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박물관 맥락에서의 로봇성격 설정의 중요성 연구

The Importance of Robot Personality in a Museum Context

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요약

본 연구는 사람과 로봇의 인터랙션을 알아보는 것을 목적으로 한다. 영화 속에서 등장하는 로봇과는 달리 실생활에서 만나는 로봇에는 특정한 성격이 존재하지 않는다. 본 연구는 다른 맥락을 가지고 있는 공간에서 로봇의 성격을 어떤 식으로 매치하는 것이 효과적인가에 대해 논의하고 있다. 본 연구의 목적을 달성하기 위해 외향성, 내향성이라는 두 가지 성격의 유형을 구분하고 선행연구에 기반하여 전통적인 형태의 박물관, 과정 중심적인 박물관 유형 조건으로 피험자간 설계를 실시하였다. 연구 결과, 피험자들은 로봇의 성격만 보았을 때 체험요소에 유의미한 영향을 미치지 못한 것으로 나타났다. 반면 다른 맥락의 장소 조건에서는 사회 정체감 요소에서 유의미한 결과를 보였다. 또한 모든 조건에서의 인터랙션 효과는 유의미하게 영향을 미치는 것으로 나타났다. 흥미로운 사실은 사용자가 가장 선호하는 조건은 외향적 성격의 로봇과 과정 중심적인 박물관 유형이며, 사용자가 가장 선호하지 않는 조건은 외향적 성격의 로봇과 전통적 유형의 박물관이었다. 이러한 결과의 함의에 대해서는 본문에서 논의하고 있다. 통계 분석은 JMP 9을 사용하여 리서치 모델 및 가설을 검증 하였다.

■ 중심어 : | 인간로봇상호작용 | 박물관 | 맥락 | 로봇퍼스널리티 |

Abstract

This study investigates human-robot interactions in a museum environment. Unlike robots in movies, robots in real life do not have 'personality,' but instead have a specific purpose and function. This research is primarily about the assignment of specific and appropriate personalities to robots in different contexts. Methods by which a definite personality can be imparted on a robot are discussed in this research. Previous research has addressed attempts to assign a robot personality based on the task context. However, the discussion of robot personality is incomplete. Therefore, we assumed that a robot's character was dependent on the characteristics of its location of use. We planned a 2x2 comparison of various robot personalities, i.e., introverted or extroverted paired with either a traditional museum or a process-oriented experiential experience. Based on Schmitt's (1999) strategic experiential modules, experiential factors were derived for each set of conditions. To achieve the objectives of the research, theoretical and empirical research were conducted simultaneously. The software JMP 9 was used to verify the research model and hypotheses.

■ keyword : | HRI | Musem | Context | Robot Personality |

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I. Introduction

Due to the increased competition among robotics firms, product marketing is reaching a limit in terms of emphasizing the product or service in a way that appeals to the emotions of the customer. To overcome these limitations, customers must be provided with a unique experience that is specific to the product and service. Experiential marketing continuously evokes recognition of the image of a product or service through unique services or events and focuses on the customer experience, with the ultimate goal of creating loyal customers. Customers assume the functionality and quality of products as well as the brand image and demand more[31]. Customers particularly desire product communications and marketing that appeal to and stimulate their senses. To address such customer needs, companies are introducing experiential factors associated with their products in order to remain competitive. Traditionally, the word museum invokes the image of a place that collects, preserves, and exhibits archaeological articles or historical artifacts. However, as a reflection of the diversity of exhibition materials and the various needs of the customers, the types of museums are diversifying.

Many museums offer a docent service in which the docent serves as a liaison of communication between museum visitors and the exhibits. According to McCoy's "Good Guide[12]," it is important for a docent to approach and engage visitors with eye contact. During this time, interaction (feedback) should also be possible and well as communication from the guide that caters to the level of the visitor. The guide also states that there should be non-verbal communication that is not related to the exhibition. One medium that can effectively comply with the characteristics of this guide is the robot-type docent, which is a new area of interest. Current commercial robot docents provide information in a monotonous electronic voice regardless of the content or context, and body language is limited. In most research, the personality of robots is either extroverted or introverted for simplicity.

However, the present paper begins on the basis of the question, "Does every museum need an extroverted personality?" In this research, we analyzed perception, considering robot personality (extrovert/introvert) and the type of museum (traditional museum/process-oriented experiential museum).

Kotler et al. (2008)[20] used four different categories to define museum type: traditional, modified traditional, community-oriented, and storytelling experiential. Museums, however, are difficult to categorize and sometimes cannot be categorized into any of the above types. Because museums can have multiple functionalities, several different characteristics can coexist in the same museum. However, Kotler et al. state: "General museums are more traditional and object-related, science museums are progressive and experience-related." On the other hand, Bennett (1995)[3] defined the customer experience as "traditional museum etiquette of quiet observation and looking, but not touching." Likewise, it is expected that, in a traditional museum experience, the visitors will be "quiet" while observing the exhibits. Nevertheless, robots with the traditional manners mentioned above have seldom been reported in scientific literature.

There are various aspects that should be considered when creating a museum tour guide robot. Within the past year, tour robots have become more common. Research is moving beyond the initial focus of operation and function and shifting to robot

personality. Previous research hypothesizes that people assume that museum tour guide robots will have an extroverted personality (Joosse et al., 2013). However, the present paper was based on the question, "Does every museum need an extroverted personality?" In this research, we studied museum user perception, considering robot personality (extrovert/introvert) and museum type (traditional museum/process-oriented experiential museum).

Ap et al. (2001) proposed that "The mediator and cultural broker functions, as suggested here, refers to the interpretive aspects of the tour guide's work which plays a vital role in enhancing the visitors' experience at a destination and their understanding of the destination and its culture[2]." Our study includes museum tour guide tasks that are described in more detail in the next section. We expect that people hold the stereotypical expectation that a traditional museum guide robot is introverted, while a process-oriented experiential museum guide robot is expected to be more extroverted.

Fig. 1. Seodaemun Natural History Museum Docent Atti

II. Related Research

2.1 The types and categories of museum

Museums can be broadly categorized into two types; general museums that collect and exhibit items from a variety of areas or specialized museums that only handle the items of a specific area such as history, science, industry, or folk culture. Increasingly, museums are evolving by expanding their exhibition areas and creating competitive services to cater to the needs of their customer audience[27].

Early museums were started as a means for individuals to showcase their collections. When the excavation of relics became more active in modern times, there was a need for a place to store these relics. As a result, more and more independent locations were provided with the sole purpose of exhibiting such relics. During the Industrial Revolution of the 18th Century, these exhibition spaces officially started to open to the public. David Dernie categorizes the characteristics of modern exhibitions into three types: a space with a story told through a narrative; a space that provides a two-way dynamic experience within the relationships between space, physical bodies, and time; and a virtual reality space offering extraordinary experiences with the objective of providing stimulating sensory events.

Kotler et al. (2008) categorized museums into four types and referred to traditional and storytelling experiential museum types to broadly describe this categorization[20]. Some research, following this context categorizes museums into either hands-on or hands-off museums, where a hands-on museum usually refers to exhibitions that are assembled by hand or where the audiences themselves are immersed in the exhibition and can touch and directly interact with the exhibition. Hands-off type exhibitions are more of a traditional exhibition type where the objects are viewed without physical contact.

The trend of modern museums is moving from merely displaying exhibition items to implementing

various new light, sound, and video experiences using state of the art technology systems in order to offer a more engaging and dynamic exhibition that is designed around participation and audience involvement. As a part of this new exhibition system, many museums and exhibitions generate audience participation through a docent system. Implementation of robot docents as tour guides in museums or similar exhibitions is believed to enrich the exhibition experience.

Therefore, this research establishes the context based on previous research that categorizes museums into traditional museums and process-oriented experiential museums. Based on this categorization, the response of the audience to the specific area of robot docents was examined.

2.2 Robot personality

Several studies have investigated the effects of robot personality. Lee et al. (2006) performed research using a pet robot AIBO (Artificial Intelligence Robot). They performed between-subject experiments including a gender-balanced 2 x 2 comparison of AIBO personality: introvert vs. extrovert and participant personality: introvert vs. extrovert. The characteristics of the AIBO were adjusted through the pitch of the voice and the size of body gestures to distinguish manifestation of extroverted and introverted personalities[22].

Shin and Choo (2011) conducted robot personality experiments using a video robot and showed that the audience could distinguish between the two character types of the robots, and that most people preferred the extroverted robot type. They also showed that, based on the context of the location, the introverted type was found to be more detail-oriented, predictable, and consistent. They found that participants could accurately recognize a robot's personality based on its verbal and nonverbal behaviors[32].

Also, Joosse et al. (2013) found that robot behavior should vary depending on location of use, as explained through the following quotation: "Household robots would need to adapt their behaviors differently from museum guide robots, robots that pick up trays in hospitals, office robots and so on[15]."

Goetts et al. (2003) found that people's expectation of the robot's role on the situation. The implication of this paper is the design of a robot's form and interaction behaviors will be an important step in the development effective personal service robot[36].

2.3 Experiential factors

Experience is defined as the overall objective reaction that occurs through the direct and indirect interactions between the providing company and the customer and stimulations from certain stimuli. This can be accompanied by various levels of customer participation. Experiential marketing is different from previous marketing in that it views customers as subjective beings rather than the rational beings considered in traditional marketing. Further, experiential marketing aims to stimulate the customer and focuses on creating an experience through the overall aura and image of the consumed brand.

Experiential marketing, which was proposed by Schmitt (1999), has four characteristics. First, it holds the customer experience in high regard. The term experiential refers to sensory, emotional, and psychological stimulation through specific situations. Second, this type of marketing involves research into the actual situations of consumption. Compared to traditional marketing, experiential marketing has a wider product range and scope of competition, so there needs to be a more detailed examination of both

customer and situation regarding product use and consumption. Third, the fact that customers are both rational and emotional must be taken into account. Many existing marketing techniques have the tendency to heavily emphasize the rationality of customers. In comparison, experiential marketing understands the customer as both rational and emotional and provides a distinctive marketing approach based on that understanding. Fourth, marketing tools are multifaceted. Experiential marketing is not limited to one methodology but thrives in a multifaceted dimension.

2.4 Strategic experiential modules

Experience is gained through the direct and indirect observation of or participation in an event or occurrence. Experiential marketing is a marketing method that optimizes and streamlines the customer experience; based on events that appeal to the five senses, it evokes feelings, thoughts, and actions. Schmitt (1999) reported the objective of delivering a holistic experience to the customer through experiential marketing. The holistic experience of a customer is formulated based on strategic experiential modules (SEMs), such as sensing, feeling, thinking, acting, and relating. The five dimensions that compose strategic SEMs can be categorized into personal experiential creations and shared experiential creations. The detailed structure of such holistic experiences is shown in [Fig. 2][31].

Schmitt claimed that various manifestations of experiential hybrids exist based on the composition of elements in each SEM. Also, holistic experiences include an emotional factor along with the previously rationality-based perspective on customers, resulting in an advantage in that a larger variety of approaches can been used to appeal to the individual.

This research, based on the context of the location and the characteristics of the robot, examines the most effective combinations of these two elements in a museum setting. To achieve this, by extracting each factor of the SEMs and measuring the effects according to condition, it is possible to examine the influences of these experiences on the user.

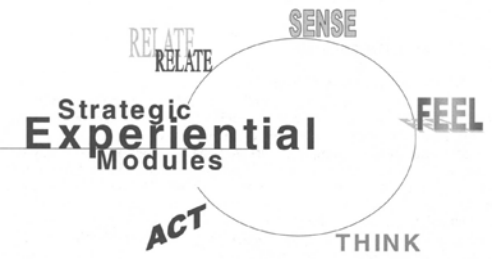

Fig. 2. Strategic experiential modules (Schmitt,1999)

2.4.1 Sensory experience

Sensory experiences stimulate the five senses of sight, hearing, touch, taste, and smell, with the objective of appealing to customers. By stimulating the five senses and providing aesthetic joy and excitement, beauty and satisfaction, the company and product are differentiated while motivating the customers through a message of value. One recent focus of advertising is combination of the five sense elements to provide joy and surprise to customers who are bored with simple and mundane communication. In this research, allowing for a sensory experience by implementing an interactive situation with a robot docent, the factors that stimulate the five senses, such as the voice, actions, and size of the robot's gestures, are examined with regard to influence on customers.

2.4.2 Affective experience

Affective experience is a strategy that evokes particular emotions regarding a company or brand. In

order for affective experiences to influence the moods and feelings of people, sensible stimulations are invoked at the time of consumption and during the process of communication. Customers experience a specific emotion during certain processes, and these emotions have a direct or indirect influence on their decision making. Research related to affective experience claims that prompting people to focus on their emotions can result in changes in behavior. The present research examined the ways in which an affective experience influences people according to the context of the location and the characteristic of the robot.

2.4.3 Creative cognitive experience

The creative cognitive experience introduced by Schmitt (1999) attempts to produce positive recognition of the company and brand. Through shock, curiosity, and entertainment, recognition gives customers accepting or expansive logic. By leading customers to create a new value system, they are made to have a more detailed and creative logic.

The objective of creative cognitive experience is to produce a positive attitude toward a particular company or brand by increasing the level of creative cognitive experience involvement.

The use of a robot docent is expected to enrich the customer's life through direct and indirect experiences and through interactions.

2.4.4 Physical experience

The physical experience detailed by Schmitt can occur as a result of interaction with another person, but it is related to the physical nature of the person or their lifestyle, which can also be seen as the long-term behavior pattern of the person. In the research of Park (2011), the increase in positive attitude toward a shopping mall, the act of searching for products, and changes in the intention to both revisit and purchase product at the shopping mall are viewed as functions of physical experiences. Through physical experience, by reducing customer uncertainties of recognized products or services, these experiences contribute to formation of favorable attitudes that create customer confidence. In this research, the increase in positive attitude toward the robot docent service, the convenience of searching for information, and the changes in the style in which the customer viewed the exhibition were regarded as functions of physical experiences and were measured.

2.4.5 Social-identity experience

The social-identity experience of Schmitt (1999) includes the four elements of senses, emotions, recognition, and behavior. Social-identity experiences have the unique characteristic of connecting not only individuals, but also organizations of individuals and even cultures through brands and services.

The social-identity factor is a very broad concept that includes a sense of connection to other customers or a feeling that one is in charge of the actual marketing of the brand or service. By providing the customers a sense of intimate human connection or community through brands or services, they experience the feeling and satisfaction of belonging to a group.

This research understands the social-identity experience as an experience that provides the feeling of connection or commonality to an individual's ideal sense of being or to another person or a cultural service through a robot docent. Robot docents, which take the general form of humans, can have a large influence on the social-identity experience in the consumption of a service. This concept was applied to the research at hand as a factor that can influence the attitude or behavior, and verification of these responses was conducted.

2.5 Hypotheses

H1: A process-oriented experiential museum has more positive effects on a) sensory experience, b) affective experience, c) creative cognitive experience, d) physical experience, and e) social-identity experience than does a traditional museum.

H2: An extroverted robot docent personality has a more positive effect on a) sensory experience, b) affective experience, c) creative cognitive experience, d) physical experience, e) social-identity experience than does a robot docent with an introverted personality.

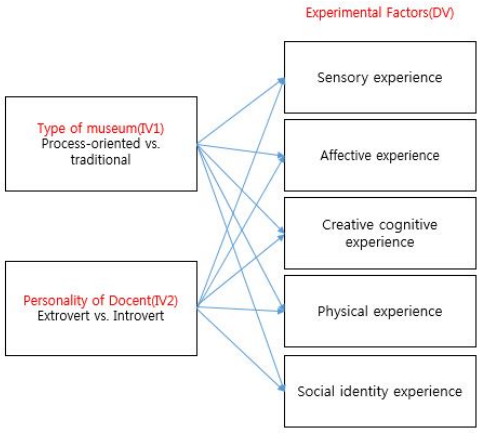

Fig. 3. Research model

III. Methods

This study was conducted as a between-subjects experiment with a 2 (introvert/ extrovert) x 2 (traditional museum/process- oriented experiential museum) matrix.

3.1 Participants and independent variables

A total of 64 undergraduate students form a large university in South Korea participated in this experiment. Participants were randomly assigned to one of four conditions. The robot used in the experiment was an NAO robot. The four robot/museum combinations of introverted - traditional museum guide, introverted - process-oriented experiential museum guide, extroverted - traditional museum guide, extroverted - process-oriented experiential museum guide included both action and voice.

Table 1. Experiential conditions

Classification	Extrovert	Introvert
Process-oriented Museum Condition	PO*E(N=16)	PO*I(N=15)
Traditional Museum Condition	T*E(N=16)	T*I(N=17)

1.1 Robot personality

Based on previous studies, the extroverted modes used more body language, with larger and faster movements compared with the introverted mode. Also, the speed and pitch of the speech were slightly higher for the extroverted robot, while introverted mode used a relatively slow, quiet voice with slow body movements.

1.2 Museum context

With regard to the context of location, to reduce contamination according to the level of interest, the same content, a Linda McCartney photography exhibition, was presented to all participants. In the process-oriented experiential museum, the exhibition was designed to include photo sharing.

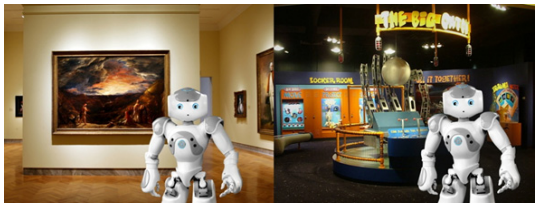

Fig. 4. Robot docent conditions
(traditional museum/process-oriented experiential museum)

3.2 Procedure

Participants were randomly assigned to one of four experiential conditions. Upon arrival in each experimental setting, participants were welcomed by the research team. Each participant was then told the objective of the experiment and was given the opportunity to provide consent or decline to participate. A pre-survey was administered after the individuals agreed to participate.

To compensate for contamination due to the popularity or reputation of characters based on previous interest in the content, the test subjects were shown the photographs of the characters that would be presented in the test. Those were could not identify the individuals shown in the photographs were chosen for inclusion in the study, and it was explained that the people in the photographs were not celebrities. The WoZ (Wizard of Oz) method was used to present photographs to the test subjects using a digital blackboard. Then the same content was shown in the next room in the same order using the explanation of the robot.

Then participants were allowed to interact with the robot for about 10 minutes. The robot provided descriptions of three photographs. At the conclusion of the interactions, the participants filled out a distributed questionnaire. After the written survey was completed, a 10 minute interview was conducted based on the survey responses.

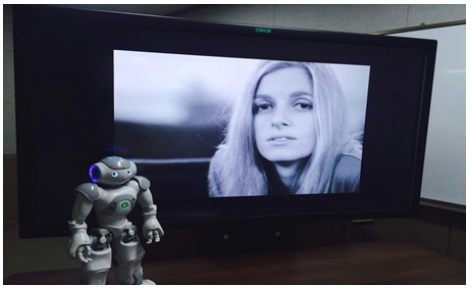

Fig. 5. Experiential conditions

3.3 Data analysis

Excluding any insincere and incomplete participant responses, the data from 60 test subjects was analyzed. In order to conduct the analysis using the JMP statistics package program, the survey data was coded appropriately. A frequency analysis was conducted to investigate the demographic distribution and general characteristics of the test subjects. A reliability analysis using Cronbach's alpha coefficient was conducted to allow for a comparison according to the characteristics of the robot and the context of the location. A two-way full factorial ANOVA was applied to examine the differences in the groups and to verify the validity and reliability of the experiential marketing and the intention of action. The full factorial ANOVA shows the primary influences of all the factors and covariants, as well as the interactive influences between all of the factors.

Ⅳ. Results

4.1 Manipulation check

To determine if the characteristics of the robot and the context of the location were properly implemented, a pre-test manipulation check was performed. A survey was conducted to determine if the statements regarding the characteristics of the robot were more closely related to the traditional museum or the process-oriented experiential museum. After conducting the survey, interviews were conducted based on the survey content in order to examine the conditions surrounding the evaluations.

4.2 The types and categories of museums

For the first time, a two-way full factorial ANOVA with identity response was conducted to test the entire model, and a reliability test was used to

determine the validity of the statements. Then, to investigate the main parameters affecting H1: 'The process-oriented experiential museum condition has a more positive effect on sensory experiences compared to the traditional museum,' ANOVAs were conducted. The results showed that the main effect of sensory experience was significant ($p<0.0013$).

4.2.1 Sensory experience

The degree of sensory experience in the process-oriented experiential museum condition (M=4.57, SE=.12799) was significantly higher than that in the traditional museum condition (M=3.95, SE=.12799). The results showed that the main effect of sensory experience was significant ($p<0.0013$).

4.2.2 Affective experience

The degree of affective experience in the process-oriented experiential museum condition (M=5.04444, SE=.19434) was significantly higher than that in the traditional museum condition (M=4.12222, SE=19434.). The results showed that the main effect of affective experience was significant ($p<0$).

4.2.3 Creative cognitive experience

The degree of creative cognitive experience in the process-oriented experiential museum condition (M=5.50, SE=.14959) was significantly higher than that in the traditional museum condition (M=5.04, SE=.14959). The results showed that the main effect of creative cognitive experience was significant ($p<0.0339$).

4.2.4 Physical experience

The degree of physical experience in the process-oriented experiential museum condition (M=4.95, SE=.17274) was significantly higher than that in the traditional museum condition (M=4.266, SE=.17274). The results showed that the main effect of physical experience was significant ($p<0.0066$).

4.2.5 Social-identity experience

The degree of social-identity experience in the process-oriented experiential museum condition (M=4.6, SE=.19574) was significantly higher than that in the traditional museum condition (M=3.78, SE=.19574). The results showed that the main effect of social-identity experience was significant ($p<0.0049$).

4.3 Robot personality

Full factorial ANOVA verified H2: 'The extrovert personality robot docent condition has more positive effects on (a) sensory experience, b) affective experience, c) creative cognitive experience, d) physical experience, e) social-identity experience) compared to the introvert personality robot docent condition.' When examining differences in the characteristics of the robot, only the social-identity experience factor was significant. The degree of social-identity experience in the extroverted condition (M=4.63, SE=.19574) was significantly higher than that of the introverted condition (M=3.755, SE=.19574). The main effects of social-identity experience related to the characteristics of the robot were found to be significant ($p<0.0025$). It is interesting that interaction effects were present in all conditions.

4.4 Interaction effects

All of conditions that showed interaction effects, it is interesting that the results of interaction between type and category of museums and robot personality showed a significant effect on sensory experience ($p=<.0001$), affective experience ($p=<0.0001$), creative cognitive experience ($p=<0.0001$), physical experience ($p=<0.0001$), and social-identity experience ($p=<0.0001$). As a detail of data showed [Fig. 6-11].

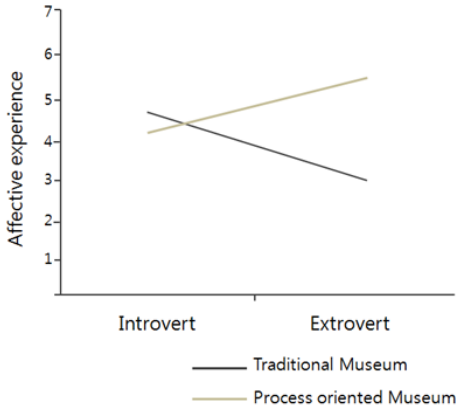

Fig. 6. Experiential Sensory

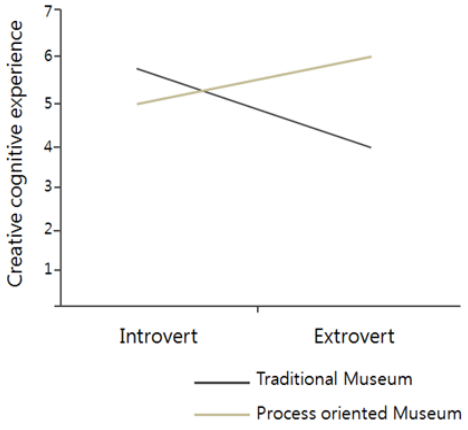

Fig. 9. Interaction effect of Creative cognitive

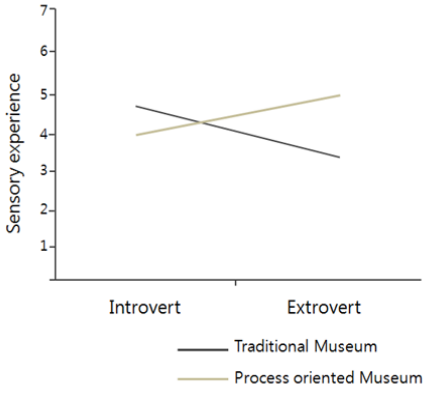

Fig. 7. Interaction effect of Affective

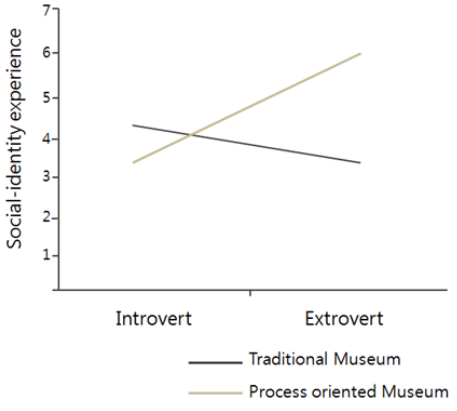

Fig. 10. Interaction effect of social-identity

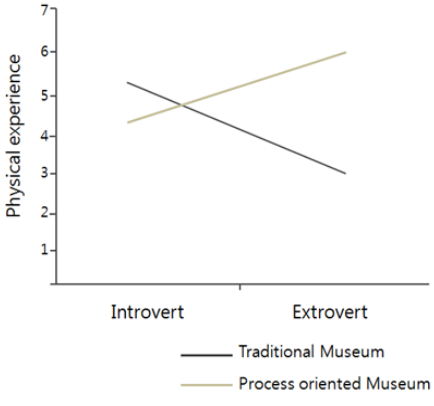

Fig. 8. Interaction effect of Physical

V. Discussion

Exhibitions are not merely a simple display of artifacts, but are a comprehensive form of communication that conveys a specific meaning or objective to the general public[37]. The objective of an exhibition is communication between visitor and exhibition. This communication occurs through a variety of experience types. The actual experience influences the satisfaction and behavioral intent of the visitor and is the objective of a variety of studies.

The present research had the objective of examining how experiential factors are evaluated dependent on museum content and robot personality.

'Experience' is defined as a new marketing paradigm that can offer a competitive advantage where there is both fierce competition among companies and a plethora of choices for consumers or users[38]. Various experiences are provided to encourage more museum and art gallery visits and also to provide differentiated services. Unlike the previous classification scheme, where locations are designated as either 'museums' or 'art galleries,' various types of experiences are provided depending on the content specific to folk culture museums, science museums, and traditional music museums.

In alignment with this era of competition regarding experiences, this research applied different docent robot characteristics in two museums with different contexts and investigated the most appropriate docent robot characteristics for the particular type and context of museum.

An ANOVA was conducted using JMP, a statistical analysis package, and the results are as follows. First, customers evaluated experiential factor differently depending on the type of museum. Each of the factors, which were evaluated using SEM modules, was evaluated differently depending on the type of location, and there was a larger influence in the process-oriented museum context. Second, differences dependent on the characteristics of the robot were found to be significant only for social-identity experience. Third, each of the factors that were evaluated using SEMs modules was shown to significantly influence attitude.

It is interesting that interaction effects were present in all measured results. Robot personality was not shown to be significant as a single factor but was significant as a combination factor with location and personality. Also, when independently evaluating personality factors, there was a stronger preference for extroverted personality over introverted personality; however, in the traditional museum context, the extroverted personality was shown to be a negative factor. This shows the possibility of the benefit of changing the personality of the robot dependent on the context and characteristics of the location. In other words, an extroverted robot personality can be suggested to be appropriate for locations that emphasize participatory context, while an introverted robot personality can be suggested to be appropriate for locations that need to be viewed calmly.

The results of this study should be approached with caution for several reasons. First, the findings reflect only limited aspects of user experiences of museum context with robot docent in an experimental environment. As the concept of robot docent is still in its early stages of development, this research is merely exploratory.

참 고 문 헌

[1] H. Aarts and A. Dijksterhuis, "Habits as knowledge structures: automaticity in goal-directed behavior," Journal of Personality and Social Psychology, Vol.78, No.1, pp.53-63, 2000.

[2] J. Ap and K. K. Wong, "Case study on tour guiding: Professionalism, issues and problems," Tourism Management, Vol.22, No.5, pp.551-563, 2001.

[3] T. Bennett, *The birth of the museum: History, theory, politics,* Routledge, 2013.

[4] B. L. Bonner, "The effects of extroversion on influence in ambiguous group tasks," Small Group Research, Vol.31, No.2, pp.225-244, 2000.

[5] D. P. Campbell, L. Crichton, J. I. Hansen, and P. Webber, “A new edition of the SVIB: The Strong-Campbell Interest Inventory,” Measurement & Evaluation in Guidance, 1974.

[6] W. H. Delone and E. R. McLean, “The DeLone and McLean model of information systems success: a ten-year update,” Journal of Management Information Systems, Vol.19, No.4, pp.9-30, 2003.

[7] C. F. DiSalvo, F. Gemperle, J. Forlizzi, and S. Kiesler, “All robots are not created equal: the design and perception of humanoid robot heads,” InProceedings of the 4th conference on Designing interactive systems: processes, practices, methods, and techniques, pp.321-326, 2002.

[8] T. Fong, I. Nourbakhsh, and K. Dautenhahn, “A survey of socially interactive robots,” Robotics and Autonomous Systems, Vol.42, No.3, pp.143-166, 2003.

[9] B. Friedman, P. H. Kahn Jr, and J. Hagman, “ Hardware companions?: What online AIBO discussion forums reveal about the human-robotic relationship,” In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp.273-280, 2003.

[10] S. D. Gosling, P. J. Rentfrow, and W. B. Swann, “A very brief measure of the Big-Five personality domains,” Journal of Research in personality, Vol.37, No.6, pp.504-528, 2003.

[11] J. Goetz, S. Kiesler, and A. Powers, “Matching robot appearance and behavior to tasks to improve human-robot cooperation,” InRobot and Human Interactive Communication, 2003 Proceedings, ROMAN 2003, The 12th IEEE International Workshop, pp.55-60, 2003.

[12] A. L. Grinder and E. S. McCoy, *The good guide: a sourcebook for interpreters, docents, and tour guides*, Ironwood Press, 1985.

[13] H. Hüttenrauch, A. Green, M. Norman, L. Oestreicher, and K. S. Eklundh, “Involving users in the design of a mobile office robot,” Systems, Man, and Cybernetics, Part C: Applications and Reviews, IEEE Transactions on, Vol.34, No.2, pp.113-124, 2004.

[14] O. P. John, E. M. Donahue, and R. Kentle, *The big-five inventory, technical report, insititute of personality and social research*, University of California, Berkeley, CA, 1991.

[15] M. Joosse, M. Lohse, J. G. Perez, and V. Evers, “What you do is who you are: the role of task context in perceived social robot personality,” In Robotics and Automation (ICRA), IEEE International Conference, pp.2134-2139, 2013.

[16] S. G. Kang, *The influence of virtual experiential marketing on customer attitude and purchase intention: focusing on online shopping mall,* Gachon University, 2014.

[17] K. J. Kim, E. Park, and S. S. Sundar, “Caregiving role in human - robot interaction: A study of the mediating effects of perceived benefit and social presence,” Computers in Human Behavior, Vol.29, No.4, pp.1799-1806, 2013.

[18] M. K. Kim, *The effect of docent and mobile-guide on the satisfaction of visitors: depending on the type of the museum and viewing experience,* Korea University, 2010.

[19] R. Korn, “An analysis of differences between visitors at natural history museums and science centers,” Curator: The Museum Journal, Vol.38, No.3, pp.150-160, 1995.

[20] N. G. Kotler, P. Kotler, and W. I. Kotler, *Museum marketing and strategy: designing missions, building audiences, generating revenue and resources*, John Wiley & Sons, 2008.

[21] S. Lauriar, G. Bugmann, T. Kyriacou, J. Bos, and E. Klein, “Training personal robots using

natural language instruction," IEEE Intelligent Systems, Vol.5, pp.38-45, 2001.

[22] K. M. Lee, W. Peng, S. A. Jin, and C. Yan, "Can robots manifest personality?: An empirical test of personality recognition, social responses, and social presence in human-robot interaction," Journal of Communication, Vol.56, No.4, pp.754-772, 2006.

[23] T. McGill, V. Hobbs, and J. Klobas, "User developed applications and information systems success: A test of DeLone and McLean's model," Information Resources Management Journal, Vol.16, No.1, pp.24-45, 2003.

[24] C. Nass, and Y. Moon, "Machines and mindlessness: Social responses to computers," Journal of Social Issues, Vol.56, No.1, pp.81-103, 2000.

[25] S. Parise, S. Kiesler, L. Sproull, and K. Waters, "Cooperating with life-like interface agents," Computers in Human Behavior, Vol.15, No.2, pp.123-142, 1999.

[26] J. H. Park, "The case study of experience marketing for brand strategy," The Treatise on The Plastic Media, Vol.14, No.3, pp.67-76, 2011.

[27] H. T. Park, *A study on the development system of cultural products for expanding the culture services and reinforcing the financial stability of the museum,* Hongik University, 2007.

[28] E. Petkus, "Enhancing the application of experiential marketing in the arts," International Journal of Nonprofit and Voluntary Sector Marketing, Vol.9, No.1, pp.49-56, 2004.

[29] H. Prendinger and M. Ishizuka, "Let's talk! Socially intelligent agents for language conversation training," Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions on, Vol.31, No.5, pp.465-471, 2001.

[30] R. Prentice, "Experiential cultural tourism: Museums & the marketing of the new romanticism of evoked authenticity," Museum Management and Curatorship, Vol.19, No.1, pp.5-26, 2001.

[31] B. Schmitt, "Experiential marketing," Journal of marketing management, Vol.15, No.1, pp.53-67, 1999.

[32] D. Shin and H. Choo, "Modeling the acceptance of socially interactive robotics: Social presence in human-robot interaction," Interaction Studies, Vol.12, No.3, pp.430-460, 2011.

[33] S. Thrun, M. Beetz, M. Bennewitz, W. Burgard, A. B. Cremers, F. Dellaert, and D. Schulz, "Probabilistic algorithms and the interactive museum tour-guide robot minerva," The International Journal of Robotics Research, Vol.19, No.11, pp.972-999, 2000.

[34] H. D. Yang, A. Y. Park, and S. W. Lee, "Gesture spotting and recognition for human-robot interaction," Robotics, IEEE Transactions on, Vol.23, No.2, pp.256-270, 2007.

[35] L. A. Zebrowitz, M. A. Collins, and R. Dutta, "The relationship between appearance and personality across the life span," Personality and Social Psychology Bulletin, Vol.24, No.7, pp.736-749, 1998.

[36] Jennifer Goetz, Sara Kiesler, and Aaron Powers, "Matching robot appearance and behavior to tasks to improve human-robot cooperation," Robot and Human Interactive Communication, 2003 Proceedings, ROMAN 2003, The 12th IEEE International Workshop on IEEE, 2003.

[37] 신동희, 김희경, "디지털 사이니지의 공간성," 한국콘텐츠학회논문지, 제15권, 제8호, pp.77-84, 2015.

[38] 신동희, 김희경, "소셜 시청(viewing)의 사용자 경험적 분석: 사용자 경험기반의 소셜 TV," 한국콘텐츠학회논문지, 제14권, 제12호, pp.112-122, 2014.

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