

Full Length Research Paper

Preliminary validity data on a new matching tool to combat hyperpersonal communication in online dating

James Houran and Rense Lange

Integrated Knowledge Systems, Inc. 2561 Hall Johnson Rd, #1217, Grapevine, TX 76051, USA.

Accepted 8 February, 2010

Singles often use compatibility tests of unknown validity to minimize the limitations of hyperpersonal communication inherent to online interactions. Thus, we conducted an online study to test a new matching system called MatchMatrix, which operates as an oracle in predicting friendship and lovers compatibility based on an analysis of birth dates. Indices positively correlated with scores on the Relationship Success Scale for unions of less than two years (N = 41), but patterns were essentially reversed for relationships of two years or more (N = 48). Additional research is needed to confirm the underlying theory behind the oracle and whether relationship accommodation is a parsimonious explanation for the disparate results.

Key words: Hyperpersonal communication, social networking, online dating, compatibility testing, social media.

INTRODUCTION

Cyberspace has been called the new "third place," because this forum represents the latest in a group of settings that are psychologically and physically apart from home and work (Oldenberg, 1991 and 1999). These places are the core settings for informal public life – places where people relax and network like coffee shops, bars, hair salons, beer gardens, pool halls and civic clubs. Researchers (Oldenberg, 1991 and 1999; Putnam, 2000) argue that capitalist society has eroded traditional third places; therefore, many people seeking human interaction flock to online communities, such as chat rooms, discussion forums, online dating and social networking websites.

Extended communication on the internet provides an ideal forum to form relationships with others. However, research has only recently begun to address the topic of relationship development in cyberspace (Bonebrake, 2002; Wolak Mitchell, and Finkelhor, 2003), in other words, how this forum influences individual communication across various interpersonal contexts. For example, some people have substantially inaccurate perceptions of other people's personalities when communicating via the internet (Rouse and Haas, 2003).

Furthermore, internet socialization may promote certain individuals to develop "fantasy identities," such as older men posing as younger men or women and married people posing as eligible singles. Notwithstanding caveats like these, Hardey (2002 and 2004) found that, the disembodied anonymity that characterizes the internet can act as a foundation for the building of trust and the establishment of real world relationships. Other experts have come to similar conclusions. In a clever series of experiments, McKenna and colleagues (McKenna, Green and Gleason, 2002) showed that individuals meeting for the first time online are more likely to reveal their "true selves" (who they really think they are) rather than their "actual selves" (how they think they should be seen). In addition, people tend to like each other more when they first meet over the internet, as opposed to face-to-face.

Finally, by researching actual web users, McKenna's team found that deep relationships can form over the internet. When those online relationships are integrated into one's real world social life, they remain stable over time - indeed, often proving more long-lived than relationships formed through traditional, face-to-face introductions (Baker, 2002).

The nature of online relationships varies (Kiesler and Kraut, 1999), but online flirting and dating constitute an important aspect of the internet phenomenon (Ahuvia and Adelman, 1992; Whitty, 2003). Despite the fact that,

*Corresponding Author. E-mail: Jim_houran@yahoo.com, Tel: (817) 542.7602.

individuals tend to develop trust with others rather quickly online (Whitty and Gavin, 2001), it must be cautioned that, online contact continues to be predominantly hyperpersonal in nature. Hyperpersonal communication refers to the unique characteristics of online interactions and communications (Walther, 1996). The work of cyber psychologists like McKenna et al. (2002) and Walther (1996), among others, indeed suggests that online interactions are fundamentally different from other forms of interpersonal or mass communications. In particular, individuals in chat-rooms and newsgroups have much less information about other participants (verbal and nonverbal cues) with which they might make attributions or form impressions of others. Instead, internet users are forced to rely on broad assumptions in order to make inferences about others, and they then inflate these perceptions of the other based on the restricted cues that are available (Walther, 1996).

For example, in a chat room, the only information one has available about a conversational partner is information that, the partner chooses to make available, such as a "screen name" that may or may not be a useful cue or personal information that an internet-user chooses to disclose and that may either be truthful or intentionally deceiving.

Combating hyperpersonal communication with compatibility testing

Online daters are notable examples of hyperpersonal communicators. That said the "tools" of online dating like personal profiles, digital photographs, webcams and real-time chat capabilities are used to foster interpersonal engagement and to help overcome the restricted cues in online impression formation. One of the most highly publicized applications for combating hyperpersonal communication is compatibility testing. Compatibility testing typically refers to a method of pairing unfamiliar people for long-term, romantic relationships based on the demographics, stated personal preferences and personality profiling of individuals within a candidate pool. In addition to a list of recommended "matches," a user also often receives a compatibility report that presents psychological information for self-awareness and guidance for connecting interpersonally with a romantic prospect. Simply stated, compatibility testing ideally helps two individuals get to know and communicate with each other on a deeper level than what they can achieve through traditional communication media. This type of testing is somehow different, and arguably more difficult, than clinical programs that assess existing couples on the critical tasks related to early marital adjustment (Fowers and Olson, 1986). Unfortunately, with some exceptions, online dating sites' sensationalized claims of scientifically-based or psychometrically valid matchmaking are rarely backed by research (Houran,

2004, 2009; Houran and Lange, et al., 2004; King, et al., 2009). Finn and Banach (2000) similarly noted the difficulties of ascertaining the credentials and identity of service providers, accessing accurate information, reliance on untested methods, difficulties in online assessment and the lack of standards and regulation regarding online human service practices.

It should not be surprising that online daters themselves even question the veracity and usefulness of compatibility testing (Houran and Lange, 2004b). Accordingly, our research program has actively studied a wide variety of compatibility systems in order to determine their consistency with the marketing claims of their respective dating sites.

Further, examinations of the efficacy of such systems have the potential to produce important refinements to models of online impression formation and relationship building. Ideally, these efforts will also inform the broader issue of the complex psychophysiological processes involved in human love and attachment.

The present study

Testing a new approach to online matchmaking

The major theories of love all conceptualize compatibility in terms of the interplay of at least two types of love: Erotic Love - love closely associated with sexual desire for a partner; and Companionate Love - which represents friendship-type platonic love towards a partner (Masuda, 2003). Typically, such constructs are measured and tested by administering one or more standardized questionnaires to members of romantic couples or control individuals. In this report we apply an alternative formulation to the prediction of romantic compatibility as is provided by the MatchMatrix company (www.MatchMatrix.com). This process does not rely on individuals' or couples' questionnaire answers, but rather compares a couples' two birth dates to generate two indices pertaining to the potential of the couple's particular relationship: a Friendship index and a Lovers index. By way of explanation, MatchMatrix is a company that provides compatibility matching services to organizations such as for human resource applications or online dating. It models satisfaction and longevity in platonic and romantic relationships as the function of "energetic compatibility." The energetic pattern defined by MatchMatrix parallels the notion of a bioelectromagnetic field. In particular, Eastern philosophy and medicine has long talked about a Qi or chi energy within human physiology, and studies in psychophysiology and biology provide empirical support for such an energy that interacts with the physical environment and the energy system of other living organisms. That pattern is reportedly fixed at birth and is synonymous with being identified as a human being. The

company claims that how two patterns merge and share similarities determines the quality of platonic or romantic relationships. This idea was proposed thirty years ago when the system's developer Dick Nelson reportedly discovered that, he could identify specific characteristics that consistently showed up when two patterns were merged in a relationship.

MatchMatrix insists that its matching method is not numerology, astrology, biorhythms or traditional personality testing. The idea of "energetic compatibility" is controversial from the perspective of mainstream social science, yet discussion of similar ideas can be found in literature grounded in transpersonal psychology and eastern based religious traditions. Interested readers might consult, for instance, the journal *subtle energies and energy medicine* for recent empirical work in this area. The exact mathematical algorithm used by MatchMatrix to compare two birth dates is proprietary and was not available for review. Therefore, we cannot describe their approach in sufficient detail for others to replicate its predictions. Accordingly, we explicitly treated the MatchMatrix method as an oracle, that is, its predictions are treated as coming from a black box about which nothing else is known other than its inputs (two birth dates) and outputs (the two compatibility indices).

The present study tested the efficacy of the MatchMatrix oracle via an online survey of individuals. The goal was not to investigate the theoretical foundation of the system, but rather to determine whether the oracle produced accurate results, thereby providing justification for continued research into the ideas espoused by MatchMatrix. Strong and positive correlations between an individual's self-reported quality of a romantic relationship and the predictions of the quality of that relationship provided by the MatchMatrix friendship and lovers indices would provide preliminary evidence consistent with the premise that the MatchMatrix method has a degree of validity. The design of the study was approved in advance by the principals of MatchMatrix. However, all data gathering, analyses and interpretations were performed by the authors of this report only.

METHODS AND PROCEDURE

Respondents were solicited via snowball sampling and "open-invitation" methods. Snowball sampling is a recruitment technique whereby existing respondents to a questionnaire help recruit future respondents. An "open-ended" invitation refers to a public invitation to participate in a study that is e-mailed or posted across the internet using a combination of press releases, distribution lists and postings on websites and chat rooms. For our purposes, as an example, we identified a list of websites and associations that catered to people seeking information on finding or sustaining romantic relationships, such as *onlinedatingmagazine.com*, *Happyfornoreason.com* and *Coffeytalk.com*. Limitations in generalizability exist with any sampling method, but we agree with other experts (Gosling, et al., 2004; Naglieri, et al., 2004; Skitka and Sargis, 2005 and 2006) that, the Internet is a powerful tool with which to investigate psychological constructs efficiently using large

samples of individuals other than the typical self-selected samples of university students who take introductory psychology courses. The final sample ($M_{age} = 50.6$ years, $SD = 5.5$, $range = 37 - 60$ years.) was heavily skewed, with 78 women and only 11 men. In this sample, 48 individuals were in a committed relationship without marriage, 31 were married and 10 were classified as "Other" which denotes short-term or long-term dating partners who have not necessarily lived together.

Respondents completed a set of demographic questions and the 42 -item Relationship Success Scales (Lange and Houran, Submitted). This instrument is a well-validated, Rasch-scaled questionnaire that asks about an individual's experience or perception across aspects of eight relationship issues, as listed here with sample items: 1. Activity Level ("Differences in our activity levels often cause conflicts in our relationship"); 2. Communication ("My partner often "talks down to me"); 3. Energy Drain (I am energized being with my partner"); 4). Friendships ("I know my partner's friends"); 5. Global Satisfaction ("My partner is the right person for me"); 6. Humor ("My partner and I can banter back and forth until we are both laughing hysterically"); 7. Misunderstandings ("I often find myself snapping back in response to my partner"); and 8. Sex ("I'm satisfied with the quality of sex with my partner").

These eight issues are not independent factors or subscales. Instead, they form a single Rasch factor (Rasch 1960 and 980), which can be characterized informally as a probabilistic version of a Guttman scale (Bond and Fox, 2007). In particular, fitting Andrich's (1978), Rasch rating scale model using the versatile Winsteps scaling software (Linacre, 2006), indicated that the internal Rasch reliability of the Relationship Success Scale is 0.93. Thus, the items defining the eight issues form a probabilistic hierarchy of relationship compatibility, or satisfaction. This finding replicates previous research (Houran, Lange, et al., 2005; Lange, Jerabek, and Houran, 2004; Busby, et al., 1995), showing relationship compatibility is a hierarchical construct that can be measured at an interval level. Moreover, in strong support of both construct and convergent validities, the items of the Relationship Success Scale form a robust statistical Rasch (1960 and 1980) measure with many of the items from the major relationship questionnaires used today for clinical and research work¹.

Accordingly, the eight relationship issues measured by the Relationship Success Scale are part of a broader continuum that also subsumes the traditional concepts of erotic love, companionate love and global measures of relationship satisfaction. Higher scores

¹ Love Attitude Scale (Hendrick and Hendrick, 1986);

Marital Adjustment Test (Locke and Wallace, 1959);

Passionate Love Scale (Hatfield and Sprecher, 1986);

Relationship Rating Form (Davis and Todd, 1985);

Revised Dyadic Adjustment Scale (Busby, Christensen, et al., 1995); Rubin Love and Liking Scales (Rubin,

1970); Sound Relationship House Questionnaire

(Gottman, 1999); and Sternberg's Triangular Theory of

Love Scale (Sternberg, 1997).

on the Relationship Success Scale therefore correspond to higher

scores on these other facets of stable and satisfying relationships that are not necessarily measured directly by the Relationship Success Scale.

RESULTS AND DISCUSSION

Expectations were partially confirmed. Using the entire sample ($N = 89$), scores on the Relationship Success Scale showed correlations of 0.160 with the MatchMatrix friendship rating and a correlation of 0.158 with the MatchMatrix lovers rating. Both coefficients were in the predicted direction, but due to their low magnitudes they were not statistically significant ($p > .10$) from zero.

This prompted us to examine the influence of length of relationship on the main findings, given that the variable of accommodation may have influenced the results.

Accommodation involves attitudinal or behavioral adaptations that each partner in a couple makes over time as the couple acclimates to the demands and needs of the other, as well as to the priorities dictated by a committed relationship. It is assumed that accommodation occurs over time, and thus, accommodation is likely exhibited most by couples who have been together for relatively longer periods of time versus couples who are in the “newlywed” stage. Data were insufficient in variance to conduct analyses on gender. Table 1 suggests that, the variable of length of relationship is an intervening variable that over time changes the relation between the Relationship Success Scale and the MatchMatrix indices from positive to negative. That is, positive and moderately strong associations were found for relationships of less than two years, which we termed “newly formed relationships.” However, negative correlations of low magnitude and non-significance were found for relationships of two years or more. It is also worth mentioning that we consistently found that the MatchMatrix friendship index was more strongly associated with Relationship Success Scale scores than with the lover’s index.

These correlations represent a basic evaluation of the predictions made by the MatchMatrix friendship and lovers indices; we did not test more detailed predictions of the MatchMatrix oracle that involved “true and false attractions” and personality modifiers that are part of a relationship report provided by the service (www.MatchMatrix.com). Thus, the results found here could change once additional quantitative and qualitative aspects of the MatchMatrix oracle which are tested in a comprehensive and well-controlled manner using sufficient and ideally randomly selected samples of individual men and women, as well as sets of verifiable couples.

These caveats, notwithstanding, the initial results suggest that the MatchMatrix friendship and lovers indices predict something systematic and meaningful with respect to the quality of romantic relationships as measured by Lange and Houran’s (Submitted).

Relationship Success Scale. The results summarized above lend preliminary empirical support for aspects of the MatchMatrix oracle, especially the friendship index which showed consistently stronger effects than the lover’s Index. There is an apparent discrepancy in that, the MatchMatrix indices applied to the current sample worked as hypothesized for newly-formed relationships, but not for more mature relationships. The MatchMatrix method might only be valid for assessing new relationships, or it could be that, mature relationships have significant nuances that are not predicted well without taking into account all the dynamic components of the MatchMatrix oracle not under consideration here. Another explanation that should be studied in future research pertains to the role of accommodation in potentially masking symptoms of an unsatisfying or incompatible relationship. Expanding on our earlier comments on the subject, high levels of relationship satisfaction can involve positive distortions (Fowers and Olson, 1993), or what Edmonds (1967) viewed as social desirability bias in relationship quality. This tendency to describe a marital or committed relationship in unrealistically positive terms is called marital conventionalization. It strongly resembles psychological constructs such as positive illusions (Taylor and Brown, 1988) and unrealistic optimism (Scheier and Carver, 1992), which have been shown to involve information-processing biases. Thus, the assessment or appraisal of one’s partner and the quality of marriage are similar to mathematical models of self-fulfilling prophecies (Houran and Lange, 2004a). Indeed previous work (Levinger, 1986; Neff and Karney, 2003) suggests that global relationship satisfaction derives from the tendency to view positive perceptions as more important than negative perceptions, as well as the tendency to alter the importance of specific perceptions as needed.

With respect to the present findings, individuals within a long-established relationship may not easily admit to (or be sensitive to) the negative aspects in a relationship given the psychological or economic investment the person has in the union. Therefore, signs of dissatisfaction could be masked or dismissed via accommodation. If accommodation increases with longevity, the length of relationship might be a serious confounding variable that yields mixed results for couples of long-standing. Clearly more research is required to understand what influence, if any, such potential biases may be in measuring relationship quality, especially with online data collection methods.

We submit the present results offer sufficiently compelling elements to justify further research into the MatchMatrix oracle, especially studies that examine more detailed predictions concerning all aspects of this controversial matching method. We caution, however, that the present results do not necessarily speak to the validity of MatchMatrix’s notion of “energetic compatibility.” There was statistical corroboration for some of the

Table 1. Pearson product moment correlations between scores on the Relationship Success Scale and MatchMatrix indices in newly-formed (less than 2 years, N = 41) vs. mature (2 years or more, n = 48) relationships.

	MatchMatrix - friendship index (newly-formed relationship)	MatchMatrix - lovers index (newly-formed relationship)	MatchMatrix - friendship index (mature relationship)	MatchMatrix - lovers index (mature relationship)
Relationship Success Scale	0.523**	0.427*	-0.276	-0.169

Note: *p < .05, **p < .01.

predictions made by the oracle, but other explanations are possible. For example, it might be that, certain age differences in a couple tend to increase or decrease overall relationship quality, nor can we rule out that, the MatchMatrix oracle simply capitalizes on chance in some unknown way at present. Therefore, future work on the MatchMatrix system is needed and should contribute new insights to the growing literature on love and attachment, as well as how the medium of the internet and applications like compatibility matching systems impact human communication.

The realm of compatibility testing, regardless of a specific form or theoretical basis, is arguably still in its infancy (Houran, 2004 and 2009; Houran, et al., 2004). Researchers and social media companies should therefore work together to ensure that these types of communication tools are scientifically valid and safe for public use, as well as effective for overcoming many of the limitations of online impression formation.

This preliminary study is an illustrative case study that, such collaborations are possible, and we encourage media and communication researchers to take notice of the important topic of tools, like compatibility testing, that strive to reduce the limitations of Walther's (1996) notion of hyperpersonal communication. This is a field ripe for future study from a variety of academic perspectives.

ACKNOWLEDGMENTS

We thank Dave Evans of online dating insider (www.onlinedatingpost.com) for introducing us to this new compatibility testing service and extend appreciation to Frank Seifert and Larry Michel of MatchMatrix for their support and participation in this preliminary research.

REFERENCES

Ahuvia AC, Adelman MB (1992). Formal intermediaries in the marriage market: A typology and review. *J. Marriage Fam.* 54: 452-463.
 Andrich D (1978). A rating formulation for ordered response categories. *Psychometrika.* 43: 357-74.
 Baker A (2002). What makes an online relationship successful? Clues from couples who met in cyberspace. *Cyberpsychol. Behav.* 5: 363-375.

Bond TG, Fox CM (2007). Applying the Rasch Model: Fundamental measurement in the human sciences. 2nd Edn (includes Rasch software on CD-ROM). Lawrence Erlbaum.
 Bonebrake K (2002). College students' Internet use, relationship formation, and personality correlates. *Cyberpsychol. Behav.* 5: 551-557.
 Busby DM, Christensen C CDR, Larson JH (1995). A revision of the Dyadic Adjustment Scale for use with distressed and nondistressed couples: Construct hierarchy and multidimensional scales. *J. Marital Fam. Ther.* 21: 289-308.
 Edmonds VH (1967). Marital conventionalization: Definition and measurement. *J. Marriage Fam.* 29: 681-688.
 Fehr B (1988). Prototype analysis of the concepts of love and commitment. *J. Pers. Soc. Psychol.* 55: 557-579.
 Fehr B, Russell JA (1991). Concept of love viewed from a prototype perspective. *J. Pers. Soc. Psychol.* 60: 425-438.
 Finn J, Banach M (2000). Victimization online: The down side of seeking human services for women on the Internet. *Cyberpsychol. Behav.* 3: 243-254.
 Fowers BJ, Olson DH (1993). ENRICH marital satisfaction scale: A brief research and clinical tool. *J. Fam. Psychol.* 7: 176-185.
 Gosling SD, Vazire S, Srivastava S, John OP (2004). Should we trust web-based studies? a comparative analysis of six preconceptions about internet questionnaires. *Am. Psychol.* 59: 93-104.
 Gottman J (1999). *The marriage clinic*. New York: W.W. Norton.
 Hardey M (2002). Life beyond the screen: embodiment and identity through the Internet. *Sociol. Rev.* 50: 570-585.
 Hardey M (2004). Mediated relationships. *Inf. Commun. Society.* 7: 207-222.
 Hatfield E, Sprecher S (1986). Measuring passionate love in intimate relations. *J. Adolesc.* 9: 383-410.
 Hendrick C, Hendrick S (1986). A theory and method of love. *J. Pers. Soc. Psychol.* 50: 392-402.
 Houran J (2004). Ethics in cross-cultural compatibility testing in Europe: an opportunity for industry growth. Paper presented at the Internet Dating / Online Social Networking Industry Association Inaugural Meeting, Nice, France.
 Houran J (2009). Science friction: compatibility testing present and future. Paper presented at the Internet Dating / Online Social Networking Industry Association Meeting, Los Beverly Hills, California.
 Houran J, Lange R (2004a) Redefining delusion based on studies of subjective paranormal ideation. *Psychol. Rep.* 94: 501-513.
 Houran J, Lange R (2004b). Expectations of finding a 'soul mate' with online dating. *North Am. J. Psychol.* 6: 297-308.
 Houran J, Lange R, Rentfrow PJ, Bruckner KH (2004). Do online matchmaking tests work? An assessment of preliminary evidence for a publicized 'predictive model of marital success.' *North Am. J. Psychol.* 6: 507-526.
 Houran J, Lange R, Wilson G, Cousins J (2005). Redefining compatibility: Gender differences in the building blocks of relationship satisfaction. Poster presented at the 17th Annual Convention of the American Psychological Society, Los Angeles, CA.
 Kiesler S, Kraut R (1999). Internet use and ties that bind. *Am. Psychol.* 54: 783-784.

- King A, Austin-Oden D, Lohr JM (2009). Browsing for love in all the wrong places? *Skeptic Mag.* 15: 48-55.
- Lange R, Jerabek I, Houran J (2004). Building blocks for satisfaction in long-term romantic relationships: Evidence for the complementarity hypothesis of romantic compatibility. Annual meeting of the AERA (Adult Development Symposium Society for Research in Adult Development). San Diego, California.
- Levinger G (1986). Compatibility in relationships. *Soc. Sci.* 71: 173-177.
- Linacre JM (2006). *WINSTEPS* Rasch measurement computer program. Chicago, IL: Winsteps.com.
- Locke HJ, Wallace KM (1959). Short marital adjustment and prediction tests: Their reliability and validity. *Marriage Fam. Living.* 2: 251-255.
- Masuda M (2003). Meta-analysis of love scales: Do various love scales measure the same psychological constructs? *Japanese Psychol. Res.* 45: 25-37.
- McKenna KYA, Green AS, Gleason MEJ (2002). Relationship formation on the Internet: What's the big attraction? *J. Soc. Issues.* 58: 9-32.
- Naglieri JA, Drasgow F, Schmit M, Handler L, Prifitera A, Margolis A, Velasquez R (2004). Psychological testing on the Internet: New problems, old issues. *Am. Psychol.* 59: 150-162.
- Neff LA, Karney BR (2003). The dynamic structure of relationship perceptions: Differential importance as a strategy of relationship maintenance. *Pers. Soc. Psychol. Bull.* 29: 1433-1446.
- Oldenburg R (1991/1999). *The great good place*. New York: Marlowe and Co.
- Putnam RD (2000). *Bowling alone: the collapse and revival of American community*. New York: Simon and Schuster.
- Rasch G (1960/1980). *Probabilistic models for some intelligence and attainment tests*. Chicago, IL: MESA Press.
- Rouse SV, Haas HA (2003). Exploring the accuracies and inaccuracies of personality perception following Internet-mediated communication. *J. Res. Pers.* 37: 446-467.
- Rubin Z (1970). Measurement of Romantic Love. *J. Pers. Soc. Psychol.* 16: 265-273.
- Scheier, M. F., and Carver, C. S. (1992). Effects of optimism on psychological and physical well being: Theoretical overview and empirical update. *Cogn. Ther. Res.* 16: 201-228.
- Skitka LJ, Sargis EG (2005). Social psychological research and the Internet: the promise and the perils of a new methodological frontier. In Amichai-Hamburger Y (Ed.), *The social net: the social psychology of the internet*. Oxford, England: Oxford University Press. pp. 1-25.
- Skitka LJ, Sargis EG (2006). The Internet as psychological laboratory. *Annual Rev. Psychol.* 57: 529-555.
- Sternberg RJ (1997). Construct validation of a triangular love scale. *Eur. J. Soc. Psychol.* 27: 313-335.
- Taylor SE, Brown JD (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychol. Bull.* 103: 193-210.
- Walther JB (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Commun. Res.* 23: 3-43.
- Whitty M, Gavin J (2001). Age/sex/location: Uncovering the social cues in the development of online relationships. *CyberPsychol. Behav.* 4: 623 – 630.
- Whitty MT (2003). Cyber-flirting: Playing at love on the Internet. *Theory Psychol.* 13: 339-357.
- Wolak J, Mitchell KJ, Finkelhor D (2003). Escaping or connecting? Characteristics of youth who form close online relationships. *J. Adolesc.* 26: 105-119.