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Abstract: Intelligent advisory services have gradually penetrated into every aspect of people's lives. Ranging from e-commerce to e-government platforms, intelligent advisory systems, with anthropomorphic and user-centered design, can potentially help to remove the technical barriers that commonly exist on traditional websites. In the research background of an intelligent advisory system in the health domain, this study seeks to explore the impact of system/user communication style similarities on user's perceptions towards the virtual advisory service. Drawing on Similarity Theory, we proposed a research framework to uncover the above relationships. Through conducting preliminary online surveys, this study empirically shows that the communication style of the virtual health advisory system, when aligned well with the user's communication style, can engage the user better, leads to more enjoyment, credibility and clarity during the interaction process. These positive perceptions towards the system can potentially create a better sense of social presence and heightened interests in continuing using the advisor services.

Keywords: Intelligent Advisory Services, Similarity Paradigm, Communication Style Similarity, Empirical Study

1. INTRODUCTION

Nowadays, virtual advisory services can be observed on a wide range of innovative service delivery platforms. They have become ubiquitous channels for firms and organizations to prompt their products, delivery their services or run certain campaigns on the web. With rapid advancement of ICT technologies such as 3D web and Artificial Intelligence, various virtual advisers or avatar hosts start to appear on e-commerce websites [1], although these virtual avatars can be very different in their looks, purposes and complexity (for examples of such systems, *c.f.*, intelligent shopping assistant called "Ask Anna!" on *ikea.com*; esthetically-pleasing shopping assistants on *3dcbd.com*; and the virtual *Dr. Schueler* on *freemd.com*).

In this study, we look at virtual health advisory services, which refer to virtual personal health care assistants who can provide timely advice and support to the user's health care information needs. For example, to better address the on-going health care information demands from people across Southern Indiana States in US, an earlier endeavor of designing health advisory services by a group of US health practitioners and researchers was called the Shared Hospital Electronic Library of Southern Indiana (SHELSI) project [2]. SHELSI was designed to determine whether the public's access and training for a virtual health sciences library system would support medical decision making in rural southern Indiana and achieve the same level of impact seen by targeted information services provided by health sciences librarians in urban hospitals. However, SHELSI only provides limited search functions for users, without humanoid interactions. Another more recent example in this area is the piloting work done by Kethuneni and colleagues, who designed and implemented 'virtual health companions' for people in the virtual environments [3]. In general, these services have been claimed to be useful to increase the potential value of health messages passed to the users [2,3].

However, to our knowledge, there have been limited systematic studies examining the value and design guidelines of virtual health advisory services, especially in relation to the potential impacts of communication style similarity on health consumers. Therefore, this study seeks to explore the message framing aspect of virtual health advisory services and its impact on advisory service delivery to the customers. Specifically, we

explore: 1) *What are the salient aspects of users' perception towards the virtual advisory services that impacts on the value or effectiveness of such services?; and 2) Does communication style similarity to the user influence the above aspects of user perceptions?*

This study presents the work of the critical first stage of a large-scale ongoing project. First, we conduct a systematic review of the contemporary research work that weaves together to inform our proposed research framework. Next, we elicit user insights on the important design aspects of virtual health advisory services, as well as the potential influence of communication style similarity between the virtual advisor and the user. Finally, we discuss the contributions and implications of this work and plans for the next stage of the project. To delimit the scope of the study, we focuses on virtual health advisory services with humanoid virtual advisors in 3D enviroments, which represents the status quo and the cutting edge developments of virtual advisory services on various private and public e-portals.

2. THEORETICAL FRAMEWORK

In the health domain, virtual advisory services have been increasingly utilized in recent years to provide people with timely health advices [3] or to assist with the analysis and treatment of hospital patients [4-6]. Various health campaigns are also being set up or delivered in the virtual environments for the public [7]. Given this notable and exciting trend, much work still needs to be done to come up with theories and practical guidelines for the design and development of virtual advisory services. Due to a lack of existing theories in the design of virtual health advisory services in the information systems discipline, in this study we borrow the theoretical lens from relevant disciplines such as the field of psychology and marketing to explore the theories behind the design of such systems.

2.1 The development and status quo of virtual health advisory services

The idea of providing health-related advice or therapy service in virtual environments emerged from earlier endeavors in the area of clinical psychology. As a critical component of the psychotherapy, virtual environments have been empirically proved to be effective tools to enhance the outcomes of various clinical therapies, for example, in assisting the treatment of acrophobia [8], agoraphobia [4] or autistics [6]. One recent popular field of the application of virtual enviroments lies in assisting the therapists to treat patients with eating disorders and/or obesity [5].

Research in the computer simulation and gaming field has also looked into the development of educational games in 3D virtual environments to provide young people with healthy lifestyle advice. For instance, a multidisciplinary team of researchers and practitioners in US developed a virtual game called "Escape from Diab (abbreviated as Diab)" to help adolescents to get rid of unhealthy eating habits that potentially lead to obesity and diabetes [9]. In the game, there is a virtual coach called DeeJay, who constantly provides good modelling and expert advice on healthy diet and physical activity to help the other avatars (i.e., the players) to escape from the evil control of King Etes and escape from Diab. The research identified a list of factors that potentially influence behaviour change for these adolescent players, including tailoring, the incorporation of knowledge mini games, appropriate goal setting, problem solving, motivational statements, goal review, feedback and behaviour inoculation to withstand negative factors. However, this fun-filled game has not empirically tested its value for users, especially in regards to the design features of this coach avatar named DeeJay.

The effective application of immersive virtual reality technology in burn wound care area also shed light on the use of virtual assistants to distract patients from the unremitting pain associated with wound care procedures. As supported by fMRI brain scans, a 35-50% reductions in procedural pain was observed for patients immersed via VR worlds [10]. In one case, medical practitioners used a Snowworld with snowman, igloos, penguins, woolly mammoths, flying fish and penguins fighting snowballs with the patients. Wearing helmets and tight

headphones, patients fly in the Snowworld, as if there is a 'curtain between the patient and reality' [11]. This interesting idea of Snowworld, set in an icy 3D canyon, was part of a series of projects carried out by Professor Hunter Hoffman at the University of Washington Harborview Burn Centre in Seattle. The various animated virtual characters or assistants can only have behavioral interactions with the immersed user. It is expected that an interesting 'companion' advisor flying with the patients in such a virtual world can help to further distract and reduce patient's attention to pain during wound care.

Another interesting idea is designing 'virtual companions' for people. Kethuneni and Colleges [3] proposed a personal healthcare assistant that accompanies a user's avatar while they travel and answers user questions like a health professional. Such an intelligent virtual advisor will be able to exhibit human traits including gestures and non-verbal behaviours. It is claimed that such a personal virtual advisor would have higher persuasive value for health messages. Two main streams of technologies facilitate the creation of the virtual advisor: 1) the conversation content from the virtual advisor is created with *chatbot*, which refers to technologies that simulate conversations with humans; and 2) the emotions of the virtual advisor are made possible using non-verbal behaviour generators (NVBGs), which read the affective state of the virtual advisor in text form and emote the non-verbal behaviour of the virtual advisor [12]. The project focuses on technical details during system design and development without examining HCI issues related to such systems.

Inspired by these pioneering work, we designed and developed an intelligent virtual health advisory system in 3D environments, with the goal of uncovering the optimal design strategies to provide such services to consumers.

2.2 Major indicators for the value of virtual health advisory services

How do we assess the value or effectiveness of virtual advisory services? How do we predict that a certain health advisory service will have another chance to influence the user? After securitizing several recommender systems in literature, we found that regardless of the underlying theory being used, one of the most widely endorsed assumptions by researchers is that *cognitions*, broadly defined, can serve as action tendencies [13]. In particular, it is held that external source of *information* is the primary driver of attitude change and consequent behaviour change [14]. Behavioural scientists frequently control behaviour mediators to exert influence on the behaviour patterns of a targeted individual or group. This is because behaviour change is frequently a complicated and long term process, making it difficult to measure the effectiveness of intervention strategies [9].

DeLone and McLean [15] consider *(perceived) information quality, service quality and use (intentions)* to be among the most important 6 IS success factors, which is critical for investigating the value of IS investments. This study consults this opinion on the basis that it has been widely featured in prior work and is flexible enough to be adapted to different circumstances [15]. Consequently in this study, at the fundamental level, we first examine *information quality* aspects of the virtual health advisory services as rated by the users. That is, we examine users' perceptions towards the information quality of the system including user engagement, perceived enjoyment, perceived clarity and perceived credibility of the advisory message.

Next, we look at two higher-level system usage outcome variables of interest. First, social presence is considered as one important service-level surrogate that reflects the value of virtual health advisory services. This is because a sense of human touch, warmth and support is the key reason why people turn to such services rather than using various online search engines like Google and Yahoo!. Except for convenience reasons, the humanoid features exhibited by such systems are also regarded as major attractions for people to be interested in continue using such services.

Second, system reuse intentions are considered by many researchers as another major criteria for assessing the value of information systems [16] and this is especially so for the virtual health advisory systems [17]. Besides, one of the most important goals of having virtual advisory services is to maximize customers' reuse intention of

the system, which subsequently enlarges the chance that the health advisory message influence the message recipient's behavior.

Overall, a sense of social presence and users' system reuse intentions are regarded as two major indicators for successful user-system-interaction experiences in the context of this research. These two aspects can largely reflect the purposes or goals of our advisory system design in this study. We acknowledge that there do exist other important system usage outcomes that reflect its effectiveness, however in the universe of discourse, these two constructs are our major concerns.

2.3 Similarity Theory on the design of virtual health advisory services

People frequently compare themselves with others. The Similarity (*a.k.a.* the Similarity-Attraction) paradigm states that the more similar a person's attributes and beliefs are to those of others, the more likely it is for that person to be attracted by the referent others [18] and to form better perceptions of the other party [19]. This social-psychology hypothesis has been extended and extensively tested on a number of topics by researchers in the information systems discipline, including face or body shape similarity between the user and the embodied agent [19,20], system-user personality similarity [21], demographic characteristics [21-23] and system-user decision process similarity [21,24,25]. While this interesting phenomena is multi-facted in nature and subject to debates, most of the themes emerged out of literature align with reward-based explanations, which asserts similarity is rewarding since it reduces uncertainty, increases self-validation and creates enjoyable interactions [21].

Based on Vugt et al. [19], similarity in certain characteristics between the virtual advisor and the user can invoke the importance of "self" schema in the advisory process. The self schema contains information about oneself, including perceptions, attributes, and experiences related to the self. Since the self is involved in cognitive processing and because of its chronic existence in working memory, concepts related to the self are likely to exert a strong influence on memory recall, judgment, and behavior [19]. Therefore, similarity, which triggers a sense of 'self' in the decision making process, can potentially influence user's perception towards the virtual advisory message [26]. Evidence shows that the underlying motivations for our attitudes toward a variety of goals are actually their implications for self-assessment, for instance attitude toward people with whom we affiliate and attitude towards winning groups (e.g., sports teams) that we wish to associate ourselves with [27]. Another experiment conducted by Bailenson and his colleagues [28] empirically showed that people are more likely to agree with and vote for political candidates with similar facial features that are achieved using photograph morphing software. Another study on virtual humans and persuasion empirically showed that users exhibit gender based in group favouritism in the form of greater attitude change for same gender virtual humans [29].

In this research, we are interested in exploring how message framing similarity influences the value of health advisory services, especially in situations when the virtual advisor exhibits similar patterns of Internet Slang usage to the user. There are many studies in the human communication area that show message framing influences persuasion [29,30]. Likewise, a communication style that can activate the self schema is likely to attract attention and be processed to a larger extent. The triggering of this "self" resonance is likely to invoke positive perceptions from the users. Further, a number of studies show that, in high involvement situations the contrast effect and the resulting perception of novelty and unexpectedness appear to stimulate individuals to process the advertising stimulus even more [31]. Similarly, Internet Slang message style, if used properly, can be considered as innovative and trendy by Internet users. Therefore, we expect appropriate usage of Internet Slang in the communication messages will stimulate customers to process the health advisory message more and appreciate the message and the advisory system better. Finally, better perceptions towards the advisory service can potentially help to create a sense of human touch (social presence) and generate future reuse intentions(see Section 2.2), which we will discuss in detail below.

2.4 Research hypotheses and model development

Similarity generates predictability among interaction partners and enables them to communicate with greater confidence and effectiveness [32]. On the other hand, when a user encounters a similar communication style, this similarity reduces the necessity for generating a large number of alternative explanations [33]. Consequently, it is likely that the user will require less cognitive effort to understand the virtual advisor's suggestions as a result of the similarity in communication styles between system and the user. Therefore, we anticipate that:

H0. User/Virtual advisory system communication style similarity (CSS) positively enhances clarity.

The similarity paradigm suggests that the more similar a person's attitudes and beliefs are to those of others, the more likely it is for that person to be attracted by the others. Prior studies also showed the more similar the members in a group, the more attracted they will be to the group [34]. Similarity on many dimensions may increase attraction [35] - aside from personality and demographic characteristics, similarity in communication style are also expected to positively influences engagement. Hence, we expect that:

H1. User/Virtual advisory system CSS positively enhances user engagement.

Enjoyment is an "affective belief that refers to the extent to which the activity of using the system is perceived to be enjoyable in its own right", regardless of any performance consequences that can be anticipated [30]. Through resonance of the 'self' schema, similarity was said to have direct effects of creating pleasurable interactions, facilitated by the increase in the ease of communication and the reduced potential for conflict. Prior study suggested that perceived decision process similarity and perceived personality similarity have significant positive impacts on perceived enjoyment [24]. Likewise, we expect similarity in communication style will also positively enhance user's feelings of enjoyment.

H2. User/Virtual advisory system CSS positively enhances user enjoyment.

Similarity in communication style were also proved to enhance user's feelings of credibility. As pointed out by Littlejohn and Foss in 'Theories of human communications' [33], when communicators discover similarities between each other, "*their attraction* to one another goes up, and their apparent *need for more information* goes down". (p.131). This reduced need for information suggests more trust during the interaction process. Some researchers integrated findings from past studies into consumer research and psychology, showing that internal similarity can increase buyers' willingness to trust salespersons and follow their guidance [36]. Others found that similarity encourages perceptions of others as in-group members, which serves as a catalyst for increased identity-based trust [37]. Prior research showed that perceived decision process similarity can increase the assistant's perceived trustworthiness [21]. It was also found that perceived behavioral similarity will positively affect credibility [24].

H3. User/Virtual advisory system CSS positively enhances perceived system credibility.

Reuse intentions refers to users' behavioral intentions of using the virtual advisory systems in a similar context in the future [38]. The following constructs were shown to be some of the most salient antecedents of consumer's reuse intentions of information systems. Perceived clarity and enjoyment, were regarded as strong predictors for technological artifacts' reuse intentions [39]. Besides, engagement was shown to exert strong positive effects on reuse intentions of information systems [40]. Moreover, research showed that credibility positively affected users' reuse intentions [38]. Consequently, we expect the same holds true for the design of virtual health advisory services.

H4: Higher perceptions of the assistant's clarity leads to higher reuse intention.

H5: Better user engagement leads to higher reuse intentions.

H6: Higher user enjoyment leads to higher reuse intentions.

H7: Higher credibility leads to higher reuse intentions.

Social presence refers to the extent to which "an artifact is perceived as sociable, warm, personal, or intimate when interacting with it" [41]. Cyr empirically showed that with human or human-like elements appearing in

virtual environments, people develop a higher sense of involvement and community, which subsequently result in a stronger sense of social presence [42]. Thus, we expect humanoid virtual advisors in the virtual health advisory services can create a sense of social presence for its users. Moreover, prior research showed that in general positive emotions of the reader as a result of the use of expressive slang and humor, can help to create a sense of connection or bond between the reader and the online message writer [43]. Likewise, these positive emotions are also expected to positively enhance the feelings of social presence:

Perceived clarity can make users feel at ease when processing the message being delivered. Users may feel less communication barriers between the two parties , which enhances the sense of social presence. Studies also showed that a situation that exhibits a higher level of credibility can lead to a better sense of social presence [44]. Another interesting work [45] found that enjoyment are closely tied to the experience of social presence, in which users feel like 'entering another world'.

H_8: *Higher perceptions of message clarity leads to a better sense of social presence.*

H_9: *Better user engagement leads to a better sense of social presence.*

H_{10}: *Higher enjoyment leads to a better sense of social presence.*

H_{11}: *Higher credibility leads to a better sense of social presence.*

Finally, we anticipate perceived social presence have a positive impact on user's intentions to reuse the system.

H_{12}: *Better perceived social presence leads to higher advisory system reuse intentions.*

Based on the above discussions, Fig. 1 presents the resultant virtual health advisory service delivery research model that synthesizes the aforementioned literature.
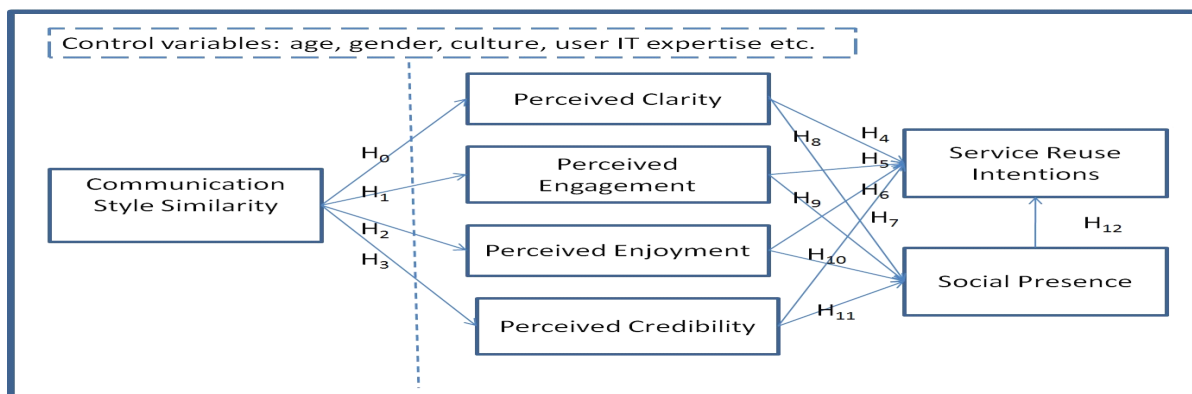

Fig. 1 The Advisory Service Delivery Research Model

3. EXPLORING USER PREFERENCES FOR THE DESIGN OF VIRTUAL ADVISORY SYSTEM

Based on a thorough understanding of the current status and theoretical foundations of virtual health advisory services, the study continues to uncover what users think about the provision of such services. This is because the ultimate purpose of having virtual health advisors is to serve the users. The first stage of this on-going project involves qualitatively gathering user's opinion about the design of our virtual advisory service prototype (Fig.2). After qualitative data collection and analysis of the result, the next stage of the project involves testing the research model through large scale experiments. This paper limits its scope to describing the first stage of our work.

Supported by MS SQL server 2008 database, the virtual advisory system is powered by a computer program that performs functions including text segmentation, analysis and case triage. The system is designed to be able to address user questions related to common health issues such as how to keep a healthy lifestyle to prevent obesity. This prototype is only used for eliciting user opinions and is subject to future refinement and enrichment of the database. Consequently, the advices and symptom triage of the virtual advisor does not mean

to replace a physician evaluation or make a diagnosis. Rather, at the current stage it only makes recommendations on a limited number of aforementioned health topics. The technical details of the system are not discussed in detail here due to the focus of HCI issues in this paper.

In this study, online survey method is chosen due to its capability in reaching more participants from different geographical regions and respondents are allowed to have more time to think about the questions being asked in the survey. The online survey is designed in an open-ended form to gather more genuine user feedbacks about the system prototype.
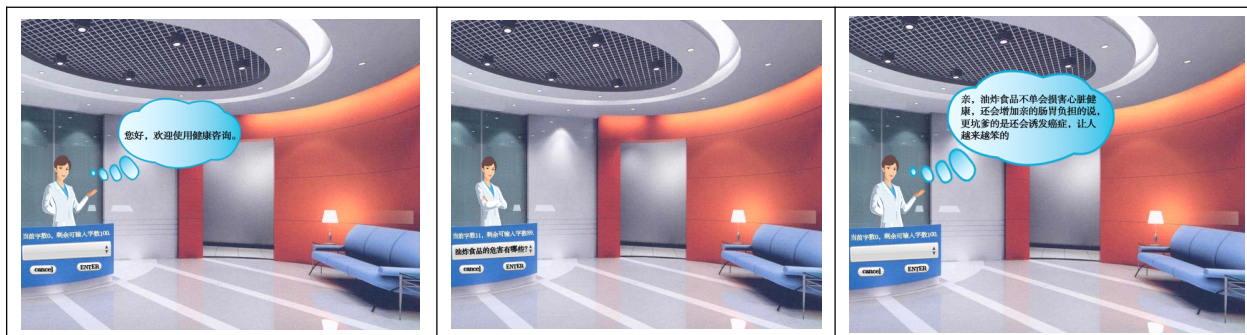

Fig 2. Exemplar Screenshots of Virtual Health Advisory Systems

To uncover user perceptions towards the design of virtual advisor, we conducted online surveys asking for user comments on the prototype system. The participants were arranged to interact with the two assigned virtual health advisors in random orders to avoid order effects. User information, such as demographics, characteristics, expertise with using Internet, attitudes towards Internet Slang and other background information for the study are recorded. Users are asked to comment on the two pilot versions of the system and provide suggestions for further improvement. The two versions of the system are identical except for that one virtual advisor communicates in a Internet-slang form of message style (ISS); while the other communicates with ordinary message styles (OMS)(see [46] for guidelines).

Purposeful sampling was utilized. We sent out emails and instant online messages to people on our contact lists and invite them to participate or forward the online surveys to their online contacts whenever feasible. In total, 91 complete responses were collected. Among these 8 were removed due to errors such as irrelevancy. The final respondent size of 83 is deemed appropriate due to data saturation [47]. Respondents, aging between 20s to 60s years, were Chinese spreading across12 different provinces of China (51 males and 32 females). Open, axial and selective coding methods were used to analyse the data [48]. Then the various emerged coding categories were screened. Data considered relevant to the research context were selected through expert review. Finally, based on the online survey feedback from potential user groups, the following themes emerged from qualitative data analysis:

First, many users commented that this virtual health advisory service is beneficial for prompting a healthy life style among people and they expect that such systems should be widely available to citizens after pilot testing and further refinement. Respondents also commented that they wish to see that this virtual advisory system continue evolving and becoming widely used by the public. Overall, people formed better perceptions towards the ISS version of the virtual advisory system than OMS version of the system. Some commented that Internet Slang communication style is easier to understand and more interesting than medical jargons. Such a trendy communication pattern can draw users into it and potentially create a sense of humor and the feelings of interacting with a real-human during the advisory process. Many users also commented that overall they feel the system is good and are interested to try the next version of the system if opportunities arise in the future - demonstrating user's future reuse intentions of our virtual health advisory services.

Second, online survey results indicated that people wish to have a sense of human touch while using the

virtual advisory service. Anthropomorphic and lively design are considered critical to the value of such systems by many respondents. Thus, a better sense of social presence, is critical for the effectiveness of such systems.

Third, the salient aspects of the virtual advisory system that matters to users most include but not limited to the following aspects: design features that could lead to better user engagement, more enjoyment(fun), credibility and clarity in the advisory process. Users who commented that they are happy to accept ISS version of the system also mentioned that they find the ISS version of the system to be more engaging, fun, trust-worthy and easier to use than the other version of the system.

Finally, there exist several important aspects for further improvement, including upgrading the voice quality of the system. There are also requests for more comprehensive contents in the knowledge base and better animation effects and more lively gestures as exhibited by the virtual advisors.

In summary, the results of the online survey align well with our proposed theoretical framework. These findings will become important guidelines for refining our system prototype as well as our proposed system framework and inform our next stage of the project.

4. DISCUSSIONS AND CONCLUSIONS

Frequently, people need to make difficult decisions about when and where they or their family members should receive healthcare. In other situations, they always wish to receive timely and professional advices for more healthy lifestyles, such as anti-obesity diets. Unfortunately, most people lack the health information and medical knowledge needed to make these decisions effectively and safely. As a result, this study explores the value of virtual advisory services in the health domain and examines the impact of advisor-user message style similarity on the realization of the value of such services. Through open-ended online surveys, we found that if properly designed, virtual advisory services can potentially create a sense of engagement, enjoyment, clarity and credibility for the consumer. Such services are also expected to create a sense of social presence and trigger reuse intentions of consumers using health service portals. In particular, similarity in communication style between the advisory system and the consumer can further enhance the above value of such services.

Following the computer-as-social-actors perspective discussed in [21], IS researchers have recently paid increasing attention to the application of psychology and human communication theories to the interactions between different kinds of advisory systems and consumers. This study contributes to the advancement of Information Systems theories in the design of virtual advisory services. It also highlights to practitioners a few important practical guidelines for the design and development of virtual health advisory systems.

The findings reported here is the first stage of a long term ongoing project. It is also supposed to serve as interesting 'think-pieces' to inspire further discussion and thinking among fellow researchers and practitioners. A mix-method approach, which is common in human-computer interaction studies, will be employed to refine and examine our research model further in the project. Enlightened by the first stage of the project, we are currently conducting a series of empirical experiments to delve further into the constructs of interest as outlined in this project.

REFERENCES

[1] Rich, C., Sidner, C.L.: Robots and avatars as hosts, advisors, companions, and jesters. AI Magazine **30**(1), 29-41 (2009).

[2] Richwine, M.P., McGowan, J.J.: A rural virtual health sciences library project: research findings with implications for next generation library services. Bulletin of the Medical Library Association **89**(1), 37 (2001).

[3] Kethuneni, S., August, S.E., Vales, J.I.: Personal Healthcare Assistant/Companion in Virtual World. In: Virtual healthcare Interaction: AAAI Fall Symposium (FS-09-07) 2009

[4] Krijn, M., Emmelkamp, P., Olafsson, R., Biemond, R.: Virtual reality exposure therapy of anxiety disorders: A review. Clinical Psychology Review **24**(3), 259-281 (2004).

[5] Riva, G.: Virtual reality in the treatment of eating disorders and obesity. environment **2**, 5 (2005).

[6] Strickland, D., Marcus, L., Mesibov, G., Hogan, K.: Brief report: Two case studies using virtual reality as a learning tool for autistic children. Journal of Autism and Developmental Disorders **26**(6), 651-659 (1996).

[7] HealthInfo_Island: HealthInfo Island: Health & Medicine in Second Life, [Online], Available, http://healthinfoisland.blogspot.com [Last accessed 01-06-2009], 15, May, 2009

[8] Emmelkamp, P., Bruynzeel, M., Drost, L., van der Mast, C.: Virtual reality treatment in acrophobia: a comparison with exposure in vivo. CyberPsychology & Behavior **4**(3), 335-339 (2001).

[9] Thompson, D., Baranowski, T., Buday, R., Baranowski, J., Thompson, V., Jago, R., Juliano Griffith, M.: Serious Video Games for Health: How Behavioral Science Guided the Design of a Game on Diabetes and Obesity. Simulation & Gaming, 1046878108328087v1046878108328081 (2008).

[10] Sharar, S.R., Miller, W., Teeley, A., Soltani, M., Hoffman, H.G., Jensen, M.P., Patterson, D.R.: Applications of virtual reality for pain management in burn-injured patients. Expert review of neurotherapeutics **8**(11), 1667 (2008).

[11] BBC: BBC News,Easing pain for burns victims using virtual reality,[Online], Available: http://www.bbc.co.uk/news/health-12297569 [Last Accessed 11-10-2012].   (2011).

[12] Lee, J., Marsella, S.: Nonverbal behavior generator for embodied conversational agents. In: Intelligent Virtual Agents 2006, pp. 243-255. Springer

[13] Dillard, J., Pfau, M.: The persuasion handbook: Developments in theory and practice. Sage Publications, (2002)

[14] Bhattacherjee, A., Sanford, C.: Influence Processes for Information Technology Acceptance: An Elaboration Liklihood Model. MIS quarterly **30**(4), 805-825 (2006).

[15] Petter, S., DeLone, W., McLean, E.: Measuring information systems success: models, dimensions, measures, and interrelationships. European Journal of Information Systems **17**(3), 236-263 (2008).

[16] Kettinger, W.J., Park, S.-H.S., Smith, J.: Understanding the consequences of information systems service quality on IS service reuse. Information & Management **46**(6), 335-341 (2009). doi:http://dx.doi.org/10.1016/j.im.2009.03.004

[17] Al-Natour, S., Benbasat, I.: The adoption and use of it artifacts: a new interaction-centric model for the study of user-artifact relationships. Journal of the Association for Information Systems **10**(9), 661-685 (2009).

[18] Graves, L.M., Powell, G.N.: THE EFFECT OF SEX SIMILARITY ON RECRUITERS'EVALUATIONS OF ACTUAL APPLICANTS: A TEST OF THE SIMILARITY‐ATTRACTION PARADIGM. Personnel Psychology **48**(1), 85-98 (2006).

[19] Vugt, H.C.V., Bailenson, J.N., Hoorn, J.F., Konijn, E.A.: Effects of facial similarity on user responses to embodied agents. ACM Transactions on Computer-Human Interaction (TOCHI) **17**(2), 7 (2010).

[20] Van Vugt, H., Konijn, E., Hoorn, J., Veldhuis, J.: When too heavy is just fine: Creating trustworthy e-health advisors. International Journal of Human-Computer Studies **67**(7), 571-583 (2009).

[21] Benbasat, I.: HCI research: Future challenges and directions. AIS Transactions on Human-Computer Interaction **2**(2), 16-21 (2010).

[22] Kim, Y., Wei, Q.: The impact of learner attributes and learner choice in an agent-based environment. Comput. Educ. **56**(2), 505-514 (2011). doi:10.1016/j.compedu.2010.09.016

[23] Moreno, R., Flowerday, T.: Students' choice of animated pedagogical agents in science learning: A test of the similarity-attraction hypothesis on gender and ethnicity. Contemporary Educational Psychology **31**(2), 186-207 (2006).

doi:http://dx.doi.org/10.1016/j.cedpsych.2005.05.002

[24] Al-Natour, S., Benbasat, I., Cenfetelli, R.: The role of similarity in e-commerce interactions: The case of online shopping assistants. In: Proceedings of the Fourth Annual Workshop on HCI Research in MIS 2005, pp. 70-74

[25] Al-Natour, S., Benbasat, I., Cenfetelli, R.T.: The Effects of Process and Outcome Similarity on Users' Evaluations of Decision Aids*. Decision Sciences **39**(2), 175-211 (2008).

[26] Slater, M., Antley, A., Davison, A., Swapp, D., Guger, C., Barker, C., Pistrang, N., Sanchez-Vives, M.: A virtual reprise of the Stanley Milgram obedience experiments. PLoS One **1**(1) (2006).

[27] Dunning, D.: The relation of self to social perception. Handbook of self and identity, 421?441 (2003).

[28] Bailenson, J., Iyengar, S., Yee, N., Collins, N.: Facial similarity between voters and candidates causes influence. Public opinion quarterly (2009).

[29] Guadagno, R., Blascovich, J., Bailenson, J., Mccall, C.: Virtual humans and persuasion: The effects of agency and behavioral realism. Media Psychology **10**(1), 1-22 (2007).

[30] Davis, F.D., Bagozzi, R.P., Warshaw, P.R.: Extrinsic and intrinsic motivation to use computers in the workplace1. Journal of applied social psychology **22**(14), 1111-1132 (1992).

[31] De Pelsmacker, P., Geuens, M., Anckaert, P.: Media context and advertising effectiveness: The role of context appreciation and context/ad similarity. Journal of Advertising, 49-61 (2002).

[32] Baxter, L.A., West, L.: Couple perceptions of their similarities and differences: A dialectical perspective. Journal of Social and Personal Relationships **20**(4), 491-514 (2003).

[33] Littlejohn, S.W., Foss, K.A.: Theories of human communication. Wadsworth Publishing Company, (2007)

[34] Baskett, G.D.: Interview decisions as determined by competency and attitude similarity. Journal of Applied Psychology; Journal of Applied Psychology **57**(3), 343 (1973).

[35] Lin, T.C., Tsai, Y.L.: Factors affecting knowledge integration-based on similarity-attraction theory. Paper presented at the PACIS, Vietnam July 11-15, 2012

[36] Al-Natour, S., Benbasat, I., Cenfetelli, R.: The Adoption of Online Shopping Assistants: Perceived Similarity as an Antecedent to Evaluative Beliefs. Journal of the Association for Information Systems **12**(5), 2 (2011).

[37] Brewer, M.B.: In-group favoritism: The subtle side of intergroup discrimination. Codes of conduct: Behavioral research and business ethics, 160-171 (1996).

[38] Wang, W., Benbasat, I.: Trust in and adoption of online recommendation agents. Journal of the Association for Information Systems **6**(3), 72-101 (2005).

[39] Van der Heijden, H.: User acceptance of hedonic information systems. MIS quarterly, 695-704 (2004).

[40] Chou, H.K., Lin, I.C., Woung, L.C., Tsai, M.T.: Engagement in E-Learning Opportunities: An Empirical Study on Patient Education using Expectation Confirmation Theory. Journal of medical systems, 1-10 (2012).

[41] Gefen, D., Straub, D.W.: Managing user trust in B2C e-services. E-service Journal **2**(2), 7-24 (2003).

[42] Cyr, D., Head, M., Larios, H., Pan, B.: Exploring human images in website design: a multi-method approach. MIS quarterly **33**(3), 539 (2009).

[43] Schindler, R.M., Bickart, B.: Perceived helpfulness of online consumer reviews: The role of message content and style. Journal of Consumer Behaviour (2012).

[44] Wang, Y.D., Emurian, H.H.: An overview of online trust: Concepts, elements, and implications. Computers in human behavior **21**(1), 105-125 (2005).

[45] Heeter, C.: Communication research on consumer VR. Communication in the age of virtual reality, 191-218 (1995).

[46] Yu, G.Y., Xiong, Z.Y.: A summary of Internet Language. China Economic Press, (2001)

[47] Guest, G., Bunce, A., Johnson, L.: How many interviews are enough? Field methods **18**(1), 59 (2006).

[48] Glaser, B.G., Strauss, A.L.: The discovery of grounded theory: Strategies for qualitative research. AldineTransaction, (1967)