442*** (0.058)	1.494*** (0.064)	1.154*** (0.033)	1.269*** (0.030)	1.593*** (0.067)	1.225*** (0.047)	1.545*** (0.066)	1.122*** (0.035)	1.915*** (0.078)
CMC vs. FtF γ_{10}	0.272** (0.096)	0.221* (0.086)	0.174** (0.041)	0.264** (0.093)	-0.132* (0.064)	0.069 (0.067)	-0.052 (0.037)	-0.058 (0.046)	0.031 (0.030)	-0.044 (0.048)	-0.193** (0.068)	0.045 (0.034)	0.036 (0.077)
Relation γ_{20}	0.201*** (0.039)	0.250*** (0.037)	0.147*** (0.036)	0.189*** (0.036)	-0.001 (0.028)	-0.040 (0.028)	-0.020 (0.020)	0.005 (0.020)	-0.064 (0.032)	0.004 (0.015)	0.050` (0.025)	-0.020 (0.013)	-0.008 (0.031)
Relation * CMC vs. FtF γ_{30}	-0.018 (0.05)	0.040 (0.046)	0.006 (0.041)	0.016 (0.046)	0.018 (0.038)	-0.028 (0.033)	-0.005 (0.024)	-0.012 (0.022)	-0.016 (0.048)	-0.015 (0.019)	-0.007 (0.033)	-0.027 (0.016)	0.012 (0.032)

NB: Numbers in parentheses represent SE of the coefficient. CMC-FTF was coded as CMC = −1, FTF = 1.
*p <0.05. **p < 0.01. ***p < 0.00.

Finally, we examined differences in single (discrete) emotions experienced in interactions taking place online and FtF. As can be observed in Table 6, all positive emotions were experienced more intensely in FtF social interactions than in online social interactions. Also interesting, that positive emotions were more intensely felt in more intimate social interactions. Yet as with the summative results, there was no interaction between type of medium and the relationship intimacy of the encounter.

5. Discussion

Despite a growing interest on emotion phenomena online recently, no research, to our knowledge, has directly examined how emotion is experienced while interacting online with others. Given the increase in the use of Web 2.0 in everyday life and the role that emotion plays in those interactions (e.g., Coviello et al., 2014; Kramer et al., 2014) this is an important question. The present study compared emotions experienced in social interactions taking place online to emotions experienced by the same persons in FtF, everyday, social interactions in order to determine the relative structure and levels of positive and negative emotion experienced in social interactions that take place FtF, co-presently, with those that take place on the Web 2.0. The study utilized an ecologically valid methodology (event sampling) that allows a more nuanced examination of social interactions. The method was also instrumental in theoretical terms since it provided the opportunity to examine emotions embedded within peoples' social encounters (Fischer & Manstead, 2008) not merely as individual emotional reactions to the online experience.

In tems of emotion structure, results from exploratory and confirmatory factor analyses suggested that in both CMC and FtF social interactions emotion can be grouped in similar clusters: positive, negative emotion, and anxiety. This similarity in the structure of emotion supports arguments for the continuity in the function of emotion experience in interactions that take place online and FtF (Derks et al., 2008). The present study extends these findings to the realm of dyadic interactions in CMC. Importantly, in both types of interactions negative emotions were distinguished from anxious-related emotions. This finding underlines the different functions of negative emotions in peoples' relationships; namely, negative emotions such as anger, rejection and sadness can have a more interpersonal function in peoples' daily encounters than anxiety, fear or nervousness that can have more intrapersonal functions (Keltner & Haidt, 1999).

Despite the observed similarities in emotion experienced, there were important differences observed in terms of intensity of positive and negative emotions (but not emotions depicting anxiety) in FtF and CMC. Social interactions taking place FtF were experienced overall more positively than CMC and this concerned all the range of the reported positive emotions. Social interactions taking place co-presently were also rated overall more satisfactorily than CMC. Importantly, in this study, positive (and not negative) emotion partly accounted for differences in satisfaction between CMC and FtF social interactions.

The results regarding positive emotion in FtF and CMC point to accounts regarding the sociality and the naturalness of the medium (Kock, 2005). Namely, in interpersonal encounters positive emotions can have a distinctive and important function as signals of affiliation and co-operation (Fischer & Manstead, 2008; Hess et al., 1995). For example, a classic study on affect in social encounters, found positive emotions were more strongly related to social interaction quality in naturally occurring social interactions than were negative emotions (Berry & Hansen, 1996; study 2), despite negative emotions predicting higher quantity and aspects of quality of social interactions. Positive emotions are central to human life due to their affiliation function and in what has to do with social co-ordination in particular. As a further attestation to this, a recent experiment found attunement to positive emotion exceeding attunement to negative emotion in dyadic interactions (Campos, Schoebi, Gonzaga, Gable, & Keltner, 2015). There are a host of other reasons as to why interactions in CMC can be less interpersonally engaging than FtF social interactions, ranging from the naturalness of the medium, a lack of automatic cues arising from gaze direction or physical gestures, to imitation of emotion (Parkinson, 2014). Indeed, imitating affiliative emotional expressions can have a significant effect on the quality of social interaction

and positive emotion in dyadic interactions is an important such resource (Mauersberger, Blaison, Kafetsios, Kessler, & Hess, 2015). The evidence from the current study necessitates further work that will identify which aspects of the non-verbal behavior in CMC may differ to interactions FtF and may hence render the interaction possibly less affiliative and less satisfactory.

Moreover, in this study, negative emotions were experienced overall more intensely in CMC than in FtF social interactions. This finding supports arguments that CMC may provide a less threatening environment to express negative emotions (Bargh & McKenna, 2004). The observation that among the negative emotions participants reported, it was higher sadness in online than in FtF dyadic interactions corresponds to that observation. However, sadness is also an emotion that increases social connection (Gray, Ishii, & Ambady, 2011) and one could understand this result also in terms of participants' effort to manipulate the sociality of the medium, particularly in Greece where sadness is a more prevalent relational emotion than in other cultures (Hess, Blaison, & Kafetsios, 2016).

5.1. Limitations and future directions for research

Nonetheless, when evaluating the results of the current study the following limitations should be considered. Firstly, the analyses involved only female student participants. Although research using momentary emotion rating methods suggests that there are no effects of gender on the experience of emotion in social interactions (Barrett, Robin, Pietromonaco, & Eyssell, 1998), further research is required if one is to generalize findings across gender and also participants of older age and a different life stage. Secondly, given the longitudinal and demanding in time and effort nature of the diary data collection, a limited number of positive and negative emotions were selected which were used in previous research. The factor analyses suggested that some of those emotions were better clustered than others. Therefore, further research is required, also in a different cultural setting to replicate and extend results from the current study. Further research with a wider range of emotions that will extend the selection of both basic and social emotions (Hareli & Parkinson, 2008) is required as well utilization of more versatile methods for emotion detection.

Despite the stated limitations, the results have important implications for emerging discussions on behavioral processes in online communication, and in particular the idea of entrainment in online social networks and social interactions (He et al., 2016). The results also point to further research for better understanding how different online contexts (video, chatting) can impact effective online communication. For example, qualitative differences observed in terms of the lower intensity of the more affiliative positive emotions suggests that currently, online interactions may be more fit for more formal social interactions that do not involve affiliative motivations. Longitudinally, the present study sets the scene for research into how online interactions may influence peoples' relationships, especially those of the closer kind, by affecting the quality of emotion experienced when interacting online, versus FtF.

6. Conclusion

Results from a large scale event sampling (diary) study suggest that experience of emotion in naturally occurring, online, computer-mediated social interactions and those that take place co-presently, FtF, share a similar structure. This finding supports an emerging literature suggesting a continuum between emotional phenomena in online and the real world. However, emotion experience in online social interactions was experienced overall

less positively and was deemed less satisfactory than FtF social interactions. This latter finding raises questions regarding the role of positive emotion for attunement, affiliation, entrainment and co-operation in computer mediated social interactions.

Author note

Appendix

Event sampling diary task

Participants were asked to complete the following set of information, for each social interaction:
Date, time, duration of communication.

Relationship type:
   friend, good friend, best friend, boy/girlfriend, family/relative, acquaintance
Type of communication:
   face to face, phone call (traditional or internet-based), chat (skype, google talk, etc.), Facebook, Other social media.
Emotions experienced during the interaction:
   Happiness, anger, disgust, fear, sadness, surprise, interest, calm, enthusiasm, anxiety, nervousness, shame, rejection (rating for each emotion was made on a 5-point Likert scale: 1 - Not at all, 2-Somewhat, 3-Moderate, 4- Much, 5 - Very much)
How satisfied were you with the interaction overall?
   (rating was made on a 5-point Likert scale 1 - Not at all, 2-Somewhat, 3-Moderate, 4-Much, 5 - Very much)
Did you avoid to express feelings to the other person?
   (rating was made on a 5-point Likert scale 1 - Not at all, 2-Somewhat, 3-Moderate, 4-Much, 5 - Very much)

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