Personalized Design of Online Communities: Increasing Contribution by Targeting Perceived Social Presence

Research-in-Progress

Seyma Guven Kocak
University of Georgia
seyma@uga.edu

Abstract
The ultimate goal of this research is to develop personalized user interfaces that increase users’ contributions to online communities. As one of the most important concepts in online community studies, perceived social presence is known to increase contributions. Extraversion and vividness, two major design concepts, increase perceived social presence in the online environment. However, perceptions and effects of design differ among people. This current research aims to analyze the differences in perceived social presence among personality traits. Moreover, the effect of personality on the relationship between design and perceived social presence is examined. A website with interactive and vivid design was developed and data will be collected through online questionnaires. In this way, the current research aims to make a contribution in online community design research by examining the appropriate design for different personality traits.

Keywords
Personalized User Interface, Online Communities, Social Presence, Interactivity, Vividness, Personality Traits, User Interface Design

Introduction
An “online community” is defined as a social network of a group of individuals who share common interests, goals, sets of beliefs, values, and experiences of common practice, communicating through the computer-mediated communication technology (Barab et al. 2003; Wellman 1997; Lazar and Preece 2002). The change in communities became significant after the 1990s, when the Web began to be used extensively (Preece and Maloney-Krichmar 2003). While earlier, the online communities were defined by comparing them to face-to-face communication, more recently they became more developed and capable of doing everything that people do in face-to-face communication (Preece and Maloney-Krichmar 2003; Rheingold 1994). In the late 1990s, the success of the Web and less expensive computing power widened the use of online communities among people (Preece and Maloney-Krichmar 2003). It attracted many researchers from different disciplines such as human-computer interaction (HCI), psychology, sociology, information systems and communication studies (Preece and Maloney-Krichmar 2003), and became a very important phenomenon in areas such as education, social support, business, and informal knowledge exchange among people in professional practices (Preece 2001; Cothrel 2000; Wenger et al. 2002; Hew 2006).

Despite the popularity of online communities, most of them fail since only a small minority of members make contributions. In previous research, it has been found that 50% of social, hobby and work mailing lists had no traffic over a 4-month period (Butler 1999). Even if a community can survive, under-contribution is still a problem (Butler 1999). A successful online community does not need everybody to contribute (Nonnecke and Preece 2000), but large number of members with a very small number of contributors may create a problem for the community to provide the necessary services (Ling et al. 2005).
In this research, my motivation is to contribute to the research that seeks a solution to the under-contribution problem of online communities. From previous studies, I have concluded that the more people feel social presence, the more they contribute. In many of the websites, interactive and vivid designs are used to induce increased social presence, and thus increased contributions. However, these designs may not affect everybody in the same way. Understanding the differences in design perceptions helps create personalized user interfaces. By creating personalized user interfaces, websites can target the maximum amount of contribution from each user. Therefore, in this study, I aim to analyze the effect of personality traits on the relationship between website design (interactive and vivid) and perceived social presence. My research question is as follows:

In order to increase users' contributions in online communities, how the website design can be tailored to the personality traits of users?

In this current study, drawing upon the existing literature, I aim to make a contribution to research of online community design by questioning the large assumption of the universal usefulness of interactivity and vividness. Moreover, I aim to understand how important personality traits are in determining people's perception of social presence in an online environment. There will also be managerial implications of this study. Companies or online community managers will be able to customize the user interface according to personality traits of their users. In this way, I argue that they can increase the contribution of each user. They can offer a “customize your design” option in the website, and include a ten-item personality questionnaire there. Also, they can invite users to participate in a short survey which aims to improve customer service.

Theory and Background

Personalized online community design

Each individual contributes to online communities in a different way, such that some people contribute more in specific online communities while some people prefer other online communities. As the difference between people’s amounts of contributions or ways of contributions is realized, audience-specific design has become an important phenomenon (Andrews 2002). Personalized design, which refers to the online community design that includes features targeting audience-specific characteristics, has been studied in recent research which reveals that the design of an online community and the strategies for increasing people’s contribution might dramatically differ among age characteristics, attitudes, beliefs and behaviors toward the Internet (Andrews 2002). Personal differences such as computer self-efficacy, computer anxiety and resistance to change are found to be the effective factors affecting the perceived ease of use of digital libraries (Nov and Ye 2008). In the case of Flickr photos, tagging was found to be related to personality factors such as self-motivation, public motivation, family motivation and the network of the person (Nov et al. 2008). The research on personalized recommendations for product configuration shows the effectiveness of personalization on user satisfaction and the quality of the process (Felfernig et al. 2010). Similar research reveals the increase in traffic to the Google News website when a personalized news recommendation system is used (Liu et al. 2010).

Beyond some previous studies on personalized user interface which have mentioned, personality traits were also analyzed as an effective factor in people's online community behavior (Nov and Arazy 2013). According to a study, it was found that the Myers-Briggs Type Indicator (MBTI) preference affects people's behavior in different software programs (Ludford and Terveen 2003). Another important study showed that people's characteristics, defined according to Big-Five personality traits, shape their social media usage (Correa et al. 2010).

As seen from previous research, the personalized user interface has become a very effective tool in the online world. It is found to be useful in increasing user contribution, ease of use and website traffic. Although many user characteristics such as age, motivation, and self-efficacy have been studied, I still know little about the personality traits and their effects on design perception. As personality traits are fundamental user attributes (Nov and Arazy 2013), it is important to understand their role in online community design. Therefore, I aim to investigate the relationship between website design and the feeling of social presence for different personality traits.
Social Presence Theory

Short et al. (1976), developers of social presence theory, defined “social presence” as the “degree of salience of the other person in the interaction and the consequent salient of the interpersonal relationships”. Being defined as a subjective quality of the communication medium, social presence is an important phenomenon in person-to-person communication since it affects the interaction. Social presence has subjective rather than objective qualities since the perception of a person affects his/her interaction and behavior, not the objective measurement of the social presence in the medium (Short et al. 1976). In research on effective system design, social presence theory is found to be a major design principle in telecommunications systems and a core concept in computer-mediated communication studies (Biocca et al. 1995).

Existing research includes the variables which affect the degree of social presence perception in the environment, such as media capabilities, user awareness and understanding of these capabilities (Short et al. 1976), social technology cues, media capabilities and individual differences (Dennis et al. 2008; Lee and Nass 2005; Rice 1993), as well as recommendation agent extraversion, vividness and computer playfulness (Hess et al. 2009).

Personality Traits

Individual differences are known as one of the variables affecting the degree of social presence in an online community (Rice 1993). The decision-making process of individuals is affected by their personality type (Thatcher and DeCour 2003).

The Big-Five Personality Traits are determined as Extroversion (some defining characteristics: active, talkative, enthusiastic, rapid personal tempo, gregariousness), Agreeableness (some defining characteristics: appreciative, generous, trusting, compliance, altruism, not critical), Conscientiousness (some defining characteristics: organized, reliable, responsible, productive, dutifulness, self-discipline), Neuroticism (some defining characteristics: anxious, unstable, tense, ego defenses, hostility, depression) and Openness (some defining characteristics: curious, insightful, unusual thought processes, imaginations, emotions, actions, ideas, values) (McCrae et al. 1992).

Vividness and Interactivity

As one of the determinants of social presence, technological features are conceptualized into two constructs, vividness and interactivity. Most studies accept this conceptualization (Steuer 1992). Vividness and interactivity are the constructs related to online community design. As analyzed in previous research, interactivity and vividness have positive effects on social presence in the online environment. This relationship between vividness–social presence and interactivity–social presence will be analyzed by adding a moderator: user's personality. Since people's decisions and feelings are affected by their personality types, the design of the environment is expected to have different effects on individuals. Therefore in this research, the effects of vividness and interactivity on social presence will be analyzed for each five personality types.
Research Model and Hypotheses

Figure 1: Research Model

In the literature, personality traits were found to affect online behavior. A study which examines the relationship between personality traits (extraversion, neuroticism) and internet interaction (Hamburger and Ben-Artzi 2000), another study which reveals the negative effects of three of the Big-Five personality traits (Agreeableness, Conscientiousness, and Extraversion) and two narrow traits (optimism and work drive) on internet usage besides the positive effects of Tough-Mindedness (Landers and Lounsbury 2006), and a similar study which investigates the relationship between three Eysenckian personality dimensions (psychoticism, extroversion and neuroticism) and Internet use to understand social interactions (Tosun and Lajunen 2010), help us realize that personality impacts online behavior. Similarly, personality is likely to affect perceived social presence, which in turn will result in different behaviors. Within the same environment, I expect that people with different personalities will perceive different degrees of social presence, and hypothesize as follows:

Hypothesis 1: The feeling of social presence differs among people according to their personality traits.

Interactivity is defined as the degree of a user’s ability to influence the form or content of the mediated environment (Steuer 1992). When the definers of big-five personality traits are analyzed, extraversion seems to be affected mostly by interaction, because of its activeness (McCrae et al. 1992). Extraverted people are defined as being gregarious, active, talkative, enthusiastic, and having rapid personal tempo (McCrae et al. 1992). Therefore, I would expect them to be willing to communicate through the media, and be active in the environment rather than staying passive. On the other hand, introverts, who prefer staying alone, reading, writing, or using computer, can be expected to be more active in online communities (Laney 2002). However, they do not like to share their ideas easily and communicate with people whom they don’t know very well (Laney 2002). Interactive environments enable people to share their ideas (e.g. writing comments under posts), and communicate with the others whose identities are unknown (e.g. chats, topic discussions). Therefore, introverts may not be comfortable using these tools and thus, may not feel social presence. However, I argue that extraverts, who would like the tools by which they can actively change the media, and communicate through media, will be more willing to use these tools. As they use these interactive tools actively, they will feel higher levels of social presence in the environment. Therefore, I expect them to like the interactive design most, and hypothesize as follows:

Hypothesis 2: Extraversion moderates the relationship between interactivity and perceived social presence. The relationship between interactivity and perceived social presence is stronger for high-extraverted individuals than for low-extraverted individuals.
Vividness is defined as the ability of a technology to provide information to the senses and create a sensorially rich mediated environment (Steuer 1992). When the defining characteristics of big-five personality traits are considered, openness is more likely to react to sensory information because of its feeling-based and aesthetically reactive behavior (McCrae et al. 1992). People who are open to new ideas are defined as being curious, insightful, and having unusual thought processes, imaginations, emotions, actions, ideas, and values; which make them like to see information in different forms and to have different experiences (McCrae et al. 1992). In vivid environments, information is presented in audio, video forms, which are richer than text (Short et al. 1976). Rich media adds emotions to the environment (Lengel et al. 1988). Therefore, I expect open people to like vivid design most, and hypothesize as follows:

**Hypothesis 3**: Openness moderates the relationship between vividness and social presence. The relationship between vividness and perceived social presence is stronger for high-open-to-experience individuals than for low-open-to-experience individuals.

By analyzing the difference of the effect of interactivity and vividness on different people, online communities can be designed according to personalities. As a result of this experiment, I aim to propose a design tool which will increase the feeling of social presence for extroverted and open-minded people, so as to increase their contributions accordingly.

**Research Methodology**

**Design of the Website**

In order to measure the effects of interactivity and vividness on social presence for different characteristics of people, a website about the life in New York City is created. The website includes advice for international students living in New York City. Eight pages are created in the website: Home, About Us, Housing, Food, Sightseeing, Shopping, Safety Tips, and Contact Us. In order to obtain 2x2 experimental design four different versions of the website are created.

Four different conditions in the experiment are summarized in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Non-interactive</th>
<th>Interactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-vivid</td>
<td>Website 1</td>
<td>Website 2</td>
</tr>
<tr>
<td>Vivid</td>
<td>Website 3</td>
<td>Website 4</td>
</tr>
</tbody>
</table>

These four websites are identical in content, but differ in design. All of them include same pages (e.g. Housing, Food) and same content under each page. Participants will be directed to any of the four websites randomly. In other words, when a participant clicks the distributed link of the website, he/she will be directed to the first version. Next person who clicks the link will be directed to the second version. By directing participants to the websites in an order, I aim to have equal number of participants for each website. By randomizing the distribution process, I account for any possible endogeneity issues.

Subjects will be forced to visit all the pages in the website before filling out the survey. Therefore, they will be exposed to all of the content and design tools specific to that experimental condition. Interactive and vivid design tools are explained in detail below.

**Interactivity**

Interactivity is defined as the degree of a user’s ability to influence the form or content of the mediated environment (Steuer 1992). To create interactive media, an interactivity scale developed by Kristof and Satran (1995) is used. From the seven dimensions of control over a message, the ones used in this research are listed in Table 2 and the applications in the website are shown in Figures 2, 3, 4 and 5. The
participants who are visiting an interactive website (Website 2 or 4) will be exposed to all of the design features shown in Figures 2-5.

Table 2: Interactivity tools used in the website

<table>
<thead>
<tr>
<th>Available Control</th>
<th>Implementation of the control in the website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control over pace</td>
<td>Clicking to the pages, images anytime</td>
</tr>
<tr>
<td>Control over sequence</td>
<td>Navigation menu, ‘read more’ buttons, clickable images, tooltip</td>
</tr>
<tr>
<td>Control over media</td>
<td>Video controls, search box</td>
</tr>
<tr>
<td>Control over transaction</td>
<td>Comment box</td>
</tr>
<tr>
<td>Control over objects</td>
<td>Mouse over effect on images</td>
</tr>
</tbody>
</table>

Figure 2: Control over pace and control over sequence (Clickable images and page navigation).
Figure 3: Control over sequence (‘Read More’ buttons).

In other states of the U.S., it may be hard to find a vegetarian product in supermarkets, but in New York City, you may see a whole section of vegetarian foods in many supermarkets.

Figure 4: Control over sequence and control over objects (Tooltip and mouse over effect).

For Muslims, there are some restrictions in meat products. They don’t eat pork products and don’t drink any beverage including alcohol. Moreover, for the chicken and meat products, the slaughtering method should be done in a specific way. "Halal" sign indicates that the meat is prepared in an "Islamic" way and the product doesn’t contain any pork or alcohol ingredient.
Vividness

Vividness is defined as the ability of a technology to provide information to the senses and create a sensorially rich mediated environment (Steuer 1992). According to Steuer (1992), vividness is defined in terms of sensory breadth which is the number of sensory dimensions included in the media, and sensory depth, which is the resolution of each sensory dimension. In this research, the environment was designed to be sensorially wide with videos, slide shows, animation and music to the website.

The interactive and vivid design tools used in the website are listed in Table 3. Vivid tools that are used in the website are shown in Figures 6 and 7. The participants who are visiting a vivid website (Website 3 or 4) will be exposed to all of the design features shown in Figures 6-7.

Table 3: Interactive and vivid design tools implemented in the experimental website

<table>
<thead>
<tr>
<th>INTERACTIVITY</th>
<th>VIVIDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clickable images</td>
<td>Embedded music</td>
</tr>
<tr>
<td>Mouse over effects on images</td>
<td>Embedded video</td>
</tr>
<tr>
<td>‘Tooltips for hyperlinks and images</td>
<td>Slide shows with music</td>
</tr>
<tr>
<td>Google search box</td>
<td>Animation (Analog clock)</td>
</tr>
<tr>
<td>Comment box</td>
<td></td>
</tr>
<tr>
<td>Controls for music and video</td>
<td></td>
</tr>
<tr>
<td>‘Read More’ buttons</td>
<td></td>
</tr>
</tbody>
</table>
About the website

Figure 6: The vivid design of the web site with examples of embedded video and animation

Figure 7: The vivid design of the web site with examples of embedded music and slide show
**Questionnaire**

Subjects will be asked to participate in the questionnaire after visiting the website. For measuring social presence and personality, well-established scales will be preferred. Short’s Social Presence measurement instrument will be used (Short et al. 1976). To measure personality traits, a short scale is preferred in order to increase the participation. In online studies, the length of the surveys is critical. In an Internet-based study, ratings of self-esteem are measured with a single-item instrument, because the participants would be unwilling to stay at the website long enough to complete a multi-item questionnaire (Robins et al. 2002). Therefore, in this study a shorter instrument, the Ten-Item Personality Inventory (TIPI) will be used (Gosling et al. 2002). Besides these main scales, there will be demographic questions, manipulation checks and scales to measure control variables. Scales and sample questions are provided in Appendix B.

**Conclusion and Future Research**

In this research, I examine the effects of design and personality factors on perceived social presence. In this way, I aim to make a contribution to the online community design research by emphasizing the importance of personality in the perception of design. I argue that interactive design is more appropriate for extraverted people in affecting the degree of social presence they perceive. Similarly, vivid design leads to a higher degree of perceived social presence for open-minded people.

I created a website to test the hypotheses. I have four different versions of the same website in order to have all necessary conditions for the experiment. In other words, the first version is neither vivid nor interactive; second version is interactive but not vivid; third version is vivid but not interactive; and the last version is both interactive and vivid. After a pilot test, I realized that interactive version of the website doesn’t increase the level of perceived social presence as much as it should do. The reason might be that people are accustomed to most of the interactive tools from other websites they visit daily. They may not notice some of them in the website, and thus may not feel social presence. Therefore, I need to make some changes in the interactive design tools before the execution of the real experiment. I may consider adding more noticeable tools such as an option for changing the color of the background, and a chat screen. After reconsidering the interactive manipulations, the next step in the study will be to identify the scales for control variables. If an appropriate scale is not available, then the available scales will be adjusted. After completing the questionnaire, I will redo a pilot study to test the validity of the scale and to diagnose some bugs. Finally, I am planning to start data collection stage by sending survey to large number of contacts.

This research can be extended by studying different design tools. Also, different personality variables, such as age, self-esteem, intelligence, and dominance might be introduced. Moreover, the effect of social presence on certain online behaviors needs to be analyzed further. I hope that this research leads to further research questions towards creating a personalized design of online communities.

**Acknowledgements**

I would like to gratefully and sincerely thank Assoc. Prof. Oded Nov, who has helped improve the quality of this paper significantly by providing guidance, and constructive feedback throughout my research.

**References**


Hew, K. F. 2006. Knowledge sharing among professionals in three online communities., (ProQuest)


Hingorani, K. 2008. "Social presence, personality types, and IT-supported teaching methods."


Appendix A: Website – Life In New York City

CONDITION 1: NON-INTERACTIVE & NON-VIVID: http://lifeinyc1.weebly.com/
CONDITION 2: INTERACTIVE & NON-VIVID: http://lifeinc2.weebly.com/
Appendix B: Scales

Social Presence Scale

| Unsociable | __ __ __ __ __ __ | Sociable |
| Insensitive | __ __ __ __ __ __ | Sensitive |
| Cold | __ __ __ __ __ __ | Warm |
| Impersonal | __ __ __ __ __ __ | Personal |
| Colorless | __ __ __ __ __ __ | Colorful |
| Small | __ __ __ __ __ __ | Large |
| Boring | __ __ __ __ __ __ | Interesting |
| Ugly | __ __ __ __ __ __ | Beautiful |
| Closed | __ __ __ __ __ __ | Open |
| Passive | __ __ __ __ __ __ | Active |

Ten-Item-Personality-Instrument (TIPI)
(Gosling et al., 2002)

<table>
<thead>
<tr>
<th>Disagree strongly</th>
<th>Disagree moderately</th>
<th>Disagree a little</th>
<th>Neither agree nor disagree</th>
<th>Agree a little</th>
<th>Agree moderately</th>
<th>Agree strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

I see myself as:

1) Extraverted, enthusiastic.
2) Critical, quarrelsome.
3) Dependable, self-disciplined.
4) Anxious, easily upset.
5) Open to new experiences, complex.
6) Reserved, quiet.
7) Sympathetic, warm.
8) Disorganized, careless.
9) Calm, emotionally stable.
10) Conventional, uncreative.

TIPI Scale scoring for measuring personality trait:
Extraversion: 1, 6R
Agreeableness: 2R, 7
Conscientiousness: 3, 8R
Emotional Stability: 4R, 9
Openness to Experiences: 5, 10R