Face off: Implications of visual cues on initiating friendship on Facebook

Shaojung Sharon Wang *, Shin-Il Moon, Kyounghee Hazel Kwon, Carolyn A. Evans, Michael A. Stefanone

Department of Communication, University at Buffalo, The State University of New York, 359 Baldy Hall, Buffalo, NY 14260-1020, USA

ARTICLE INFO

ABSTRACT

This research investigates how moderating factors and theoretically relevant contextual variables affect impression formation and the willingness to initiate virtual friendship. An experiment examined both main and interaction effects for visual cues, profile owner's gender, and evaluator's gender; a 2 (stimulus gender: male and female) × 3 (visual conditions: attractive, unattractive, and no-photo) × 2 (evaluator's gender: male and female) between subjects model analysis of variance (ANOVA) was employed. A three-way interaction between gender and appearance was revealed. The results indicated that both male and female subjects were more willing to initiate friendships with opposite-sex profile owners with attractive photos. Subjects also displayed comparatively higher willingness to make friends with profile owners who did not include visual cues than with those who revealed an unattractive photo. The hyperpersonal model was supported and extended to address gender attributes.

1. Introduction

The Internet has become a principal venue for social interaction. There is a growing body of literature suggesting that the Internet and its communication tools facilitate the maintenance of existing relationships (Katz & Rice, 2002), formation of romantic connections (McKenna, Green, & Gleason, 2002), construction of virtual community (Rheingold, 1996), and most notably, the emergence of online friendships (Parks & Floyd, 1995). In light of the widespread use of social network sites (SNSs) in the last few years, there has been interest in the potential of the Internet to create new relationships; Facebook.com is an example of a SNS where people communicate and foster friendship with each other in cyberspace.

In August 2009, the number of American visitors to Facebook reached more than 90 million and it was ranked 5th on the Top 50 US Web Properties list (comScore, 2009). As Facebook has focused its attention on expansion and increased adoption worldwide, it is now the fourth largest site in the world; with 340 million unique global visitors as of June, 2009 (Schonfeld, 2009). Hitwise report also revealed that Facebook and other popular SNSs have overtaken adult entertainment as the most visited website category on the Internet for 18 to 24 year-olds (Tancer, 2008).

Facebook allows users to create profiles that often contain personal information including photos and video images. It is a vehicle for posting and sharing visual biographies to maintain friendships with acquaintances and for exploring relationships with formerly unknown others. Having access to personal information is a funda-

mental requirement when initiating friendships. Gathering such information offline typically involves only a few important cues for perceivers to form impressions of their target communication partners and physical appearance is the most accessible of these cues (Jones, 1990; Kenny, 1991). Visual cues are extremely important as they function to form initial impressions between zero-history dyads quickly and accurately (Ambady & Rosenthal, 1992) that can impact the willingness to build future relationships. While there is ample evidence supporting this proposition offline, little research has examined the role of these visual cues in interpersonal relationship formation online.

Computer-mediated communication (CMC) places emphasis on reduced communication cues, synchronous or asynchronous communication (Walther, 1996), and anonymity (McKenna & Bargh, 2000). The social identification model of deindividuation effects (SIDE) (Lea & Spears, 1991, 1995) posits that the anonymity and lack of identifiability inherent in most CMC serves to accentuate the effect of the salient social identity and strengthen the dominant normative response associated with it. The SIDE model focuses on the cognitive processes by which CMC communicators use social identity variables and social category information to make inferences and over- environment should result in deindividuation which leads to increasingly stereotyped and exaggerated representations of others (Hancock & Dunham, 2001). Given the deindividuating features of CMC and exaggerated stereotypic representations in asynchronous settings, CMC can even surpass the level of affection and emotion of parallel face-to-face (FtF) interaction (Walther, 1996).

Early CMC did not support facial expression or verbal intonation as a means for establishing social presence (Short, Williams, & Christie, 1976). This visual anonymity allowed CMC users to

* Corresponding author. Tel.: +1 716 645 2141.
  E-mail addresses: shaowang@buffalo.edu, sharonwang74@hotmail.com (S.S. Wang).

minimize undesirable physical or behavioral cues and select more favorable information to disclose; selective display of these cues enables the deliberate presentation of self in early stages of relationship development (Goffman, 1963). This is not the case today, however, as both visual and vocal cues are no longer rare in contemporary CMC settings. For example, research on gender stereotyping in a CMC environment reveals that gendered cartoon characters (visual cues) yield stronger effects on gender inferences and conformity behavior than do verbal cues (Lee, 2007). More recent research on online dating (Hancock & Toma, 2009) examined photos posted on online dating profiles and the extent to which the photo resembles its owner's typical appearance. This study highlights the importance of online self-presentation of one's physical attractiveness through visual elements like photographs.

On SNSs like Facebook photographs are selectively displayed to create positive self-presentations for potential relationships. The selective presentation of self and anticipated future interaction characteristic of Facebook users raises many questions. For example, how do visual cues affect relationship formation online? Are visual cues that are important in offline relationships also important in the initiation of virtual friendships? Whereas people may not substitute their traditional social networks for online relationships maintained exclusively via Facebook, this study does not examine what constitutes online friendship. Nor does it focus on the extent to which online interactions result in offline relationships. Rather, the goal of this study is to achieve a better understanding of the theoretical mechanisms at play when people make decisions about whom to become friends with via SNSs. In addition we propose to extend the hyperpersonal model by systematically analyzing how moderating factors and theoretically relevant contextual variables affect impression formation and the willingness to initiate friendship online.

2. Research on Facebook

Numerous empirical studies have been conducted to examine patterns of college students' use of Facebook. These focused on a variety of academic interests including characteristics of profile elements (Lampe, Ellison, & Steinfield, 2007), self-presentation (Stutzman, 2006), surveillance and privacy concerns (Gross & Acquisti, 2005; Joinson, 2008; Peluchette & Karl, 2008), social capital (Ellison, Steinfield, & Lampe, 2007) and social grooming (Tufekci, 2008), relationship marketing strategies for the Facebook generation (Meadows-Klue, 2008), and students' perceptions of teacher self-disclosure via Facebook (Mazer, Murphy, & Simonds, 2007). While some studies indicate negative outcomes of Facebook use (e.g., stalking and identity theft), others demonstrate how Facebook can generate a variety of positive social outcomes such as enhanced social capital and collaboration.

One general conclusion of these studies was that Facebook plays a significant role in supporting pre-existing social relations. For example, when Ellison et al. (2007) examined whether or not Facebook is used to meet new people, the authors found that college students use Facebook primarily to maintain relationships with shared social groups (e.g., high-school classmates, old friends, and current classmates) or a shared location (e.g., dormitory). This differed from early CMC research on virtual communities which posited that online community members would be more likely to meet others outside their pre-existing social group or location (Wellman, Salaff, Dimitrova, Yuan, & Gay, 2006). Facebook thus generally supports geographically-bound communities exhibiting a tendency to flow from offline to online interactions.

This tendency was also supported by a recent *Pew Internet and American Life Project Report* (Lenhart & Madden, 2007) indicating 91% of US teens use SNSs to contact friends they see often while 82% of them use SNS to keep in touch with friends they rarely see in person (but already know). This study also found, however, that 49% of SNS users (27% of online teens) use these sites to make new friends. More specifically, the Pew study showed that nearly half (47%) of social network-using older teen boys (ages 15–17) had friends in their SNS who they had never met, as did 28% of older teen girls. Further, Stefanone, Lackaff, and Rosen (2008) found on average about 15% of Facebook networks were comprised of people who had never actually met in person.

The new relationship formation process for the Facebook generation has raised questions about impression management and self-presentation in this less anonymous online environment. Zhao, Grasmuck, and Martin (2008) found that the visual possibilities of Facebook enable users to showcase themselves implicitly through their friend list, photos, and wall postings and thus require audiences' equal attention to their social milieu. In this way, they argued users create hoped-for "digital selves" to enhance their overall self-images and chances to connect in the offline world.

Likewise, the number of friends Facebook users collect (Tong, Van Der Heide, Langwell, & Walther, 2008) and the physical attractiveness and wall postings of their friends shown on their profiles (Walther, Van Der Heide, Kim, Westerman, & Tong, 2008) provide meaningful cues to shape observers' impressions of profile owners. This line of research, derived from Walther's (1992) social information processing (SIP) theory, employs a Brunswikian Lens Model (see Walther et al., 2008, for review) on judgments about uncertainty to explore how the attractiveness of friends' photos and text shown on Facebook profiles can impact the profile owners' perceived attractiveness. These cues influence judgments about profile owners even though theprofile owners themselves did not provide that information (Walther et al., 2008).

Most of the research to date on Facebook has focused on connecting and reconnecting people, as well as addressing privacy and self-disclosure concerns. This new approach, however, illustrates the process of electronic impression formation by newer communication technologies and highlights the warrant of SIP theory. That is, people use whatever information is available to make judgments about their online partners and impression formation about others encountered online is the same process used for others encountered offline.

Although there is no direct relationship between the number of friends SNS users have and their perceived attractiveness by others, the number of friends may function as a proxy for physical attractiveness when photographic cues are absent (Tong et al., 2008). By the same token, the extent text left by one's friends contributes to the perception of physical attractiveness when photographs are not available remains unknown. Indeed even though both visual and textual cues are now accommodated in SNSs, the implications of visual cues on making friends online have not been fully explored. Further, factors involved with initiating friendship in CMC environments have not been extensively studied. A brief review of past CMC as well as interpersonal communication literature can further illuminate the scope of these issues and their investigation.

3. Theoretical framework

Based on the idea that communication media's social effects differ in the degree to which they allow people to experience others as being psychologically present by providing a sense of intimacy and immediacy (Short et al., 1976), the core of early CMC research (Culnan & Markus, 1987; Daft and Lengel, 1986; Sproull & Kiesler, 1986) was founded on examining variability in the capacity of CMC to transmit social context cues. The cues-filtered-out (CFO) approach (Culnan & Markus, 1987) combines social presence theory

(Short et al., 1976) and lack of physical and salient social cues framework to posit that CMC impedes relationship development due to the reduction in non-verbal cues. This perspective highlights the apparent need for physical/visual appearance in effective communication as the amount of information between and the level of affection toward CMC partners are positively related (Storck & Sproull, 1995).

Visual cues which are more dominant than verbal cues are absent in traditionally text-based CMC. Contemporary Internet-based communication tools like SNSs, however, were designed specifically to accommodate visual cues including images and videos. These mediated environments facilitate synchronous display of both visual and textual cues; this contrasts sharply with early text-based CMC as visual cues now serve as prominent elements during impression formation.

3.1. The hyperpersonal model

Contrary to the CFO approach, evidence suggests there is a high degree of socioemotional content in CMC (Reingold, 1993) and although there are fewer paralinguistic cues, people who are "seasoned communicators" in CMC become "adept at using and interpreting textual signs and paralinguistic codes" (Lea & Spears, 1995, p. 217). People tend to rely on a range of different cues like language, style, timing and speed of writing, punctuation, or emoticons when making inferences about potential relationships (Mantovani, 2001). This is congruent with the SIP perspective (Walther, 1992) which posits that social exchange and subsequent relationship development via CMC, given enough time, is equivalent to that of offline relationships. Hence, the presence of photographic images of each other to promote affection and social attraction is less effective for long-term CMC partners than it is for unacquainted CMC group interaction (Walther, Slovacek, & Tidwell, 2001). These findings resonate with the hyperpersonal model (Walther, 1996) which emphasizes people's tendency to over-attribute available information to create an idealized image of others in the absence of other cues during CMC.

Walther (1996) argued that in the absence of non-verbal cues in lean media, message senders have a greater ability to strategically develop and selectively present themselves whereas message receivers idealize and build their impressions on any bit of information they receive about their communicative partners. In short, selective self-presentation combined with selective reception can foster heightened senses of liking and intimacy. The hyperpersonal model, as Walther et al. (2001) explain, "depicts how senders select, receivers magnify, channels promote, and feedback increases enhanced and selective communication behaviors in CMC" (p. 110).

The hyperpersonal model clarifies how the presence of visual cues like photographs affect interpersonal attraction for unacquainted CMC partners and further postulates that the greatest outcome of social interaction mainly occurs after a longer period of time if text only is used alone by CMC users (Walther, 1996). More precisely, it suggests that CMC communicators form exaggerated perceptions about their partners while visual cues are absent and makes predictions about what happens during ongoing interactions. It does not emphasize, however, the role of non-verbal cues on once-off profile perceptions in initiating online relationships at the unacquainted stage.

3.2. The current study

Because selective self-presentation is enhanced in text-based CMC (Walther, 2007), the current study explores the importance of displaying visual cues during the initial stage of online friendship formation. In this study, visual cues are examined through simulated Facebook profiles between six conditions: photo (no-photo, attractive photo, unattractive photo) × sex (female/male profile owners).

3.2.1. Display of visual cues

Past studies of interpersonal communication and friendship formation processes (Duck, 1982; Udry, 1966) operationalized the "acquaintance stage" (Duck, 1982, p. 135) in which people first encounter, then react to and make impressions about their formerly unacquainted counterparts. During this stage, people make judgments about each other prior to dyadic interaction. Here they primarily rely on visual cues like attractiveness, race, height, and hair color to evaluate the viability of new relationships. Visual cues are critically important during the acquaintance stage; only after this stage do people consider deeper and more cognitive information such as personality similarity (Duck, 1982).

While visual cues are important during early stage interaction, facial characteristics are not only the main source of most non-verbal information but also an essential source of information about emotion, age, race, and sex (Alley, 1988; Ekman, 1992). When people perceive and evaluate others, they tend to look at their faces. Prior to engaging in conversations, these facial characteristics influence perceptions about the willingness to establish relationships with others as well. In this study we specifically manipulate Facebook profile owners' portraits in which the face and its expression are predominant. Thus, we hypothesize.

H1: There will be a main effect on display of profile photos (visual cues) on Facebook.

3.3. Physical attractiveness stereotype

While SNSs allow users to present ideal selves, physical attractiveness stereotypes (Dion, Berscheid, & Walster, 1972) operate to influence the way people create preliminary impressions about others when visual cues are presented. People's perception of their romantic partner's physical attractiveness varies depending on the quality of social interaction developed over time (Albada, Knapp, & Theune, 2002). In the context of new relationships, however, physical attractiveness functions as a predominant element to predict individuals' attitude at the acquaintance stage (Berscheid & Walster, 1974).

Results from numerous studies on physical attractiveness indicate that those who are physically attractive reap greater social rewards ranging from more romantic dates to higher average incomes (Feingold, 1992; Roszell, Kennedy, & Grabb, 1989). Attractive people are believed to possess a number of positive characteristics (Riggio, 1986) and lead more fulfilling lives (Feingold, 1992). Dion et al. (1972) claim that, in people's perception of others, "what is beautiful is good" (p. 285) and abundant research has documented this stereotype (Adams, 1982; Alley & Hildebrandt, 1988; Dion, 1981, 1986; Hatfield & Sprecher, 1986; Patzer, 1985) as a prevailing phenomenon exhibited in everyday life.

The online profiles presented in this study contain limited personal information that does not function to enhance perceived social presence (Short et al., 1976). When the physical reality of the other person in a mediated environment is absent, pictures can convey visual impressions that support the principle of cue substitutability to intimacy (Argyle & Dean, 1965) because subjects can adopt affective messages of the profile owners. The influence of physical attractiveness is likely as important in CMC as it is offline. Building on the large body of literature which suggests physical attractiveness is associated with interpersonal attraction, we posit

H1a: Those who are exposed to attractive profile photos will be more willing to initiate friendships than those in the unattractive and no-photo conditions.

The hyperpersonal model suggests that reduced non-verbal cues in CMC lead to an idealized perception by message receivers to inflate the impression and generalize positive cues on other unknown personality aspects of message senders. We incorporate physical attractiveness stereotypes and hyperpersonal affinity to propose

H1b: Those who are exposed to unattractive profile photos will be less willing to initiate friendships than those exposed to the no-photo condition.

3.4. Physical attractiveness and gender

Literature on friendship formation suggests that opposite-sex and same-sex friendships represent a qualitatively different type of interaction. Both men and women prefer opposite-sex friends than same-sex ones for obtaining "insider" information of opposite-sex mates (Bell, 1981; Bleske & Buss, 2000; Hacker, 1981; Sapadin, 1988). These preferences for opposite-sex friendships have been adapted over human evolutionary history (Bleske & Buss, 2001). In fact, men are more motivated to initiate friendships with a member of the other sex based on sexual attraction and romantic interest than are women (Buss, 1989; Sprecher, 1989).

Early studies of relationship formation during FtF communication emphasize physical attractiveness in heterosexual mate choice and research demonstrates that physical attractiveness is a strong predictor of dating desirability for both sexes (Buss, 1989; Feingold, 1990; Walster, Aronson, Abrahams, & Rottman, 1966; Gangestad & Buss, 1993).This raises another question about relationship development in the context of CMC: what type of relationship is most likely to develop online? Parks and Roberts (1998) studied several virtual communities and found that opposite-sex relationships dominated friendships in cyberspace and these online relationships did not differ from relationships developed offline. The extent that men and women may differ in the importance they accord to physical attractiveness allows us to approach this issue empirically by adding gender as a predictor of inferences about their online communicative partners. Thus,

H2: There will be an interaction effect between profile owner's gender and evaluator's gender such that willingness to initiate friendship will be higher among opposite-sex profile owners across all three conditions (no-photo-attractive photo-unattractive photo).

Drawing on the possible majority of opposite-sex relationships formed online (Parks & Roberts, 1998), we further hypothesize

H2a: Male evaluators will be more willing to initiate friendships with female profile owners than with male profile owners.

H2b: Female evaluators will be more willing to initiate friendships with male profile owners than with female profile owners.

People search for same-sex friends similar to themselves based on a variety of dimensions such as intelligence, physical attractiveness, social class, educational level, and age (Buss, 1984). While same-sex friendships provide adaptive benefits, they may also be costly and destructive. For example, strong similarity between same-sex friends may result in competing for or stealing mates (Bleske & Buss, 2000; Buss, 1984; Tolson & Urberg, 1993).

Kernis and Wheeler (1981) further distinguish "radiation" and "contrast" effects: people are perceived more attractively when they are associated with physically attractive friends of the opposite-sex. This radiation effect is consistent with the *what is beautiful is good* stereotype (Dion et al., 1972). Contrast effects (Kernis & Wheeler, 1981) suggest that people are rated more negatively when in the presence of attractive same-sex friends than unattractive ones. Hence, highly attractive people experience the highest rejection rate during social contacts with same-sex peers (Krebs & Adinolfi, 1975).

Facebook users make friends with both sexes. Users display their own as well as their friends' photos on their profiles. Research has demonstrated that physical attractiveness of profile owners' friends directly influence profile owners' perceived attractiveness (Walther et al., 2008). The radiation effect may occur when having an attractive friend of the other sex on Facebook user's profile. Having a physically more desirable photo of a same-sex friend may, however, result in a "contrast effect" on the profile owner during courtship. We predict that attractive people are more desirable as opposite-sex virtual friends but are less preferred as same-sex virtual friends. Thus, the interaction between a profile owner's gender and evaluator's gender can be further qualified such that

H3a: Evaluators will be more willing to initiate friendships with opposite-sex profile owners with attractive photos than with attractive same-sex dyads.

H3b: Evaluators will be less willing to initiate friendships with opposite-sex profile owners with unattractive photos than with unattractive same-sex dyads.

Finally, the hyperpersonal model asserts that it is more likely that people's expectations of others can be met leading to interpersonal liking when non-verbal cues are lacking. When the availability of visual cues is subsumed into the desirability of physical attractiveness for relationships between members of the same and opposite-sex, we propose the following hypothesis:

H3c: Evaluators will be more likely to initiate friendships with opposite-sex profile owners with no-photos than with no-photo same-sex dyads.

4. Method

4.1. Participants

A convenience sample of college students in an introductory communication course (COM101) at a public university in the eastern United States was recruited and participants were granted research credit for their voluntary participation. An announcement was made in class to approximately 475 students by one of our research team members calling for their participation. A total of 350 students completed the survey, yielding roughly a 73.7% response rate.

Participants (93%) were randomly assigned to one of the six experimental conditions. However, because of the limited sample pool, towards the end a few participants were forced into specific conditions to ensure equal cell sizes. About 11 percent (39 participants) had no Facebook account or did not indicate their gender, and were excluded. Male participants comprised 57% of the sample. The mean age for the sample was 20.2 years (SD = .187); participants ranged from 18 to 36 years old. The number of respondents in each group for the final sample is shown in Table 1.

4.2. Procedure

A link was posted on the shared course website by the instructor so the participants had access to the online survey anytime they wished. This single URL directed them to a consent form which explained that the study was to investigate friendship formation on Facebook and they would be asked to consider a fictitious person's profile. Participants were then exposed to one of the six prepared Facebook-like profiles. An online questionnaire measuring their willingness to initiate a friendship with the profile owner followed whichever profile they viewed. After rating their willingness to initiate a friendship, demographic information (e.g., age, gender, and college year) and other basic information about their Facebook use was collected.

Table 1
Means and standard deviations.

	Attractive		Unattractive		No-photo	
	Male	Female	Male	Female	Male	Female
Evaluator						
Male						
M	2.24	3.66	2.29	2.13	2.09	3.13
SD	1.06	1.28	1.15	1.05	1.08	1.65
N	35	29	30	30	28	26
Female						
M	2.92	2.04	2.08	2.54	2.23	2.16
SD	1.62	0.84	1.24	1.12	1.57	1.10
N	20	23	15	26	27	22

4.3. Measures

4.3.1. Facial attractiveness

Although past research on physical attractiveness has included both facial and bodily attractiveness, facial symmetry (Jones et al., 2001), facial averageness, and distinctiveness (Rhodes et al., 2001; Langlois & Roggman, 1990; Langlois, Roggman, & Musselman, 1994; Rhodes & Tremewan, 1996) were also commonly discussed. Drawing on evolutionary psychology, facial attractiveness judgments tend to be consistent across sexes, sexual orientations, ethnic groups, and ages (Alley & Cunningham, 1991; Grammer & Thornhill, 1994; Langlois & Roggman, 1990; Rhodes, Proffitt, Grady, & Sumich, 1998; Thornhill & Gangestad, 1999). For example, Cunningham, Roberts, Barbee, and Druen (1995) observed that Asian, Hispanic, Black, and White men all rated females with "high eyebrows, widely spaced large eyes with dilated pupils, high cheekbones, small nose, a narrow face with thin cheeks, large smile, full lower lip, small chin, and fuller hairstyle" as more attractive (p. 275). Facial symmetry (Grammer & Thornhill, 1994; Rhodes et al., 1998), averageness (Alley & Cunningham, 1991; Langlois & Roggman, 1990), and sexual dimorphism (Thornhill & Gangestad, 1999) are also important factors in determining facial attractiveness.

Profile photos of attractive and unattractive males and females were chosen based on this theory; profiles without photos were also included. Photos for the profiles were acquired from Braun, Gruendl, Marberger, and Scherber's report (2001)[1] and were publicly accessible through the website *Beautycheck* (http://www.beautycheck.de/). This large research project on facial attractiveness was conducted at Regensburg and Rostock Universities in Germany. The software-manipulated compound facial images are composites from a number of real people's photos and have been tested based on the facial symmetry hypotheses in a series of experiments.

Using the facial images of Braun et al.'s report (2001) is justifiable as their attractiveness was previously tested based on facial symmetry. Moreover, it was advantageous to use these images because these photos were produced by altering identical images using a computer program. Therefore, these images mitigate the possibility of biased attractiveness assessment.

Attractiveness was operationalized as a dichotomous variable and the specific photos selected were congruent with the existing body of research. Figs. 1 and 2 shown below are sample profiles with an attractive versus unattractive facial image of a female that were used in our experiment.[1] Other optional information available on typical profiles was minimized to increase internal validity.

4.3.2. Willingness to initiate friendship

Four Likert-type items were used to measure whether respondents were willing to accept fictitious profile owners as friends and further interact with them online. These items were designed to reflect the intention to engage in online exchanges *beyond* the initial, low cost behavior of accepting the other as a Facebook friend. These items included whether or not participants were willing to add the profile owner as a friend, accept a friendship invitation from the profile owner, "poke" the profile owner, and write on profile owner's wall (Cronbach's alpha reliability score = .82). Responses ranged from 1 (strongly disagree) to 7 (strongly agree). An average was computed across the four items to estimate one's "willingness to initiate friendship" score ($M = 2.47$, $SD = 1.32$). Table 1 reports standard deviations with means. To test the normality of the variable's distribution, both skew and kurtosis were measured (Skew = .861 and Kurtosis = .484) and found to be within acceptable limits. Levene's homogeneity test was conducted to determine whether there were significant differences in variability of the dependent variable between all conditions. The error of the dependent variable was equal across groups, indicating $F(11, 313) = 1.72$, $p > .05$ indicating that the variances were homogeneous.

5. Results

To examine both the main and interaction effects for visual cues, profile owner gender and evaluator gender, a 2 (owner gender: male, female) × 3 (visual condition: attractive, unattractive, no-photo) × 2 (evaluator's gender: male, female) between subjects analysis of variance (ANOVA) was employed. Willingness to initiate friendship on Facebook was the primary dependent variable. Recall that this study is designed to explore the role visual cues play in initial friending behavior on SNSs like Facebook.

5.1. Manipulation check

The attractiveness manipulation was tested to assure the selected photos of attractive and unattractive males and females made specific distinctions. A total of 44 subjects were recruited and randomly divided into four groups of equal size ($N = 11$). Four photos comprised of two male (attractive and unattractive) and two female photos (attractive and unattractive) were randomly assigned to each group, composed of raters from both sexes. Participants' perceptions of the profile owners' facial attractiveness were measured using six Likert scale items (e.g., He/she has an attractive face, or he/she is sexy looking).

Two separate independent sample *t*-tests were conducted. The results suggest that all of the attractiveness manipulations were successful. The two male photos were perceived as significantly different on the attractiveness scores, $t(20) = 2.10$, $p < .05$, $r^2 = .18$. The two female photos were also significantly different from each other in terms of the perceived attractive scores, $t(20) = 4.12$, $p < .01$, $r^2 = .46$.

5.2. Hypotheses tests

H1 predicted that there would be a main effect for display of profile photos on Facebook. The results of the ANOVA indicated a significant main effect for visual cues on respondents' willingness to initiate friendships, $F(2, 299) = 3.51$, $p < .05$, $\eta^2 = .02$. Thus, the H1 was supported. Post hoc comparisons using Tukey's procedure at $p < .05$ indicated that evaluator's viewing attractive profile owner's photos ($M = 2.72_a$, $SD = 1.35$) had more willingness to initiate friendships than when viewing photos in the unattractive condition ($M = 2.26_b$, $SD = 1.12$), whereas evaluator's in the no-photo
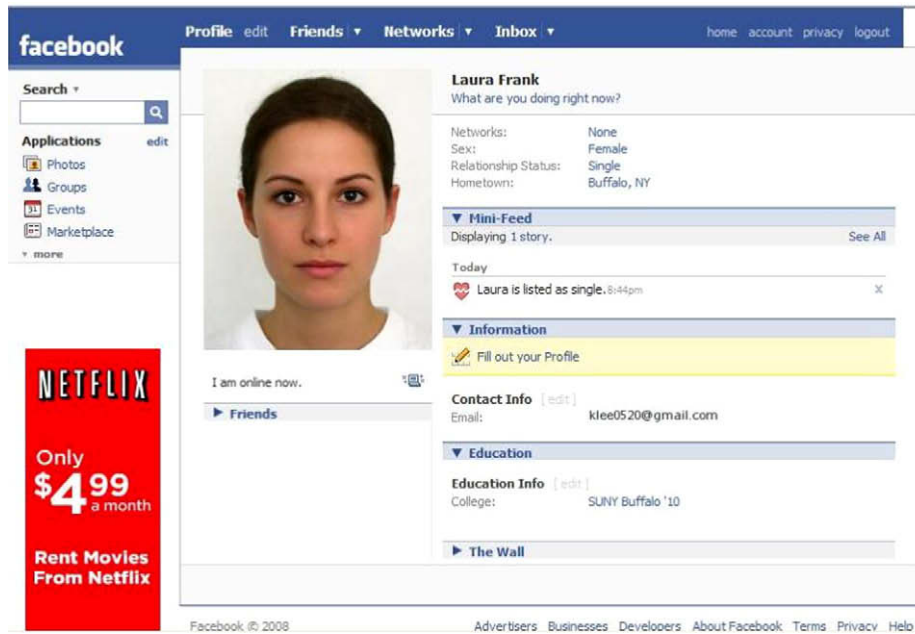
---
[1] Photos were acquired from Braun, C., Gruendl, M., Marberger, C. & Scherber, C. (2001). Beautycheck – Ursachen und Folgen von Attraktivitaet. Report. <http://www.beautycheck.de/> Accessed 13.11.07.

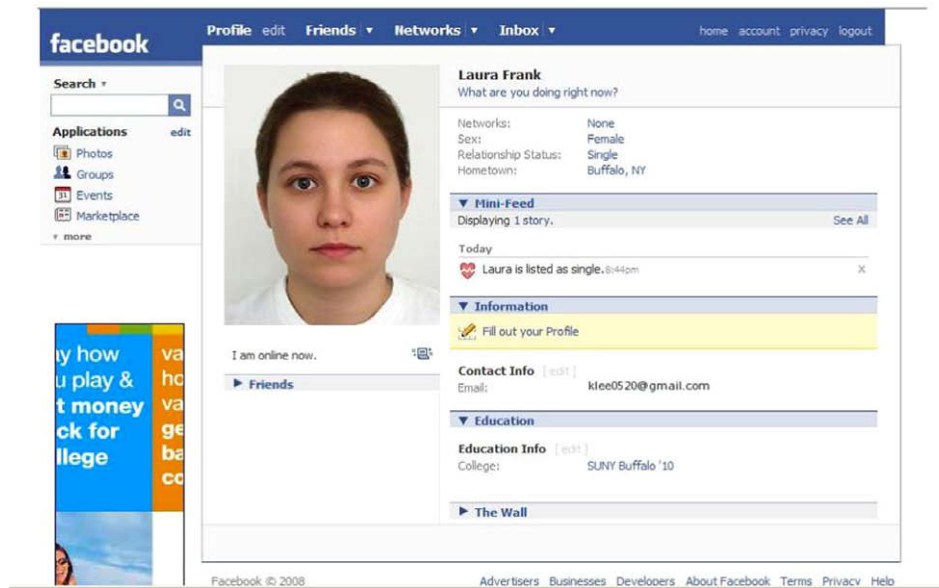**Fig. 1.** Sample prepared Facebook profile with attractive female profile photo.

Fig. 2. Sample prepared Facebook profile with unattractive female profile photo.

stimulus ($M = 2.40_{ab}$, $SD = 1.43$) did not differ from either those in the attractive photo condition or in the unattractive condition. Thus, H1a was partially supported, but H2b was rejected.

H2 predicted that there would be an interaction effect between profile owner's and evaluator's gender on willingness to initiate friendships such that willingness to initiate friendship would be higher among opposite-sex dyads than same-sex dyads. As Fig. 3 shows, there was a significant interaction effect for gender, $F(1, 299) = 16.20$, $p < .01$, $\eta^2 = .03$. Two separate independent sample t-tests were conducted and indicated that male evaluators were more willing to initiate friendships with female profile owners ($M = 2.96$, $SD = 1.47$) than with male profile owners ($M = 2.21$, $SD = 1.09$), $t(176) = 3.89$, $p < .01$, $r^2 = .08$, whereas for female evaluators, male profile owners ($M = 2.42$, $SD = 1.53$) did not differ from

female profile owners ($M = 2.26$, $SD = 1.04$), $t(131) = .71$, $p = .71$. Thus, results were consistent with H2a, but not with H2b.

H3 predicted that the simple opposite-sex gender interaction would be moderated by visual conditions. The analysis indicated that there was a significant three-way interaction (profile owner gender by evaluator gender by visual cue), $F(2, 299) = 13.02$, $p < .001$, $\eta^2 = .05$, supporting H3. The two-way interaction between profile owner gender and evaluator gender was examined separately for each visual cue. H3a predicted that evaluators would be more likely to initiate friendships with opposite-sex profile owners with attractive photos than with same-sex dyads. As shown in Fig. 4, the results showed that male evaluators exposed to attractive photos were more willing to initiate friendships with female profile owners ($M = 3.66$, $SD = 1.28$) than with male profile
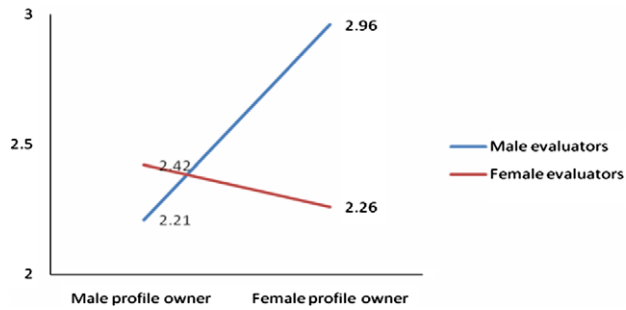
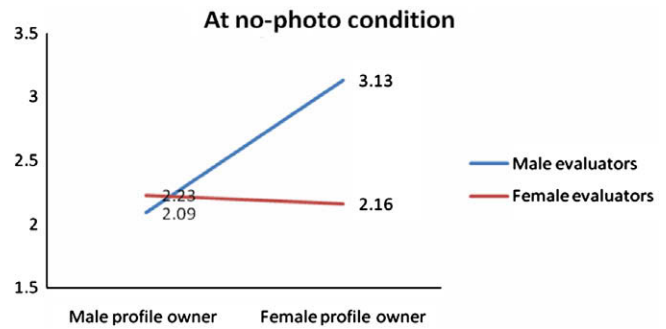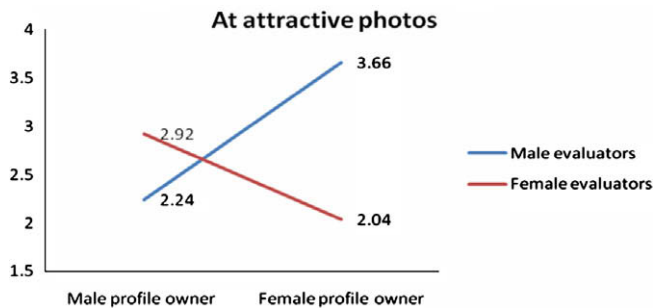**Fig. 3.** Interaction effect between profile owner's and evaluator's gender.

Fig. 4. Two-way interaction between profile owner gender and evaluator gender in the attractive photo condition.

owners ($M = 2.24$, $SD = 1.05$), while female evaluators exposed to attractive photos are more willing to initiate friendships with male profile owners ($M = 2.92$, $SD = 1.62$) than with female profile owners ($M = 2.04$, $SD = .84$). Two separate independent sample t-tests supported H3a.

Similarly, H3c predicted that evaluators would be more willing to initiate friendships with opposite-sex profile owners with no-photos than with same-sex dyads. As Fig. 6 shows, the results indicated that male evaluators were more willing to initiate friendships with female profile owners ($M = 3.13$, $SD = 1.65$) than male profile owners ($M = 2.09$, $SD = 1.08$), $t(52) = 2.78$, $p < .01$, $r^2 = 13$, when they were exposed to the no-photo conditions; female evaluators, however, did not differ in their willingness to initiate friendships with male profile owners ($M = 2.23$, $SD = 1.57$) or female profile owners ($M = 2.16$, $SD = 1.10$) when exposed to the no-photo condition. Contrary to H3a and H3c, H3b predicted the opposite direction to the two-way interaction effect. However, the two independent sample t-tests did not yield significance for the two-way interaction effect (see Fig. 5). Thus, data were inconsistent with the prediction.
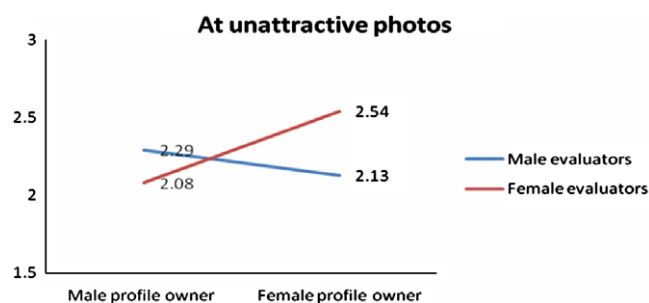

Fig. 5. Two-way interaction between profile owner gender and evaluator gender in the unattractive photo condition.

Fig. 6. Two-way interaction between profile owner gender and evaluator gender in the no-photo condition.

6. Discussion

The goal of this study was to explore the effect of visual cues on initiating friendships on Facebook. We posited physical attractiveness of the message sender and gender of both message sender and receiver would influence the willingness to initiate friendship with zero-history CMC partners. This investigation not only addresses the theoretical significance of the hyperpersonal framework but also illustrates gender differences in the judgment of friendship initiation during one-shot online encounters when visual cues are either available or absent.

Display of one's profile photo on Facebook had a significant main effect on willingness to initiate friendships with the profile owners. Physical attractiveness was most salient as a visual cue when choosing whom to befriend when other verbal or non-verbal cues were limited. A three-way interaction of gender and appearance was also revealed. The results suggest that both male and female subjects were more willing to initiate friendships with opposite-sex profile owners with attractive photos. They also displayed comparatively higher willingness to make friends with the profile owners who did not include visual cues than with those who revealed an unattractive photo. Male subjects in particular were found to be more willing to be friends with the visually anonymous (no profile photo) female profile owners than with anonymous males.

The empirical findings of this study suggest a number of important implications for the understanding of how people decide to make friends in the virtual world. First, at a theoretical level, our findings resonate with the hyperpersonal model in general; they indicate a gender difference when establishing dyadic relationships in particular. That is, despite the persistent primacy of physical attractiveness on the initiation stage of relationship either offline or online, especially with regard to opposite-sex relationships, visual anonymity often facilitates the relational process. This finding is consistent with the hyperpersonal model of interaction which suggests the exaggeration of impressions about CMC partners based on the displayed information. Exclusion of visual cues in their SNS profiles may, therefore, be one strategy of selective self-presentation for message senders. From a message receiver's perspective, the absence of visual information is supplemented through the process of idealizing the partner based on other cues. In CMC, textual information has been regarded as the source of halo effects (Thorndike, 1920) on general attitudes toward virtual partners including their physical attractiveness. This manifestation of the affect heuristic allows CMC users to make judgments about their partners without being aware that their unconscious assumptions play a role in their cognitive processes. As a result, the hyperpersonal effect persists in the context of SNSs where users can provide infinite visual cues about themselves if they so choose.

It nonetheless needs to be noted that the hyperpersonal model is an extension of the SIP perspective (Walther, 1992). SIP predicts that verbal and paralinguistic cues lead to uncertainty reduction in CMC environments. Although social cues conveyed in CMC are reduced compared to FtF interaction, SIP posits that impression formation and relational communication can still be developed as long as adequate time is given. The time required to construct and decode messages is crucial in text-based CMC. The ability to express emotions in text and selective self-presentation are very important for creating a hyperpersonal atmosphere over a longer period of time, leading to the development of friendships. In the present SNS setting, however, photos individuate people quickly and effectively. The inclusion of a small but clearly identifying photo of profile owners accompanying personal text messages stimulates group-level identification. This study underscores the importance of visual cues in conveying social immediacy and forming initial impressions online. Our findings indicate that selective self-representation combined with selective reception can foster a heightened sense of affinity even during one-time profile exposure.

Findings of this study also suggest that the hyperpersonal effect should be expanded to address individual-level attributes. Gender was a particularly significant moderator when no-photo was displayed in Facebook profiles. Male subjects responded especially strongly to visual cues and were more susceptible to the hyperpersonal effect than females. Females were more cautious about people they did not know. This gender difference can be attributed to various factors such as the tendency toward impression inflation, the perceived importance of physical attractiveness in virtual friendship formation, and potentially different relational seeking purposes in Facebook use.

A second implication of our findings is that recent SNS settings like Facebook can foster social norms for social stereotyping construction. Earlier research on CMC found that stereotypical responses were possible even when cues were limited to a feminine or masculine first name (Matheson & Zanna, 1990). Our findings support this proposition as physical attractiveness and gender stereotypes were associated with a pattern by which more attractive people were viewed more favorably as virtual friends and opposite-sex friendships were more likely to be formed even in the no-photo condition. The view that this form of CMC lacks adequate social cues was not supported; indeed socially recognizable meanings, even given cues selectively presented in the time-limited situation, were observed.

Finally, visual cues can play a critical role during social interaction online and offline alike. Physical attractiveness is one of the most elemental criteria people use when forming impressions about others offline. This finding was also consistent in the context of CMC as participants were more likely to make friends with physically attractive online partners of the opposite-sex. In sum, the findings of this study suggest that norms and relationship development patterns are analogous in CMC and FtF situations. People use similar processes whether for forming both online and offline relationships.

Limitations of the present study include that our investigation was based on cross-sectional data and limited to the initial stage of virtual friendship formation. The importance of visual cues in relationship development over time in CMC was not assessed. Although we examined the validity of the hyperpersonal model in the context of online friendship initiation, it should be noted that in our experiment, text information of the Facebook profile owner was limited to name, sex, hometown, school affiliation, and email address and relationship status was designated as single across all conditions. The influence of textual information such as wall-to-wall postings and detailed personal information like literature and entertainment preferences typically revealed in Facebook profiles were excluded from our experimental design. The explanatory power of the hyperpersonal model should be further explored with more textual information about the Facebook profile owners and tested in a longitudinal assessment.

We also acknowledge that willingness to initiate a friendship carries with it the possibility that the target might decline the friendship request and this may inhibit people from making friend requests via Facebook. However, there is evidence that uninhibited friending of strangers online is common practice. Recall on average 15% of Facebook user's networks are comprise of people never actually met FtF (Stefanone et al., 2008). Data specifically addressing participant's likelihood to make contact with formerly unknown others were not assessed in the current study. Yet, it is important to note that *generally* participants were not likely to initiate friendships with relative strangers, evident by the low mean scores for this variable ($M = 2.47$, $SD = 1.32$). Moreover, given the fact that this study was based on potential behavior, people's actual friending decisions may yield different outcomes in real-life scenarios.

References

Adams, G. R. (1982). Physical attractiveness. In A. G. Miller (Ed.), *In the eye of the beholder: Contemporary issues in stereotyping* (pp. 253–304). New York: Praeger.

Albada, K. F., Knapp, M. L., & Theune, K. E. (2002). Interaction appearance theory: Changing perceptions of physical attractiveness through social interaction. *Communication Theory, 12*(1), 8–40.

Alley, T. R. (1988). Physiognomy and social perception. In T. R. Alley (Ed.), *Social and applied aspects of perceiving faces* (pp. 167–186). Hillsdale: Erlbaum.

Alley, T. R., & Cunningham, M. R. (1991). Averaged faces are attractive, but very attractive faces are not average. *Psychological Science, 2*, 123–125.

Alley, T. R., & Hildebrandt, K. A. (1988). Determinants and consequences of facial aesthetics. In T. R. Alley (Ed.), *Social and applied aspects of perceiving faces* (pp. 101–140). Hillsdale: Erlbaum.

Ambady, N., & Rosenthal, R. (1992). Thin slices of behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological Bulletin, 2*, 256–274.

Argyle, M., & Dean, J. (1965). Eye-contact, distance and affiliation. *Sociometry, 28*, 289–304.

Bell, R. (1981). Friendships of women and men. *Psychology of Women Quarterly, 5*, 402–417.

Berscheid, E., & Walster, E. H. (1974). Physical attractiveness. In L. Berkowitz (Ed.). *Advances in experimental social psychology* (Vol. 7, pp. 158–215). New York: Academic Press.

Bleske, A. L., & Buss, D. M. (2000). Can men and women be just friends? *Personal Relationships, 7*, 131–151.

Bleske, A. L., & Buss, D. M. (2001). Opposite-sex friendship: Sex differences and similarities in initiation, selection, and dissolution. *Personality and Social Psychology Bulletin, 27*, 1310–1327.

Buss, D. M. (1984). Evolutionary biology and personality psychology: Toward a conception of human nature and individual differences. *American Psychologist, 39*, 361–377.

Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12*, 1–49.

comScore (2009). Top 50 US Web Properties for August 2009. <http://www.comscore.com/Press_Events/Press_Releases/2009/9/comScore_MediaMetrix_Ranks_Top_50_U.S._Web_Properties_for_August_2009comScore/> Retrieved 25.09.09.

Culnan, M. J., & Markus, M. L. (1987). Information technologies. In F. M. Jablin, L. L. Putnam, K. H. Roberts, & L. W. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 420–443). Newbury Park: Sage.

Cunningham, M. R., Roberts, A. R., Barbee, A. P., & Druen, P. B. (1995). Their ideas of beauty are, on the whole, the same as ours: Consistency and variability in the cross cultural perception of female physical attractiveness. *Journal of Personality & social psychology, 68*, 261–279.

Daft, R. L., & Lengel, R. K. (1986). Organizational information requirements, media richness and structural determinants. *Management Science, 32*(5), 554–571.

Dion, K. K. (1981). Physical attractiveness, sex roles and heterosexual attraction. In M. Cook (Ed.), *The bases of human sexual attraction* (pp. 3–22). London: Academic Press.

Dion, K., Berscheid, E., & Walster, E. (1972). What is beautiful is good. *Journal of Personality and Social Psychology, 24*, 285–290.

Duck, S. W. (1982). Interpersonal communication in developing acquaintance. In G. R. Miller (Ed.), *Explorations in interpersonal communication* (pp. 127–148). Beverly Hills: Sage.

Ekman, P. (1992). Facial expression of emotion: New findings, new questions. *Psychological Science, 3*, 34–38.

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "Friends:" Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*, 1143–1168.

Feingold, A. (1990). Gender differences in effects of physical attractiveness on romantic attraction: A comparison across five research paradigms. *Journal of Personality and Social Psychology, 59*, 981–993.

Feingold, A. (1992). Good looking people are not what we think. *Psychological Bulletin, 11*, 304–341.

Gangestad, S. W., & Buss, D. M. (1993). Pathogen prevalence and human mate preferences. *Ethology and Sociobiology, 14*, 89–96.

Goffman, E. (1963). *Behavior in public places: Notes on the social organization of gathering.* New York: Free Press.

Grammer, K., & Thornhill, R. (1994). Human (*Homo sapiens*) facial attractiveness and sexual selection: The role of symmetry and averageness. *Journal of Comparative Psychology, 108*, 233–242.

Gross, R., & Acquisti, A. (2005). Information revelation and privacy in online social networks. In Proceedings of ACM's twelfth annual workshop on privacy in the electronic society (pp.71–80). New York, NY.

Hacker, H. M. (1981). Blabbermouths and clams: Sex differences in self-disclosure in same-sex and cross-sex friendship dyads. *Psychology of Women Quarterly, 5*, 385–401.

Hancock, J., & Dunham, P. (2001). Impression formation in computer-mediated communication revisited: An analysis of the breadth and intensity of impression. *Communication Research, 28*, 325–332.

Hancock, J., & Toma, C. (2009). Putting your best face forward: The accuracy of online dating photographs. *Journal of Communication, 59*(2), 367–386.

Hatfield, E., & Sprecher, S. (1986). *Mirror, mirror: The importance of looks in everyday life.* Albany: State University of New York Press.

Joinson, A. N. (2008). Looking at, looking up or keeping up with people? Motives and use of Facebook. In Proceedings of SIGCHI's twenty-sixth annual human factors in computing systems (pp.1027–1036). New York, NY.

Jones, E. E. (1990). *Interpersonal perception.* New York: W.H. Freeman and Company.

Jones, B. C., Little, A. C., Penton-Voak, I. S., Tiddeman, B. P., Burt, D. M., & Perrett, D. I. (2001). Facial symmetry and judgements of apparent health: Support for a "good genes" explanation of the attractiveness–symmetry relationship. *Evolution and Human Behavior, 22*, 417–429.

Katz, J. E., & Rice, R. E. (2002). *Social consequences of internet use: Access involvement and interaction.* Cambridge: MIT Press.

Kenny, D. A. (1991). A general model of consensus and accuracy in interpersonal perception. *Psychological Review, 98*, 155–163.

Kernis, M. H., & Wheeler, L. (1981). Beautiful friends and ugly strangers: Radiation and contrast effects in perceptions of same-sex pairs. *Personality & Social Psychology Bulletin, 7*(4), 617–620.

Krebs, D., & Adinolfi, A. (1975). Physical attractiveness, social relations, and personality style. *Journal of Personality and Social Psychology, 31*(2), 245–253.

Lampe, C., Ellison, N., & Steinfeld, C. (2007). A familiar face(book): Profile elements as signals in an online social network. In Proceedings of SIGCHI's eighteenth annual human factors in computing systems (pp.435–444). New York, NY.

Langlois, J. H., & Roggman, L. A. (1990). Attractive faces are only average. *Psychological Sciences, 1*, 115–121.

Langlois, J. H., Roggman, L. A., & Musselman, L. (1994). What is average and what is not average about attractive faces? *Psychological Science, 5*, 214–220.

Lea, M., & Spears, R. (1991). Computer-mediated communication, deindividualization and group decision-making. *International Journal of Man-Machine Studies, 34*, 283–301.

Lea, M., & Spears, R. (1995). Love at first byte? Building personal relationships over computer networks. In J. T. Wood & S. Duck (Eds.), *Understudied relationships: Off the beaten track* (pp. 197–233). Newbury Park: Sage.

Lee, E. J. (2007). Categorical person perception in computer-mediated communication: Effects of character representation and knowledge bias on sex inference and informational social influence. *Media Psychology, 9*, 309–329.

Lenhart, A., & Madden, M. (2007). Teens, privacy, & online social networks. Pew Internet and American Life Project Report. <http://www.pewinternet.org/pdfs/PIP_Teens_Privacy_SNS_Report_Final.pdf/> Retrieved July 30.07.07.

Mantovani, F. (2001). Networked seduction: A test-bed for the study of strategic communication on the Internet. *Cyberpsychology & Behavior, 4*(1), 147–154.

Matheson, K., & Zanna, M. T. (1990). The focus is on me. *Social Science Computer Review, 8*, 1–12.

Mazer, J. P., Murphy, R. E., & Simonds, C. J. (2007). I'll see you on "Facebook:" The effects of computer-mediated teacher self-disclosure on student motivation, affective learning, and classroom climate. *Communication Education, 56*(1), 1–17.

McKenna, K. Y. A., & Bargh, J. A. (2000). Plan 9 from cyberspace: The implications of the Internet for personality and social psychology. *Personality and Social Psychology Review, 4*, 57–75.

McKenna, K. Y. A., Green, A. S., & Gleason, M. E. J. (2002). Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues, 58*, 9–31.

Meadows-Klue, D. (2008). Falling in love 2.0: Relationship marketing for the Facebook generation. *Journal of Direct Data and Digital Marketing Practice, 9*(3), 245–250.

Parks, M. R., & Floyd, K. (1995). Making friends in cyberspace. *Journal of Computer Mediated Communication, 1*(4). <http://jcmc.indiana.edu/vol1/issue4/parks.html/> Retrieved 25.09.07.

Parks, M., & Roberts, L. (1998). Making MOOsic: The development of personal relationships on line and a comparison to their off-line counterparts. *Journal of Social and Personal Relationships, 15*, 517–537.

Patzer, G. L. (1985). *The physical attractiveness phenomena.* New York: Plenum Press.

Peluchette, J., & Karl, K. (2008). Social networking profiles: An examination of student attitudes regarding use and appropriateness of content. *Cyberpsychology & Behavior, 11*(1), 95–97.

Reingold, H. (1993). *The virtual community.* New York: Addison-Wesley.

Rhodes, G., Proffitt, F., Grady, J. M., & Sumich, A. (1998). Facial symmetry and the perception of beauty. *Psychonomic Bulletin & Review, 5*(4), 659–669.

Rhodes, G., & Tremewan, T. (1996). Averageness, exaggeration and facial attractiveness. *Psychological Science, 7*, 105–110.

Rhodes, G., Zebrowitz, L., Clark, A., Kalick, S., Hightower, A., & McKay, R. (2001). Do facial averageness and symmetry signal health? *Evolution and Human Behavior, 22*, 31–46.

Riggio, R. E. (1986). Assessment of basic social skills. *Journal of Personality and Social Psychology, 51*, 649–660.

Roszell, P., Kennedy, D., & Grabb, E. (1989). Physical attractiveness and income attainment among Canadians. *Journal of Psychology, 123*, 547–559.

Sapadin, L. A. (1988). Friendship and gender: Perspective of professional men and women. *Journal of Social and Personal Relationships, 5*, 387–403.

Schonfeld, E. (2009). Facebook is now the forth largest site in the world. *TechCrunch.com.* <http://www.techcrunch.com/2009/08/04/Facebook-is-now-the-fourth-largest-site-in-the-world/> Retrieved 21.09.09.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* New York: John Wiley & Sons.

Sprecher, S. (1989). The importance to males and females of physical attractiveness, earning potential, and expressiveness in initial attraction. *Sex Roles, 21*, 591–607.

Sproull, L., & Kiesler, S. (1986). Reducing social context cues: Electronic mail in organizational communication. *Management Science, 32*, 1492–1512.

Stefanone, M. A., Lackaff, D., & Rosen, D. (2008). We're all stars now: Reality television, Web 2.0, and mediated identities. In The proceedings of ACM's nineteenth annual hypertext and hypermedia (pp. 107–112). Los Alamitos, CA.

Storck, J., & Sproull, L. (1995). Through a glass darkly: What do people learn in videoconferences? *Human Communication Research, 22*(2), 197–219.

Stutzman, F. (2006). An evaluation of identity-sharing behavior in social network communities. *Journal of the International Digital Media and Arts Association, 3*(1), 10–18.

Tancer, B. (2008). *Click: What millions of people are doing online and why it matters.* NewYork: Hyperion.

Thorndike, E. L. (1920). A constant error in psychological ratings. *Journal of Applied Psychology, 4*, 25–29.

Thornhill, R., & Gangestad, S. W. (1999). Facial attractiveness. *Trends in Cognitive Sciences, 3*, 452–460.

Tolson, J. M., & Urberg, K. A. (1993). Similarity between adolescent best friends. *Journal of Adolescent Research, 8*, 274–288.

Tong, S. T., Van Der Heide, B., Langwell, L., & Walther, J. B. (2008). Too much of a good thing? The relationship between number of friends and interpersonal impressions on Facebook. *Journal of Computer-Mediated Communication, 13*, 531–549.

Tufekci, Z. (2008). Grooming, gossip, Facebook and Myspace. What can we learn about these sites from those who won't assimilate? *Information, Communication & Society, 11*(4), 544–564.

Udry, J. Richard (1966). *The social context of marriage.* Philadelphia: J.B. Lippincott.

Walster, E., Aronson, V., Abrahams, D., & Rottman, L. (1966). Importance of physical attractiveness in dating behavior. *Journal of Personality and Social Psychology, 4*, 508–516.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction. *Communication Research, 19*(1), 52–90.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*, 3–44.

Walther, J. B. (2007). Selective self-presentation in computer-mediated communication: Hyperpersonal dimensions of technology, language, and cognition. *Computers in Human Behavior, 23*(5), 2538–2557.

Walther, J. B., Slovacek, C. L., & Tidwell, L. C. (2001). Is a picture worth a thousand words? Photographic images in long-term and short-term computer-mediated communication. *Communication Research, 28*(1), 105–134.

Walther, J. B., Van Der Heide, B., Kim, S. -Y., Westerman, D., & Tong, S. T. (2008). The role of friends' appearance and behavior on evaluations of individuals on facebook: Are we known by the company we keep? *Human Communication Research, 34*, 28–49.

Wellman, B., Salaff, J., Dimitrova, D., Yuan, Y. C., & Gay, G. (2006). Homophily of network ties and bonding and bridging social capital in computer-mediated distributed teams. *Journal of Computer-Mediated Communication, 11*, 1062–1084.

Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior, 24*, 1816–1836.