



Getting acquainted through social network sites: Testing a model of online uncertainty reduction and social attraction

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ABSTRACT

The first aim of this study was to examine which uncertainty reduction strategies members of social network sites used to gain information about a person who they had recently met online. The second aim was to investigate whether and how these uncertainty reduction strategies resulted in social attraction. Drawing on a survey of 704 members of a social network site, we found that respondents had used active, passive, and interactive strategies to reduce uncertainty about their new acquaintance. Interactive strategies were most effective in reducing uncertainty about the target person. Respondents' level of uncertainty about the acquaintance mediated the relationships between the use of interactive uncertainty strategies and perceived similarity on the one hand and social attraction on the other. Finally, respondents' perceived valence of the obtained information about the acquaintance moderated the relationship between the level of uncertainty and social attraction.

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1. Introduction

The popularity of social network sites has increased tremendously in the past few years. For example, from 2006 to 2008, MySpace grew from about 66 million to 117 million unique visitors worldwide, and Facebook grew from 14 million to 132 million visitors during the same period (Comscore, 2007, 2009). Social network sites, like MySpace and Facebook, specifically aim at building and maintaining social networks. These sites are usually open or semi-open systems. Everyone is welcome to join but new members have to register. The sites typically allow members to create an online profile containing self-descriptions, react to the profiles of other members, and become "friends" with other members (Ellison, Steinfield, & Lampe, 2006; Lampe, Ellison, & Steinfield, 2007). Participants may use the sites to keep in touch with existing friends or to meet new people (Boyd, 2004; Dwyer, Hiltz, & Passerini, 2007; Ellison et al., 2006; Tong, Van Der Heide, Langwell, & Walther, 2008).

Social network sites belong to the latest generation of computer-mediated communication (CMC) environments. Contemporary CMC environments seem to vary along two dimensions. First, they differ in the extent to which they provide visual and auditory cues. Whereas some CMC applications, such as MUDs (Multi-User-Dungeons) are predominantly text-based, other environments, such as MMOG's (Massively Multiplayer Online Games) and social network

sites, are cue-richer applications in that they also provide audiovisual cues. Second, contemporary CMC environments vary in their openness. Whereas some CMC environments, such as Instant Messaging, are predominantly used for dyadic, one-to-one communication, other environments, such as social network sites, encourage more open, one-to-many communication.

Cue-rich and open CMC environments may have two profound consequences for CMC theories and research. First and more generally, they may help us to refine theory building in CMC research. Most CMC theories, such as the reduced cues perspective (Kiesler, Siegel, & McGuire, 1984), media richness theory (Daft & Lengel, 1984), the social information processing perspective (Walther, 1992), the social identity model of deindividuation effects (Lea & Spears, 1995), and hyperpersonal theory (Walther, 1996) are based on the assumption that people interact in CMC environments that are characterized by dyadic communication and reduced cues. However, with the advent of technologies and applications that allow for more open communication structures and the inclusion of auditory and visual cues, several propositions of existing theories may need some adjustment. This study, with its focus on social network sites and, thus, on cue-richer, more open CMC environments, may initially help us to widen the scope of existing CMC theories such that these theories can also be applied to cue-rich open CMC environments.

Second and more specifically, cue-richer, open CMC environments may have important consequences for the uncertainty reduction strategies that members can use to gain information about a target person in initial interactions. By initial interactions we mean the entry phase during which interactants experience

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uncertainty and/or a lack of predictability about their new relational partner (Neuliep & Grohskopf, 2000). In offline settings, people generally use three types of uncertainty reduction strategies (URS's) to get to know a target person: passive, active, and interactive strategies (Berger & Calabrese, 1975; Berger, Gardner, Parks, Schulman, & Miller, 1976). Passive strategies are those in which an informant unobtrusively observes the target person, for example in situations in which the target person reacts to or interacts with others. Active strategies involve proactive efforts to get to know the target person, without confronting the person. A common active strategy consists of asking others about the target person. Finally, interactive strategies require a direct interaction between the communication partners. One interactive strategy is direct questioning and another is self-disclosure. Self-disclosure usually elicits self-disclosure from the target partner. In this way, self-disclosure can be seen as an information-seeking strategy (Berger et al., 1976).

The range of URS's that can be employed to reduce uncertainty in CMC may depend on the two dimensions of CMC (cue-poor vs. cue-rich and dyadic vs. open communication). In principle, one can use passive, active and interactive URS's in every CMC application. It has been shown, for example, that in cue-poorer CMC settings users develop skills to decode textual cues, such as language errors and emoticons, to reduce uncertainty and form impressions about a target person (Curtis, 1996; Hu, Wood, Smith, & Westbrook, 2004; Tidwell & Walther, 2002; Utz, 2000; Walther & D'Addario, 2001; Walther & Tidwell, 1995). However, in cue-poorer and dyadic CMC, passive and active uncertainty reduction strategies are more difficult to employ because they require a lot of effort (Carey, 1980; Curtis, 1996) to find the functional equivalents of the information sources (e.g., visual cues or friends of the partner) that are typically unavailable in this type of CMC (Tidwell & Walther, 2002). As a result, interactive strategies (i.e., direct questioning and self-disclosure) are the most used strategies in dyadic reduced-cues CMC settings (Parks & Floyd, 1996; Ramirez, Walther, Burgoon, & Sunnafrank, 2002; Tidwell & Walther, 2002).

However, in cue-richer and open CMC environments, such as social network sites, information gathering through passive and active URS's is less effortful and consequently faster. On social network sites, it is not only possible to observe the target person unobtrusively, for example via his or her personal profile (Tong et al., 2008; Walther, Van Der Heide, Kim, Westerman, & Tong, 2008), but also to ask third parties for information about the target person. In addition, social network sites provide their users with many opportunities for self-presentation (Boyd, 2004; Donath & Boyd, 2004; Walther et al., 2008). Users on these sites can upload a great deal of information about their selves, including pictures, videos, and self-descriptions. Therefore, it is no surprise that users of social network sites relatively often use passive strategies (e.g., observation) to form impressions about a target person (Tong et al., 2008; Walther et al., 2008).

However, while all three URS's can theoretically be utilized on social network sites, the prevalence of these strategies on these sites has never been investigated in one study. Therefore, the first aim of this study is to investigate which uncertainty strategies are most commonly used on social network sites. Hence, the first research question reads:

RQ1: To what extent do members of social network sites use passive, active, and interactive uncertainty reduction strategies?

1.1. Social network sites, level of uncertainty, and social attraction

The differences between social network sites and cue-poorer CMC applications may not only have profound consequences for the URS's that members use, but also for relationship formation

and social attraction on these sites (Tong et al., 2008; Walther et al., 2008). One of the aims of members of social network sites is to get to know people and to form friendships. This friendship formation goes hand in hand with the development of social attraction, because friendship formation usually does not occur without a minimum level of social attraction (Reis & Shaver, 1988).

CMC theories and research have paid ample attention to social attraction processes in CMC environments. A series of studies have investigated the effects of CMC on social attraction in initial interactions. Most studies have reported positive effects of CMC on social attraction (Antheunis, Valkenburg, & Peter, 2007; Bargh, McKenna, & Fitzsimons, 2002; McKenna, Green, & Gleason, 2002). This positive effect of CMC on social attraction has often been attributed to a particular use of online URS's (e.g., Antheunis et al., 2007; Tidwell & Walther, 2002). For example, it has been suggested that the reduced cues in CMC increase the use of interactive URS's, such as self-disclosure and direct questioning (Antheunis et al., 2007; Tidwell & Walther, 2002). After all, CMC partners need to compensate for the lack of information that they usually get through nonverbal cues in face-to-face environments. Both direct questioning (Antheunis et al., 2007; Tidwell & Walther, 2002) and online self-disclosure (Antheunis et al., 2007; Bargh et al., 2002; Coleman, Paternite, & Sherman, 1999; Joinson, 2001; Tidwell & Walther, 2002) are common phenomena in reduced-cues CMC environments. There is also evidence that interactive URS's encourage interpersonal attraction in reduced-cues CMC environments (Antheunis et al., 2007).

Although online interactive URS's may explain the effects of reduced-cues CMC on social attraction, it is still an open question whether and how these processes will apply to cue-richer and open social network sites. For example, it is still unknown how the three URS's relate to the level of uncertainty on cue-rich and open social network sites. Moreover, it is unclear whether an information seeker's level of uncertainty mediates the influence of URS's on social attraction. Therefore, the second aim of this study is to investigate how online uncertainty reduction processes on social network sites are related to social attraction. To do so, we will develop and test an initial model that explains the relationships between online URS's, the level of uncertainty, and social attraction (see Fig. 1). In the next sections, we will discuss the assumptions of our model in more detail.

1.2. Three uncertainty reduction strategies on social network sites

The core of uncertainty reduction theory (URT; Berger & Calabrese, 1975) is that the three types of URS's (passive, active, and interactive) reduce uncertainty in the information seeker. According to URT, uncertainty reduction is the gathering of information that allows the information seeker to predict someone's attitudes and behavior. During the uncertainty reduction processes, the information seeker creates mental models that help him/her to make sense of other people and their intentions, emotions, and behaviors (Berger & Calabrese, 1975; Srull & Wyer, 1989). Earlier CMC studies have demonstrated that CMC partners predominantly use interactive strategies to reduce the level of uncertainty and form impressions about one another (Parks & Floyd, 1996; Ramirez et al., 2002; Tidwell & Walther, 2002). However, these earlier studies did not examine all three URS's simultaneously and the studies typically involved cue-poorer CMC settings. After all, cue-richer CMC environments, such as social network sites, allow for a broader range of URS's than dyadic, cue-poorer CMC environments. Offline uncertainty reduction research predicts that interactive URS's are most efficient in reducing the level of uncertainty (Emmers & Canary, 1996). Therefore, our first hypothesis, which is modeled through paths H1a, H1b, and H1c in Fig. 1, reads:

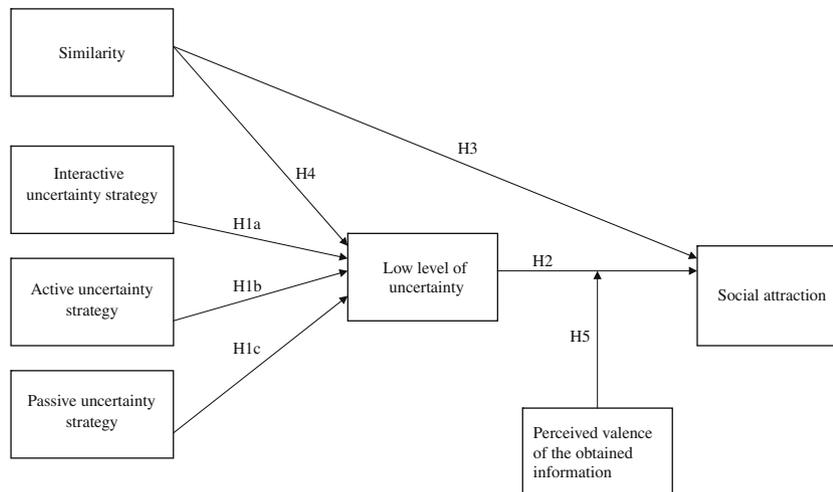


Fig. 1. Hypothesized model explaining the relationships between online uncertainty reduction strategies, level of uncertainty, and social attraction.

H1: Interactive uncertainty reduction strategies (H1a) will be most effective in reducing the level of uncertainty, followed by active (H1b), and passive (H1c) uncertainty reduction strategies.

1.3. Level of uncertainty and social attraction

One of the assumptions in URT (Axiom 7; Berger & Calabrese, 1975) is that lower levels of uncertainty are positively related to social attraction in initial interactions. In other words, the more a person can predict and explain others' behavior, the more they are attracted to them (Kellermann & Reynolds, 1990). The relationship between the level of uncertainty and social attraction has frequently been investigated, albeit only in offline environments. Most studies have found that lower levels of uncertainty are positively related to social attraction (Afifi & Metts, 1998; Clatterbuck, 1979; Douglas, 1990, 1994; Gudykunst, 1985; Gudykunst, Yang, & Nishida, 1985; Kellermann & Reynolds, 1990), although several other studies have found no relationship (Gudykunst & Nishida, 1984), or even a negative relationship between uncertainty and social attraction (Afifi & Burgoon, 2000; VanLear & Trujillo, 1986). Although the relationship between the level of uncertainty and social attraction has often been addressed in offline environments, there is still little evidence for this relationship in CMC environments (Ramirez & Burgoon, 2004). Given that the majority of studies on the relationship between offline uncertainty and social attraction have yielded positive associations between lower levels of uncertainty and social attraction, our second hypothesis, which is modeled through path H2 in Fig. 1, states:

H2: Members of social network sites with lower levels of uncertainty about the target person will feel more socially attracted to that person.

1.4. Similarity, level of uncertainty, and social attraction

Dozens of studies have shown that similarity is one of the main predictors of social attraction (for a review, see Berscheid & Reis, 1998). Social attraction to another person seems to result largely from the perceived 'rewards' that an individual receives from the other. These rewards can be experienced in different ways. They can result from direct interaction (e.g., a flattering remark or self-disclosure), but they can also result from passive observation of the target person (e.g., watching that the target person likes the same music as one does). Rewards like these are most likely to be experienced by individuals who are similar (Newcomb, 1961). Based on this argument, our third hypothesis, which is modeled through path H3 in Fig. 1, is:

H3: On social network sites, an information seeker's perceived similarity with the target person will positively predict social attraction between the information seeker and the target person.

Similarity not only positively predicts social attraction, it also affects the information seeker's level of uncertainty (Berger & Calabrese, 1975; Clatterbuck, 1979; Gudykunst et al., 1985; Parks & Adelman, 1983; Prisbell & Andersen, 1980). By perceiving someone as similar, one can more easily employ self-knowledge to draw conclusions about the other. This increases the information seeker's knowledge about the target person, which in turn reduces his or her level of uncertainty. Perceived similarity may also result in more effective communication, which, in turn, results in lower levels of uncertainty (Prisbell & Andersen, 1980). Therefore, we expect a positive effect of perceived similarity on the level of uncertainty. This relationship is modeled through path H4 in Fig. 1.

H4: There will be a positive effect of perceived similarity on the reduction of the level of uncertainty.

1.5. Mediation hypotheses

We have hypothesized that both the three URS's and similarity positively influence respondents' level of uncertainty. We have also hypothesized that a lower level of uncertainty positively predicts social attraction. Therefore, it may logically be possible that respondents' level of uncertainty mediates the effect of the independent variables (i.e., the three URS's and similarity) on the dependent variable social attraction (Berger & Calabrese, 1975; Parks & Adelman, 1983). We expect two types of mediation. In the case of the relationship between the URS's and social attraction we expect full mediation. In other words, we expect that the influence of the three URS's on social attraction will be entirely carried by respondents' level of uncertainty. In the case of the relationship between similarity and social attraction, we expect that the online level of uncertainty will act as a partial mediator. We do not expect that level of similarity will act as a full mediator, because similarity has been consistently found to be directly and strongly related to social attraction (for a review, see Berscheid & Reis, 1998). In Fig. 1, our expectations are modeled through paths H1a, H1b, H1c, and H2 for the relationships between the URS's and social attraction and H2, H3, and H4 for the relationship between perceived similarity and social attraction.

1.6. Perceived valence of information: A contingent condition?

Although the majority of studies have found that reduced uncertainty levels increase social attraction, some studies have

reported no or even opposite effects (Affi & Burgoon, 2000; Gudykunst & Nishida, 1984; VanLear & Trujillo, 1986). An important explanation for these inconsistent results could lie in the omission of an important moderating variable, namely the perceived valence of the information obtained through the URS's. A similar idea has been investigated earlier by Sunnafrank (1986, 1990). Sunnafrank's Predicted Outcome Value Theory assumes that the relationship between uncertainty reduction and social attraction is moderated by an individual's perceived outcome of the interaction (1986, 1990). Likewise, it is conceivable that the valence of the information conveyed may moderate the influence of the level of uncertainty on social attraction. Perceived valence of the information refers to the extent to which an individual perceives the information of the target person as positive or negative, regardless of its credibility or quality.

Scheidel (1977) suggested that social attraction might depend on the valence of the obtained information. That is, if a person, who tries to gain information about a target person, receives primarily negative information about this target person, this person will not like the target person. Conversely, if this person would receive primarily positive information about the target person, he or she might feel more attracted to the target person. Douglas (1994) suggested that both uncertainty and attraction can change as a function of the valence of the obtained information. That is, if the obtained information about the target person is positive, persons may become less uncertain about and more attracted to the target. If the obtained information is negative or mixed, the level of uncertainty and attraction may remain the same or move in the opposite direction.

However, it is plausible to assume that the valence of the obtained information influences the effect of the level of uncertainty on social attraction. We expect that the relationship between uncertainty and social attraction will thus be moderated by the perceived valence of the obtained information. Due to perceptive salience, negative information generally attracts more attention and is better remembered than positive information (e.g., Pratto & John, 1991). Therefore, we expect that when the perceived valence of the information is negative, the effect of the low level of uncertainty on social attraction will become stronger. On the other hand, when the perceived valence of the information is positive, the effect of level of uncertainty on social attraction will become less strong. This hypothesis is modeled through path H5 in Fig. 1.

H5: The effect of a low level of uncertainty on social attraction is contingent upon the information seeker's perceived valence of the obtained information.

1.7. Social network sites in the Netherlands and the US

The data used in this survey study were collected among members of the Dutch social network sites Hyves (www.hyves.nl). Hyves is currently the most popular social network site in the Netherlands. Hyves is very similar to US-based social network sites, such as MySpace and Facebook. Currently, almost 50% (over 7.7 million people) of the Dutch population are a member of Hyves. The average age of Hyves members is 23 years, and the majority of the members are highly educated. Similar to MySpace (Dwyer, Hiltz, & Passerini, 2007), Facebook (Lampe, Ellison, & Steinfield, 2006), and Friendster (Boyd, 2004), one of the important motivations for visiting Hyves is to keep in touch with existing friends and to find more information about persons met in the offline world. Because there are no striking differences between Hyves and other social network sites, we believe that our findings will validly generalize to other users of social network sites.

2. Method

2.1. Sample and procedure

In November 2006 an online survey was conducted among 2188 active members of Hyves. The participants were recruited through advertisements on the Hyves website. The age of the users ranged from 10 to 62. Because our goal was to measure the uncertainty reduction process in initial online interactions, only participants who reported having recently met one or more persons through Hyves or the Internet were included in our analyses. Therefore, the findings in this paper are based on the 704 participants (65% female) who indicated that they had met one or more acquaintances through Hyves or the Internet. The average age of that group was 22.47 ($SD = 6.54$).

After a brief introduction, participants were asked some general questions about their use of Hyves. Subsequently, they were asked if they had met one or more friends through Hyves or the Internet. If this was the case, respondents were asked to think of the online friend with whom they had communicated most recently through Hyves. The participants were then asked a series of questions about this particular friend.

2.2. Measures

2.2.1. Uncertainty reduction strategies

We used 14-items to measure the use of the three uncertainty reduction strategies (passive, active, and interactive URS) on social network sites. Our operationalization of URS was based on the definitions of Berger and colleagues (Berger & Calabrese, 1975; Berger et al., 1976) and on operational definitions used in earlier studies (Jourard, 1971; Miller, Berg, & Archer, 1983; Tidwell & Walther, 2002). We adjusted these scales for the measurement of URS's on social network sites. The wording of the URS items started with: "When being on Hyves, how often did you..." followed by the fourteen activities that are listed in Table 1. The response categories were 1 (*never*), 2 (*once in a while*), 3 (*two or three times*), and 4 (*more than three times*).

To test whether our items would result in the three-dimensional structure established by previous URT research, we randomly divided our sample into two samples in order to conduct both an exploratory and a confirmatory factor analysis. The exploratory factor analysis yielded three factors, explaining 69.6% of the variance. In line with URT earlier research, Factor 1 (Eigen value = 2.40) reflected the items that measured passive uncertainty reduction. Factor 2 (Eigen value = 1.49) consisted of the items measuring active uncertainty reduction, and Factor 3 (Eigen value = 5.85) reflected the items measuring interactive uncertainty reduction. The items, factor loadings, scale means and standard deviations, along with the Cronbach's alphas of the scales, are shown in Table 1. To further validate this three-dimensional scale, we subsequently conducted a confirmatory factor analysis with the second sample. This analysis confirmed the three dimensions established in the exploratory factor analysis. The confirmatory analysis yielded a satisfactory fit, $\chi^2(68, N = 353) = 173.12$, $p < .001$, CFI = .963, RMSEA = .066 (90% CI: .054–.079).¹ In sum, both the exploratory and the confirmatory factor analysis supported the previously found three URS's and suggest that our fourteen items reliably capture URS's on social network sites.

2.2.2. Social attraction

Our measure of social attraction was based on McCroskey and McCain's Measurement of Interpersonal Attraction (1974). The

¹ Error terms of very similar worded items were allowed to covary.

Table 1
Three dimensions in online uncertainty reduction strategies.

	Factor 1	Factor 2	Factor 3
When being on Hyves, how often have you...			
Factor 1: Passive strategies			
1 ...read his/her weblog?	.71		
2 ...read his/her tips?	.69		
3 ...read messages on his/her page?	.69		
4 ...looked at his/her pictures?	.67		
5 ...looked at his/her profile?	.64		
Factor 2: Active strategies			
6 ...asked his/her friends questions about his/her education or work?		.87	
7 ...asked his/her friends questions about his/her personal things?		.84	
8 ...asked his/her friends questions about his/her spare time?		.78	
Factor 3: Interactive strategies			
9 ...told him/her things about your spare time?			.90
10 ...asked question to him/her about his/her personal things?			.89
11 ...told him/her things about your personal things?			.88
12 ...told him/her things about your education or work?			.88
13 ...asked question to him/her about his/her education or work?			.86
14 ...asked question to him/her about his/her spare time?			.84
Cronbach's alpha	.76	.79	.95
Scale means	2.06	1.17	2.18
Standard deviations	0.83	0.49	1.09

Note. Factor loadings $\leq .50$ are not reported.

items were: "This person is pleasant to talk with," "This person is pleasant to be with," "This person fits well in my circle of friends," "We get along well together," "It feels comfortable when he/she is around." The response categories ranged from 1 (*completely disagree*) to 5 (*completely agree*). The five items formed a one-dimensional scale (explained variance 79%), with a Cronbach's alpha of .93 ($M = 3.14$, $SD = 1.21$).

2.2.3. Similarity

To measure similarity, we used four items of the Perceived Homophily Measure (McCroskey, Richmond, & Daly, 1975): "This person thinks like me," "This person behaves like me," "This person is similar to me," and "This person is like me." The response categories for each of the items ranged from 1 (*completely disagree*) to 5 (*completely agree*). The items formed a one-dimensional scale (explained variance 82%), with a Cronbach's alpha of .93 ($M = 2.48$, $SD = 1.10$).

2.2.4. Level of uncertainty

Four of the five items were based on the CLUES7 scale from Clatterbuck (1979): "I can predict very well how this person will behave," "I can predict very well the things this person finds important," "I can predict very well this person's attitudes," and "I can predict very well this person's feelings and emotions." The fifth item was from Kellermann and Reynolds (1990): "I understand this person well." The response categories for each of the items ranged from 1 (*completely disagree*) to 5 (*completely agree*). The five items loaded on one factor (explained variance 86%), and resulted in a Cronbach's alpha of .96 ($M = 2.75$, $SD = 1.27$).

2.2.5. Perceived valence of the obtained information

If respondents had reported having used a particular URS, we presented them with a follow-up question that asked whether they thought the obtained information was positive or negative. The response categories were -2 (*very negative*), -1 (*negative*), 0 (*neutral*), 1 (*positive*), and 2 (*very positive*). This follow-up question on the perceived valence of the obtained information could only be presented to the respondents if they had used the particular strategy. Therefore, for each respondent, the number of items on which the total valence score is based depended on the number of strategies that this respondent had used. For each of the URS's that respondents used to gain information, we asked how they per-

ceived the obtained information. The resulting scale had a Cronbach's alpha of .93 ($M = 1.08$, $SD = .56$).

2.2.6. Amount of communication

We used the amount of communication between respondents and their target person as a control variable in our model. Several earlier studies have shown that the amount of communication between individuals in itself may increase perceived social attraction (Berger & Calabrese, 1975; Parks, 1978). We asked respondents to indicate how often he/she had communicated with the target person through Hyves, email, IM, telephone, and in a personal meeting. The response categories ranged from 1 (*never*) to 7 (*6 to 7 days a week*). We averaged the responses on these items, which led to a Cronbach's alpha of .78 ($M = 2.74$, $SD = 1.70$).

3. Results

Our research question asked to what extent members of social network sites use passive, active, and interactive URS's. Our results showed that passive strategies are most commonly used: Almost all respondents (98.9%) reported using one or more passive strategies. In addition, 83.9% reported using one or more interactive strategies. Finally, active strategies were used least frequently. Only 19.7% used one or more active strategies.

3.1. Correlations among all variables in the model

Table 2 provides the zero-order correlation matrix of the variables included in the model as presented in Fig. 1, as well as their correlations with the amount of communication, age, and gender. All variables of our model were significantly positively related to each other. All three URS's were positively related to a low level of uncertainty. The strongest correlation was with interactive URS's. Similarity was also significantly positively related to the level of uncertainty and to social attraction. The URS's positively correlated with social attraction. Again, the strongest correlation was between interactive URS's and social attraction.

Table 2 shows that gender (male = 0) was not related to the use of active and interactive URS's and similarity. However, in comparison to males, females less often used passive strategies to reduce their uncertainty. They also perceived their target person less often as socially attractive. Finally, females perceived the information

Table 2
Correlations among all variables in our hypothesized model.

	1	2	3	4	5	6	7
1. Passive URS							
2. Active URS	.26**						
3. Interactive URS	.45**	.13**					
4. Low level of uncertainty	.41**	.15**	.49**				
5. Similarity	.41**	.19**	.37**	.70**			
6. Social attraction	.47**	.15**	.51**	.76**	.74**		
7. Valence of information	.46**	.14**	.37**	.45**	.50**	.56**	
Amount of communication	.45**	.19**	.54**	.63**	.55**	.67**	.40**
Age	.08*	.01	-.09*	-.01	-.003	.001	.02
Gender (0 = male)	-.12**	-.04	.03	-.09*	-.07	-.15**	-.11**

Note. URS = uncertainty reduction strategy.

* $p < 0.05$.

** $p < .01$.

more often as negative than males did. Age was not related to the use of active URS, level of uncertainty, similarity, social attraction, and the valence of information. However, there was a small significant positive relationship between age and the use of passive URS's and a negative relationship between age and the use of interactive URS's.

3.2. Testing the hypothesized model

In our model presented in Fig. 1 we hypothesized four mediated effects. More specifically, we hypothesized that the level of uncertainty would mediate the relationships between four independent variables (passive URS's, active URS's, interactive URS's and similarity, see the left-hand side of Fig. 1) and the dependent variable social attraction. To investigate the coefficients of the hypothesized paths in Fig. 1 and the validity of these four mediation assumptions, we used a bootstrap approach to mediation developed by Preacher and Hayes (2004, 2008). Preacher and Hayes' approach is similar to Baron and Kenny's (1986) causal steps approach in two respects. First, it also uses regression analyses to investigate how the four independent variables (the three URS's and similarity) influence the mediating variable (level of uncertainty), and how the mediating variable influences the dependent variable (social attraction). Second, it also tests whether the influence of the independent variables on the dependent variable disappears when the mediating variable is included. Preacher and Hayes' (2004) approach extends Baron and Kenny's causal steps approach in that it formally tests the significance of the hypothesized mediated effect with bootstrapping.

For each of the possible mediated effects, we tested first, on the basis of the normal theory, whether the various paths that consti-

tute our model were significant. Subsequently, we performed a formal test of the mediated effect on the basis of the bootstrap method (1000 samples, $N = 704$). In each analysis, we controlled for the remaining three independent variables as well as for age, gender, and amount of communication. The normal theory revealed that the two paths from the passive ($B = .04$, $SE = .06$; $\beta = .02$, *ns*) and active URS's ($B = -.07$, $SE = .08$; $\beta = -.05$, *ns*) to level of uncertainty were not significant. The paths from interactive URS's ($B = .19$, $SE = .04$; $\beta = .16$, $p < .001$) and similarity ($B = .56$, $SE = .04$; $\beta = .47$, $p < .001$) to level of uncertainty were significant. These results supported H1a and H4. Furthermore, the path from level of uncertainty to social attraction was also significant ($B = .28$, $SE = .03$; $\beta = .31$, $p < .001$). This means that our second hypothesis is also supported. Finally, the positive relationship between similarity and social attraction was also significant ($B = .38$, $SE = .03$; $\beta = .36$, $p < .001$), which confirmed H3. The beta coefficients for all paths between the independent, mediating, and dependent variables are presented in Fig. 2.

Because a significant relationship between the independent variable and the mediator is a necessary condition for mediation, the mediation hypothesis for the relationship between passive and active URS's and social attraction was not supported. In other words, level of uncertainty could not mediate the effects of active and passive URS's on social attraction, because there was no influence of these variables on level of uncertainty. Active URS's were also not directly related to social attraction. However, passive URS's were directly related to social attraction ($\beta = .07$, $p < .01$).

The bootstrapping procedure revealed that the mediation effects of interactive URS's and similarity on social attraction were significant. For the mediated path from interactive uncertainty strategy to social attraction, the 95% bias corrected and accelerated

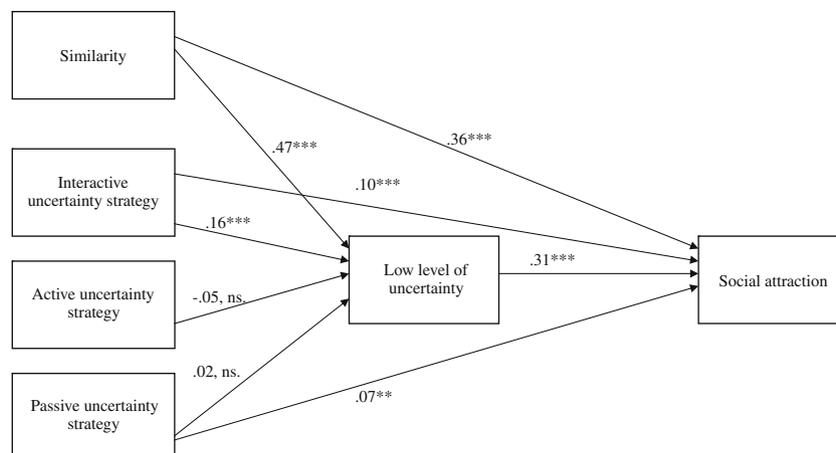


Fig. 2. Observed model explaining the relationships between online uncertainty reduction strategies, level of uncertainty, and social attraction. Note. ** $p < .01$, *** $p < .001$.

confidence interval was estimated to lie between .0325 and .0848 ($B = .053$, $SE = .013$; $p < .001$). For the mediated path from similarity to social attraction the 95% bias corrected and accelerated confidence interval was estimated to lie between .1223 and .2043 ($B = .157$; $SE = .020$, $p < .001$). Because zero was not in these confidence intervals, it is safe to conclude that these two mediated effects were significantly different from zero (see Preacher & Hayes, 2004 for a detailed explanation of this procedure). However, both the direct effects of interactive URS's and similarity on social attraction remained significant when the influence of the mediating variable level of uncertainty was controlled. As a result, both the relationships between interactive URS's and social attraction and between similarity and social attraction were only partially mediated. When testing the model - without the moderator - in structural equation modeling (AMOS 7.0), similar results were found. The model yielded a satisfactory fit, χ^2 (338, $N = 704$) = 1156.99, $p < .001$, CFI = .951, RMSEA = .059 (90% CI: .055–.062).

3.3. Moderated mediation

In our fifth hypothesis, we hypothesized that the effect of the level of uncertainty on social attraction was moderated by the valence of the information that respondents had obtained about the target person (H5 in Fig. 1). In other words, we assumed that the strength of the mediated effects in our study was *linearly contingent* on the value of the perceived valence of the obtained information. The simultaneous occurrence of both mediation and moderation in one model is often referred to as moderated mediation (Preacher, Rucker, & Hayes, 2007).

It is generally difficult to investigate moderated mediation in one statistical analysis. However, Preacher et al. (2007) have recently developed a macro based on the bootstrap method to investigate and formally test moderated mediation. We used their macro to investigate whether the mediated effects that we found for both interactive uncertainty reduction and similarity on social attraction were further moderated by respondents' perceived valence of the obtained information. We performed two separate bootstrap analyses (1000 samples, $N = 704$) to generate a bias-corrected and accelerated 95% confidence interval for the moderated mediation effect of interactive URS's and similarity on social attraction. In each analysis, we controlled for the remaining three independent variables as well as for age, gender, and amount of communication. In both analyses, the perceived valence of the obtained information acted as a significant moderator of the effects of level of uncertainty to social attraction ($B = -.10$, $SE = .04$, $p < .01$). When the point estimates of each indirect effect were investigated separately for a range of values of the moderator perceived valence of the obtained information (i.e., the mean, as well as 1 SD above and 1 SD below the mean), none of the bias-corrected and accelerated 95% confidence intervals included zero. This means that we can safely conclude that the perceived valence of the obtained information moderated the mediation effects of the level of uncertainty on social attraction. Post-hoc probing revealed that when the evaluation of the obtained information was more positive, the relationship between a low level of uncertainty and social attraction was significantly positive but relatively weak. The more negative the perceived valence of the information was, the stronger the positive relationship between a low level of uncertainty and social attraction became.

4. Discussion

The first aim of the present study was to investigate which URS's are most commonly used on social network sites. In cue-poorer and dyadic computer-mediated communication (CMC) set-

tings, participants predominantly employ interactive strategies (Parks & Floyd, 1996; Ramirez et al., 2002; Tidwell & Walther, 2002). We asked to what extent members of social network sites use passive, active, and interactive uncertainty reduction strategies. We found that on social network sites, people use all three uncertainty reduction strategies. The passive URS was most commonly used, followed by the interactive and the active URS. In contrast to text-based CMC environments, social network sites have more auditory and visual cues available and are relatively open systems. Apparently, this allows CMC participants not only to use interactive URS's (i.e., direct questioning and self-disclosure), but also to observe their target persons (passive strategy), or to ask other participants for information about the target persons (active strategy). The relatively high use of passive strategies is not surprising. Unlike other forms of CMC, social network sites usually encourage users to disclose a great deal of information about themselves. Consequently it is plausible that users of these sites use this information to reduce uncertainty and form impressions of the target person. Active strategies were least often used on social network sites. This result is also comprehensible. To employ active strategies a user must have access to the profiles of the friends of the target person. However, this access is usually not yet possible in initial interactions between users of social network sites.

The second aim of this study was to investigate how uncertainty reduction processes on social network sites are related to social attraction. To do so, we developed and tested a conceptual model that explains the relation between online URS's, level of uncertainty, and social attraction (see Fig. 1). The first hypothesis of our model stated that interactive URS's would reduce the information seeker's level of uncertainty most effectively. This hypothesis received support. Although the passive URS was most commonly used, the interactive URS was the only strategy that effectively reduced the information seeker's level of uncertainty.

It would be interesting to know how our results compare to cue-poorer CMC environments and to offline environments. However, both comparisons are difficult to make. First, in cue-poor and dyadic CMC environments the information seeker has to rely mainly on interactive URS's. As a result, in these CMC environments it is more difficult to compare the effectiveness of the three uncertainty reduction strategies. Second, although in offline settings it is possible to use all three strategies, to date only one research has compared the effectiveness of the three URS's in one study. Emmers and Canary (1996) did find that of the three URS's, interactive strategies were used most often. But, this study concentrated on negative events in ongoing relationships, so that their results are only modestly comparable to our results. However, based on our results and the study of Emmers and Canary (1996), it is plausible to assume that interactive URS's are also most effective in online and offline settings. There is not only a direct interaction between the information seeker and the target person (Emmers & Canary, 1996), but the information seeker also has more control over the communication process (Berger, 1979). The information seeker can determine the topic of the conversation, ask the target person probing questions, or deliberately self-disclose specific information about the topic.

4.1. Level of uncertainty and social attraction

Our second hypothesis, which stated that on social network sites a low level of uncertainty would lead to social attraction, was confirmed by our data. This finding is in line with an earlier CMC study by Ramirez and Burgoon (2004) who also found that a low level of uncertainty predicted a higher level of social attraction among CMC participants. Our finding also coincides with the majority of offline studies that reported a positive relationship

between level of uncertainty and social attraction (e.g., Douglas, 1994; Kellermann & Reynolds, 1990).

However, while we did find a direct effect of the level of uncertainty on social attraction, we hypothesized that this relation would be moderated by the perceived valence of the information that the information seeker obtained from the target person (Hypothesis 5). We indeed found that the perceived valence of the information acted as a moderator in the uncertainty-social attraction relationship. This moderating effect has important implications for our study and for earlier studies (e.g., Douglas, 1994; Kellermann & Reynolds, 1990). After all, when a moderating effect is found, it is no longer possible to interpret a direct effect of level of uncertainty on social attraction. Our study clearly showed that the direct relationship between level of uncertainty and social attraction is not direct, but contingent upon the perceived valence of the information.

More specifically, we hypothesized that when the perceived valence of the information is negative, the effect of the low level of uncertainty on social attraction will become stronger. On the other hand, when the perceived valence of the information is positive, the effect of level of uncertainty on social attraction will become less strong. This hypothesis was supported. We indeed found that when the perceived valence of the obtained information was more positive, the relationship between a low level of uncertainty and social attraction was less strong, than when the perceived valence of the information about the target person was more negative. This finding implies that when an information seeker perceives the information he or she obtains from the target person as positive, his or her level of uncertainty about the target person is a relatively less important determinant of social attraction. However, when the perceived information about the target person is negative, his or her level of uncertainty is a major determinant of social attraction. One explanation for this finding could be that negative information was scarcer than positive information and that it therefore stands out more than positive information (Resnick, Zeckhauser, Swanson, & Lockwood, 2006). Another explanation could lie in the negativity bias, which refers to the greater attention that information seekers pay to negative rather than to positive information (e.g., Pratto & John, 1991).

Our results have important implications for uncertainty reduction theory. A core assumption in Berger & Calabrese's (1975) uncertainty reduction theory is that lower levels of uncertainty are positively related to social attraction in initial interactions. However, our results showed that, at least on social network sites, it is not the quantity of the obtained information that increases social attraction; rather, it is the valence of the obtained information that counts. Future research should therefore focus both on how much information is exchanged and on how positive and negative this information is.

4.2. Mediated hypotheses

We hypothesized that the information seekers' level of uncertainty would act as a mediator between the four independent variables (i.e., the three URS's and similarity) and the dependent variable social attraction. We found two mediated relationships. First, the level of uncertainty mediated the relationship between the interactive URS and social attraction, albeit only partly. The interactive URS also had a direct positive effect on social attraction. This is in line with earlier research, which demonstrated that interactive URS's – whether they are employed online or offline – lead to an increase in social attraction (Albada, Knapp, & Theune, 2002; Antheunis et al., 2007; Bargh et al., 2002; Collins & Miller, 1994; McKenna et al., 2002).

Second, we also found the hypothesized mediated relationship between similarity and social attraction. In line with our expectations, the level of uncertainty partially mediated between similar-

ity and social attraction. This mediating relationship was assumed by Berger and Calabrese (1975) in offline communication. To date, at least to our knowledge, only Parks and Adelman (1983), have demonstrated this mediating relationship, although only in offline and developed relationships. Our study is the first to find support for this relationship in online initial interactions.

4.3. Limitations

Although our study has shed some new light on CMC in general and CMC on social network sites in particular, we recognize that our study has some limitations. First, we used a cross-sectional rather than an experimental or a longitudinal design. Although we based all our hypotheses on earlier theories and research, which have established a clear causal direction for several of our relationships, our results cannot preclude the possibility of reversed causal relationships. However, fielding longitudinal studies is time consuming and expensive. Furthermore, the field of research on social network sites is still young and conducting longitudinal studies before establishing basic relationships seems very risky. Second, we used a convenience sample rather than a random sample. However, our sample proved to be an accurate representation of the population of Hyves in terms of age, gender and education. Although convenience samples are generally problematic for the estimation of univariate statistics and effect sizes, they are still usable to establish initial relationships between variables (Bogaert, 1996).

4.4. Implications and future research

Our study has important implications for the use of uncertainty reduction strategies in CMC. Most of these theories are still based on reduced cues perspectives and the assumption of dyadic communication. They assume that, due to a lack of auditory and visual cues, CMC partners are mainly forced to rely on interactive URS's. Our findings demonstrated that users of social network sites use all three types of URS's, most notably the interactive and passive URS's. Because recent CMC environments, such as social network sites, have more cues available, future research may pay more attention into the effects of cue-rich and open CMC environments on social attraction.

We also found that both passive and interactive URS's indirectly or directly predicted social attraction. Our finding that interactive URS's resulted in social attraction is in line with existing CMC theories, most notably Walther's (1996) Hyperpersonal Communication theory, which predicts that CMC stimulates self-disclosure and social attraction. Although existing theories were not yet able to apply their predictions to cue-richer and more open CMC environments, their propositions concerning the relationship between interactive URS's and social attraction seem still valid. Although, our finding that the passive URS's also directly influenced social attraction seems difficult to reconcile with any existing CMC theory, it does make sense. Contrary to other forms of CMC, on social network sites, people present a great deal of positive information about themselves, which observers may subsequently use to reduce uncertainty and form impressions. To theoretically explain this result, we may have to rely on offline interpersonal theories. Unfortunately, offline research on the differential effects of URS's on social attraction is too scarce to provide a bench-mark for our present study. Future research should elaborate on our findings by comparing the effects of cue-poor CMC, cue-rich CMC, and offline communication on social attraction.

References

- Affifi, W. A., & Burgoon, J. K. (2000). The impact of violations on uncertainty and the consequences for attractiveness. *Human Communication Research*, 26, 203–233.

- Affi, W. A., & Metts, S. (1998). Characteristics and consequences of expectation violation in close relationships. *Journal of Social and Personal Relationships*, 15, 365–392.
- Albada, K. F., Knapp, M. L., & Theune, K. E. (2002). Interaction appearance theory: Changing perceptions of physical attractiveness through social interaction. *Communication Theory*, 12, 8–40.
- Antheunis, M. L., Valkenburg, P. M., & Peter, J. (2007). Computer-mediated communication and interpersonal attraction: An experimental test of two explanatory hypotheses. *CyberPsychology and Behavior*, 10, 831–836.
- Bargh, J. A., McKenna, K. Y., & Fitzsimons, G. M. (2002). Can you see the real me? Activation and expression of the “true self” on the Internet. *Journal of Social Issues*, 58, 33–48.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Berger, C. R. (1979). Beyond initial interaction: Uncertainty, understanding, and the development of interpersonal relationships. In H. Giles & R. St. Clair (Eds.), *Language and social psychology* (pp. 122–144). Oxford: Basil Blackwell.
- Berger, C. R., & Calabrese, R. J. (1975). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research*, 1, 99–112.
- Berger, C. R., Gardner, R. R., Parks, M. R., Schulman, L., & Miller, G. R. (1976). Interpersonal epistemology and interpersonal communication. In G. R. Miller (Ed.), *Explorations in interpersonal communication* (pp. 149–171). Beverly Hills, CA: Sage.
- Berscheid, E., & Reis, H. T. (1998). Attraction and close relationships. In D. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 193–281). New York: McGraw-Hill.
- Bogaert, A. F. (1996). Volunteer bias in human sexuality research: Evidence for both sexuality and personality differences in males. *Archives of Sexual Behavior*, 25, 125–140.
- Boyd, D. M. (2004). Friendster and publicly articulated social networking. Paper presented at the Conference of Human Factors and Computing Systems, Vienna, Austria.
- Carey, J. (1980). Paralanguage in computer mediated communication. In N. K. Sondheim (Ed.), *The 18th annual meeting of the association for computational linguistics and parasession on topics in interactive discourse: Proceedings of the conference* (pp. 67–69). Philadelphia: University of Pennsylvania.
- Clatterbuck, G. W. (1979). Attributional confidence and uncertainty in initial interaction. *Human Communication Research*, 5, 147–157.
- Coleman, L. H., Paternite, C. E., & Sherman, R. C. (1999). A reexamination of deindividuation in synchronous computer-mediated communication. *Computers in Human Behavior*, 15, 51–65.
- Collins, N. L., & Miller, L. C. (1994). Self-disclosure and liking: A meta-analytic review. *Psychological Bulletin*, 116, 457–475.
- Comscore.com. (2007). *Social networking goes global: Major social networking sites substantially expanded their global visitor base during past year*. Available from <http://www.comscore.com/press/release.asp?press=1555>.
- Comscore.com (2009). *Social networking explodes worldwide as sites increase their focus on cultural relevance*. Available from http://www.comscore.com/Press_Events/Press_Releases/2008/08/Social_Networking_World_Wide/language/eng-US.
- Curtis, P. (1996). Mudding: Social phenomena in text-based virtual realities. In M. Stefik (Ed.), *Internet dreams: Archetypes, myths, and metaphors* (pp. 265–292). Cambridge, MA: MIT Press.
- Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organization design. *Research in Organizational Behavior*, 6, 191–233.
- Donath, J. S., & Boyd, D. (2004). Public displays of connection. *BT Technology Journal*, 22, 71–82.
- Douglas, W. (1990). Uncertainty, information-seeking, and liking during initial interaction. *Western Journal of Speech Communication*, 54, 66–81.
- Douglas, W. (1994). The acquaintanceship process: An examination of uncertainty, information seeking, and social attraction during initial conversation. *Communication Research*, 21, 154–176.
- Dwyer, C., Hiltz, S. R., & Passerini, K. (2007). Trust and privacy concern within social networking sites: A comparison of Facebook and MySpace. Paper presented at the thirteenth Americas conference on information systems, Keystone, CO, USA.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2006). Spatially bounded online social networks and social capital: The role of Facebook. Paper presented at the 56th annual conference of the international communication association, Dresden, Germany.
- Emmers, T. M., & Canary, D. D. (1996). The effect of uncertainty reducing strategies on young couples' relational repair and intimacy. *Communication Quarterly*, 44, 166–182.
- Gudykunst, W. B. (1985). The influence of cultural similarity, type of relationship, and self-monitoring on uncertainty reduction processes. *Communication Monographs*, 52, 203–218.
- Gudykunst, W. B., & Nishida, T. (1984). Individual and cultural influences on uncertainty reduction. *Communication Monographs*, 51, 23–36.
- Gudykunst, W. B., Yang, S.-M., & Nishida, T. (1985). A cross cultural test of uncertainty reduction theory: Comparisons of acquaintances, friends, and dating relationships in Japan, Korea, and the United States. *Human Communication Research*, 11, 407–454.
- Hu, Y., Wood, J. F., Smith, V., & Westbrook, N. (2004). Friendship through IM: Examining the relationship between Instant Messaging and intimacy. *Journal of Computer-Mediated Communication*, 10 [Article 6].
- Joinson, A. N. (2001). Self-disclosure in computer-mediated communication: The role of self-awareness and visual anonymity. *European Journal of Social Psychology*, 31, 177–192.
- Jourard, S. M. (1971). *Self-disclosure: An experimental analysis of the transparent self*. New York: Wiley.
- Kellermann, K., & Reynolds, R. (1990). When ignorance is bliss: The role of motivation to reduce uncertainty in uncertainty reduction theory. *Human Communication Research*, 17, 5–75.
- Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist*, 39, 1123–1134.
- Lampe, C., Ellison, N. B., & Steinfield, C. (2006). A Face(book): in the crowd: Social searching vs. social browsing. Paper presented at the 20th anniversary conference on computer supported cooperative work, Banff, AB, Canada.
- Lampe, C., Ellison, N. B., & Steinfield, C. (2007). A familiar Face(book): Profile elements as signals in an online social network. Paper presented at the conference on human factors in computing systems, San Jose, CA, USA.
- 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). Beverly Hills, CA: Sage.
- McCroskey, J. C., & McCain, T. A. (1974). The measurement of interpersonal attraction. *Speech Monographs*, 41, 261–266.
- McCroskey, J. C., Richmond, V. P., & Daly, J. A. (1975). The development of a measure of perceived homophily in interpersonal communication. *Human Communication Research*, 1, 323–332.
- McKenna, K. Y., Green, A. S., & Gleason, M. E. (2002). Relationship formation on the internet: What's the big attraction? *Journal of Social Issues*, 58, 9–31.
- Miller, L. C., Berg, J. H., & Archer, R. L. (1983). Openers: Individuals who elicit intimate self-disclosure. *Journal of Personality and Social Psychology*, 44, 1234–1244.
- Neuliep, J. W., & Grohskopf, E. L. (2000). Uncertainty reduction and communication satisfaction during initial interaction: An initial test and replication of a new axiom. *Communication Reports*, 13(2), 67–77.
- Newcomb, T. (1961). *The acquaintance process*. New York: Holt, Rinehart and Winston.
- Parks, M. R. (1978). Perceived sex differences in friendship development. Paper presented at the annual convention of the speech communication association, Minneapolis, MN, USA.
- Parks, M. R., & Adelman, M. B. (1983). Communication networks and the development of romantic relationships: An explanation of uncertainty reduction theory. *Human Communication Research*, 10, 55–79.
- Parks, M. R., & Floyd, K. (1996). Making friends in cyberspace. *Journal of Communication*, 46, 80–97.
- Pratto, F., & John, O. P. (1991). Automatic vigilance: The attention-grabbing power of negative social information. *Journal of Personality and Social Psychology*, 61, 380–391.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36, 717–731.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42, 185–228.
- Prisbell, M., & Andersen, J. F. (1980). The importance of perceived homophily, level of uncertainty, feeling good, safety, and self-disclosure in interpersonal relationships. *Communication Quarterly*, 28, 22–33.
- Ramirez, A., & Burgoon, J. K. (2004). The effect of interactivity on initial interactions: The influence of information valence and modality and information richness on computer-mediated communication. *Communication Monographs*, 71, 422–447.
- Ramirez, A., Walther, J. B., Burgoon, J. K., & Sunnafrank, M. (2002). Information-seeking strategies, uncertainty and computer-mediated communication: Toward a conceptual model. *Human Communication Research*, 28, 213–228.
- Reis, H. T., & Shaver, P. (1988). Intimacy as an interpersonal process. In S. Duck (Ed.), *Handbook of personal relationships* (pp. 367–390). New York: Wiley.
- Resnick, P., Zeckhauser, R., Swanson, J., & Lockwood, K. (2006). The value of reputation on eBay: A controlled experiment. *Experimental Economics*, 9(2), 79–101.
- Scheidel, T. M. (1977). Evidence varies with phases of inquiry. *Western Journal of Speech Communication*, 41, 20–31.
- Srull, T. K., & Wyer, R. S. (1989). Person memory and judgment. *Psychological Review*, 96, 58–83.
- Sunnafrank, M. (1986). Predicted outcome value during initial interactions: A reformulation of uncertainty reduction theory. *Human Communication Research*, 13(1), 3–33.
- Sunnafrank, M. (1990). Predicted outcome value and uncertainty reduction theories. A test of competing perspectives. *Human Communication Research*, 17(1), 76–103.
- Tidwell, L. C., & Walther, J. B. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research*, 28, 317–348.

- Tong, S., 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.
- Utz, S. (2000). Social information processing in MUDs: The development of friendships in virtual worlds. *Journal of Online Behavior*, 1, 1. <<http://www.behavior.net/JOB/v1n1/utz.html>> Retrieved 20.09.07.
- VanLear, A. C., & Trujillo, N. (1986). On becoming acquainted: A longitudinal study of social judgement processes. *Journal of Social and Personal Relationships*, 3, 375–392.
- Walther, J. B. (1992). Interpersonal effects in computer-mediated communication: A relational perspective. *Communication Research*, 19, 52–90.
- Walther, J. B. (1996). Computer-mediated communication: impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23, 3–43.
- Walther, J. B., & D'Addario, K. P. (2001). The impact of emoticons on message interpretation in computer-mediated communication. *Social Science Computer Review*, 19, 324–347.
- Walther, J. B., & Tidwell, L. C. (1995). Nonverbal cues in computer-mediated communication, and the effect of chronemics on relational communication. *Journal of Organizational Computing*, 5, 355–378.
- Walther, J. B., Van Der Heide, B., Kim, S.-Y., Westerman, D., & Tong, S. (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.