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The Effect of Non-verbal Communication using Cinemagraph in Mobile Electronic Commerce of Agrifood on Visual Attention and Purchase Intention

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Abstract This paper is a study on what kind of effect non-verbal communication in mobil electronic commerce has on purchase intention and visual attention. For this purpose, the screen of mobile shopping mall produced arbitrarily was exposed to the experimental group and the control group. The experimental group was exposed to the screen of mobile shopping mall that expressed non-verbal communication making use of cinemagraph images and the control group was exposed to the screen of mobile shopping mall based on still images. For the study, survey research and experimental research were conducted simultaneously. Data of survey research were analyzed by MANOVA and t-test, and by using eye-tracker experimental research recorded the duration of time that the subjects stared images. The results of experiment show that in non-verbal communication the experimental group that saw cinemagraph images recorded shorter average staring time than the control group that saw ordinary images, and the cinemagraph had statistically significant effect on visual attention as well. And it was analyzed that non-verbal communication had significant effect on the purchase intention of the experimental group, but had no effect on the purchase intention of the control group. The results can be interpreted that the people who saw cinemagraphs in mobile shopping environment had spent shorter time in seeing products than the people who saw ordinary images, but still the former came to have purchase intention on the products. The results of the present study can be useful for marketers who try to sell agrifood in mobile environment.

Keywords Cinemagraph, Purchase Intention, Eye-tracking, Non-verbal communication

1 Introduction

With the recent spread of smart phones, consumers came to use smart phones to enjoy convenient shopping anytime and anywhere. The size of mobile shopping market was 3.97 trillion won as of 2013 and expected to continue to grow in the future [1]. According the 2013 'Mobile Internet Use Survey' by Korean Internet and Security Agency on 6,000 people over 12 years nationwide in June and July 2013 [1], 36.4% of mobile Internet users used mobile shopping, and among them, 91.8% used search of products or services, 53.7% checked order and delivery confirmation, 53.7% checked discount/promotion information or obtained coupons. Users of mobile shopping was found to spend much time and energy on product search. This shows product search is very important for the mobile shopping users, but there has not been enough research on this yet.

The present study tries to examine how non-verbal communication of shopping model on the screen of product details that consumers can encounter during their product search affect their visual attention and purchase intention. The definition of non-verbal communication here is the communication with others using gestures, time, or space rather than verbal expression [9]. For the study, the sub-

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jects were exposed to various forms of facial expressions, behavior, and postures of photographic models to explain the products. And in order to express non-verbal communication of the shopping models, experimental sample images were produced by using cinemagraph images and still images. For accurate data collection of visual attention of the subjects, the eye movement of the subjects were measured by eye-tracker and a survey was conducted.

2 Theoretical Background and Research Hypotheses

2.1 Non-verbal Communication Image Appeal and Uncertainty Reduction Theory

More often than not, non-verbal communication is complemented by verbal messages to be delivered as a more decisive message [3]. Non-verbal communication is delivered together with verbal communication with its grammatical rules, which are a linguistic aspect. Dodd (1998) has pointed out that non-verbal communication can complement the message of verbal communication, deny verbal communication, or reaffirm the verbal message, and can also replace verbal communication. These aspects of non-verbal communication were studied in marketing area as well. Kim, Jae-Eun and 2 other researchers (2009) studied how the appearance of the sales clerk working in the store affect the emotions and memories of customers as well as their purchase; Lee Ok-hee (2012) studied the effect of non-verbal communication on trust, switching barrier, and repurchase intention. And many other research results show that non-verbal communication can replace verbal communication, and affects service quality, brand attitude, credibility, purchase and repurchase intention, and emotions and memories of customers. Based on previous research, the present study tries to examine whether non-verbal communication influences the purchase intention of customers in on-line environment too. Especially, because unlike the off-line environment, the on-line environment only provides limited information such as visual and auditory information, customers face uncertainty about information for product purchase.

According to Uncertainty Reduction Theory [6], customers have a tendency to maximize value of product purchase through behavior to reduce risk related to uncertainty so that they can diminish lack of information on products they want to consume [14]. Therefore, Cue Rich Environment in shopping environment can diminish uncertainty about purchase, non-verbal expression of the shopping model also can work as a cue to diminish uncertainty, which finally can reduce the risk the uncertainty about purchase [14]. The present study proposed cinemagraph images as a way to reduce the uncertainty about detailed product photos in mobile shopping environment and the following section discusses cinemagraph.

2.2 Cinemagraph

Cinemagraph is characterized by the fact that a certain part of the picture is played as a moving image and its designer can intentionally provide the motion cue [13]. It came to be known from 2011 by the American fashion photographers Jamie Beck and Kevin Burg through The Huffington Post. As a genre of photography, cinemagraph is frequently used in photographic art, and recently it is also studied in marketing area. In the environment of image electronic commerce, Jiseob Park (2014) conducted a comparative experiment on a cinemagraph and a still image of a food product. The result has confirmed that cinemagraph enhances purchase intention, brand attitude, perceived monetary value, perceived freshness, and perceived flavor. Based on previous research, the present study inserted into the product not photographs but motion cues such as facial expressions, gestures, and movement of the model in order to express non-verbal communication of the shopping model.

2.3 Purchase Intention

Purchase intention means the possibility that consumers' conviction or attitude to the future planned or expected can be translated into real action [5], and since it implies the possibility to predict the consumer behavior, high purchase intention means a high possibility to actually purchase the product [10]. The present study used the images produced for non-verbal communication in the mobile shopping environment as a variable to measure how much consumers have purchase intention on the product after they see the images.

2.4 Research Hypotheses

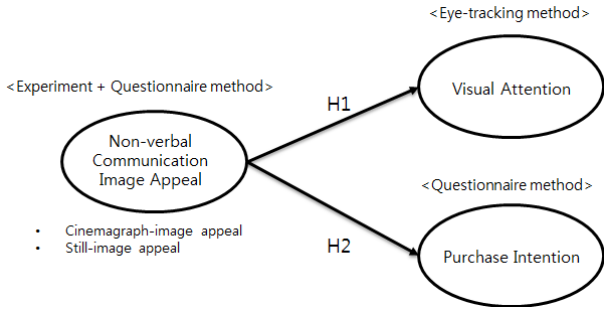


Fig. 1 Research Model

The present study proposes research model consisting of 3 variables as shown in Fig. 1. Cyr et al. [8] have pointed out that images in on-line environment can generate emotional responses in people and high human image appeal leads to high trust. Also, according to the research of Young Wook Seo at al., which was based on the research of Cyr at al., Human Brand Image Appeal influences purchase intention. The present study is also an examination what kind of influence the expression of non-verbal communication has on the purchase intention of consumers in the mobile shopping environment and suggests hypotheses as follows:

H1: In mobile shopping environment, non-verbal communication of the shopping model will influence visual attention.

H2: In mobile shopping environment, non-verbal communication of the shopping model will influence purchase intention.

3 Experiment and Analysis

3.1 Experimental Design and Procedure

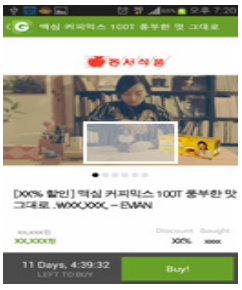
Participants

For this study, 30 undergraduate and graduate students of Yonsei University in Seoul have been recruited. Of the participants, 18 were male and 12 were female. As for the age groups, 36.6% of participants were 21~25years old, 22.0% were 26~30 years old, 12.2% were 31~35 years old. The participants were of the young generation who usually use mobile devices for shopping. 68.3% of participants in the experiment had experienced mobile shopping, and 24 participants (58.5%) replied that they use mobile shopping 1 to 3 times per month on average. And to the question 'if they regard the product image as important in mobile shopping mall,' 26 participants (63.4%) replied positively. To the question 'whether they rather consult product descriptions often,' 27 participants (46.3%) replied positively. And to the question 'are you hungry at the moment,' 19 participants (46.3%) replied negatively.

Materials and design

As a study aiming to promote the sale of agrifood in on-line environment, the present study consulted recent news articles on electronic commerce [2] to select food samples that customers purchased the most from on-line stores in 2014. The research has shown the order of 1) coffee 2) water 3) tea 4) nuts 5) diet foods. Especially, it was found that the most frequent purchase was through mobile social commerce. So the present study made the sample in a style similar to the Groupon mobile social commerce shopping mall. 5 of the selected samples have product details pages produced in accordance with the actual mobile shopping environment. Also, consulting the non-verbal communication method studied by D. S. Sundaram (2000), samples were prepared in the following 5 types. 5 cinemagraph-type product details pages and 5 still-image-type product details pages were prepared for pseudo language sample (coffee), postures sample (diet food), facial expressions sample (nuts), appearance sample (tea), and spatial behavior sample (water). Produced samples are shown in Table 1.

Table 1 Experimental samples

Category	Cinemagraph-image (rectangular box is movement area)	Still-Image
Pseudo Language (Coffee)		

Postures (Diet)		
Facial Expressions (Nuts)		
Appearance (Tea)		
Aroxemics (Water)		

Experimental Procedure

Sufficient explanation on experimental procedure was given to the participants before the experiment, and the participants who saw the cinemagraph images were grouped as experimental group and the participants who saw the still images were grouped as control group randomly, and were placed to sit at the computer desk each installed with Tobii T120 eye-tracker and smart phone cradle. The experiment was carried out as the participants read the experiment instructions drawn up in Microsoft Power Point format on the screen on the desk, and they moved to the next stage when they finished reading. The samples shown to them were on Galaxy Note 2 (resolution: 20 x 1280, LCD size: 144mm), and the eye-tracker was calibrated before the samples were shown.

Participants were exposed to the samples in the order of pseudo language sample (coffee), postures sample (diet food), facial expressions sample (nuts), appearance sample (tea), and spatial behavior sample (water). And after seeing each sample, they were asked to complete the questionnaire consisting of 7-point Likert scale. While the participants were watching the samples eye-tracker tracked their eyes, and after the experiment are completed, 5,000 won was given to them as reward. The experiment took on average 20 minutes.

3.2 Experimental Results and Analysis

Using the SPSS 19.0 version, the hypothesis about the

survey data was tested and survey data were analyzed. Eye-tracker data were analyzed by Tobii Studio software. To analyze visual attention, the present study divided the shopping mall screen into 3 parts of AOI (Area of Interest): Brand Area, Product Area, and Message Area. And fixation length of each area of the two groups was recorded to be compared and analyzed.

Table 2 shows the mean and standard deviation for each group on the dependent variable for the degree of visual attention and purchase intention based on the five non-verbal types of communication. In almost all sectors including purchase intention, the control group (still-image group) spent longer average staring time than the experimental group (the cinemagraph-image group). But the experimental group recorded higher than the control group in Brand AOI of facial expressions, appearance, and spatial behavior and Product AOI of appearance. Fig. 2 shows the results in graph. Fig. 3 represents analysis of Heat-map for each group and AOI settings screen.

(Note1 PLMAOI: Pseudo Language Message AOI, PLBAOI: Pseudo Language Brand AOI, PLPAOI: Pseudo Language Product AOI, PLAOI: Posture Message AOI, PBAOI: Posture Brand AOI, PPAOI: Posture Product AOI, FMAOI: Facial Exression Message AOI,FBAOI: Facial Expression Brand AOI, FPAOI: Facial Expression Product AOI, APMAOI: Appearance Message AOI, APBAOI: Appearance Brand AOI, APPAOI: Appearance Product AOI, ARMAOI: Aroxemics Message AOI, ARBAOI: Aroxemics Brand AOI, ARPAOI: Aroxemics Product AOI

(Note2) Visual Attention : Area of Interest (AOI) - Area Fixation Length

Table 2 Group means for the two dependent variables

Group	N	Visual Attention																										Purchase Intention	
		Pseudo Language(Coffee)						Posture (Diet)						Facial Expression (Nuts)						Appearance (Tea)						Aroxemics (Water)							
		Message AOI		Brand AOI		Product AOI		Message AOI		Brand AOI		Product AOI		Message AOI		Brand AOI		Product AOI		Message AOI		Brand AOI		Product AOI		Message AOI		Brand AOI		Product AOI			
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
CIA	14	1.51	1.50	3.07	4.41	3.79	2.99	1.92	1.52	3.13	4.69	2.98	2.88	1.57	1.44	4.29	4.88	2.76	2.95	2.04	1.71	3.69	4.50	3.81	1.82	1.17	1.08	3.89	5.06	2.30	1.54	4.13	0.77
SIA	16	1.99	2.12	3.80	3.93	4.21	3.29	2.12	2.69	3.95	3.74	3.32	2.69	1.73	1.48	4.18	3.20	2.89	2.10	2.49	2.97	2.95	2.66	3.44	2.11	1.65	2.07	3.45	2.82	2.96	2.86	4.235	0.73

(Note) CIA: Cinemagraph-image Appeal, SIA: Still-image Appeal, M: Mean, SD: Standard Deviation, AOI: Area of Interest

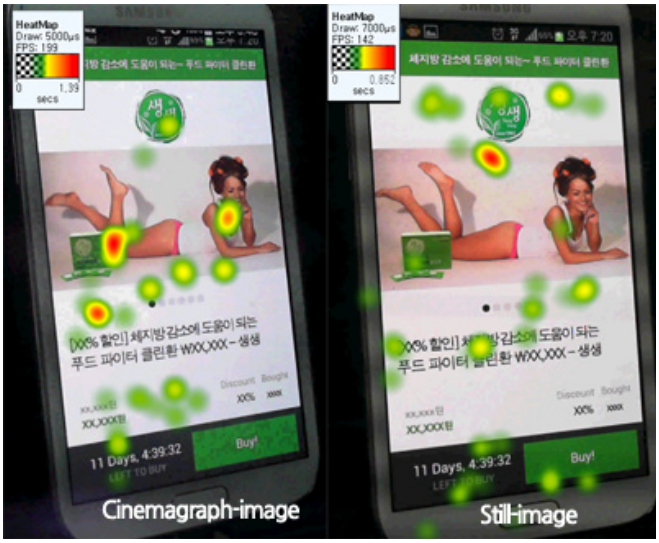


Fig. 2 Comparison of AOI between two groups

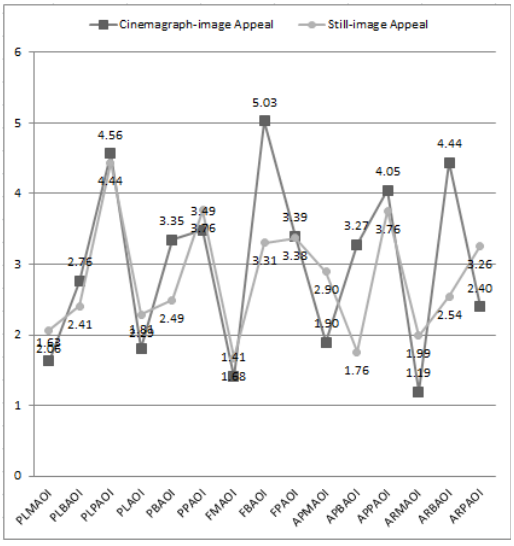


Fig. 3 Heat map measured by eye-tracking

Table 3 A Summary of the Result of the Multivariate Analysis of Variance

Independent Variable	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Pseudo Language (Coffee)	Message AOI	0.032	1	0.032	0.009	0.926
	Brand AOI	8.188	1	8.188	0.727	0.403
	Product AOI	5.245	1	5.245	0.427	0.520
	Purchase Intention	0.206	1	0.206	0.859	0.364
Postures (Diet)	Message AOI	9.146	1	9.146	1.510	0.232
	Brand AOI	12.938	1	12.938	1.024	0.322
	Product AOI	9.452	1	9.452	1.238	0.277
	Purchase Intention	0.754	1	0.754	3.145	0.089*
Facial Expressions (Nuts)	Message AOI	0.016	1	0.016	0.008	0.931
	Brand AOI	12.188	1	12.188	0.607	0.444
	Product AOI	6.943	1	6.943	0.595	0.448
	Purchase Intention	0.477	1	0.477	1.989	0.172
Appearance (Tea)	Message AOI	1.007	1	1.007	0.119	0.734
	Brand AOI	11.742	1	11.742	1.350	0.257
	Product AOI	6.732	1	6.732	1.627	0.215
	Purchase Intention	2.408	1	2.408	10.046	0.004***
Aroxemics (Water)	Message AOI	0.096	1	0.096	0.031	0.861
	Brand AOI	0.000	1	0.000	0.000	0.998
	Product AOI	4.542	1	4.542	0.675	0.420
	Purchase Intention	1.023	1	1.023	4.267	0.05**

Table 3 shows results of MANOVA for the group means for the two dependent variables of non-verbal communication (pseudo language, facial expressions, appearance, and spacial behavior) and the dependent variables for the two groups (visual attention and purchase intention). The survey shows F-statistic of posture, appearance, and spatial behavior is valid and there are differences between the two groups.

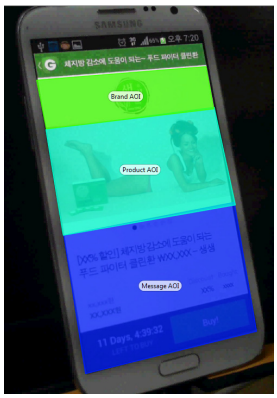


Fig. 4 AOI (Area of Interest)

Table 4 is a table supporting this, and it was confirmed that Brand AOI of pseudo language and Brand AOI of posture were valid. Table 5 only represented the variable of purchase intention of each group in MANOVA results, and the analysis shows that while the control group had no effect on purchase intention, the appearance and spatial behavior of the experimental group had significant effect on purchase intention. That is, compared to the control group that was exposed to ordinary still-images with no non-verbal communication applied, the experimental group that was exposed to cinemagraphs used for non-verbal communication had significant effect on purchase intention in appearance (tea), spatial behavior (water). Table 6 shows t-text of each AOI Data (time of staring) to test if each group shows statistical difference in Brand AOI, Product AOI, and Message AOI of visual attention. The analysis shows no AOI was statistically significant. However, the MANOVA Contrast Results in Table 4 showed there were significant differences in the sector of Brand AOI between the experimental group and the control group. Therefore, Hypothesis 1 (H1) that in mobile

shopping environment, non-verbal communication of the shopping model will influence visual attention compared to non-verbal communication was partially adopted. And H2 was also partially adopted because cinemagraph images of non-verbal communication had significant effect on purchase intention.

Table 4 MANOVA Contrast Results

Contrast		Dependent variable															
		Visual Attention															Purchase Intention
		Pseudo Language (Coffee)			Posture (Diet)			Facial Expression (Nuts)			Appearance (Tea)			Aroxemics (Water)			
		Message AOI	Brand AOI	Product AOI	Message AOI	Brand AOI	Product AOI	Message AOI	Brand AOI	Product AOI	Message AOI	Brand AOI	Product AOI	Message AOI	Brand AOI	Product AOI	
Cinemagraph-Image Appeal versus Still-Image Appeal	Mean Difference	-0.924	-3.638	-2.101	-0.287	-3.752	-0.862	-0.001	-1.884	0.740	-0.528	-2.184	-0.889	-0.496	-0.771	-1.129	0.005
	Standard Error	1.033	1.819	1.901	1.335	1.928	1.498	0.794	2.430	1.853	1.580	1.599	1.103	0.951	2.352	1.406	0.265
	Significance	0.381	0.057*	0.281	0.832	0.064*	0.571	0.999	0.446	0.693	0.741	0.185	0.429	0.607	0.746	0.430	0.985

Table 5 The Result of MANOVA for Purchase Intention between Group

Group	Independent Variable	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Cinemagraph-Image Appeal	Pseudo Language(Coffee)	Purchase Intention	0.004	1	0.004	0.032	0.862
	Posture (Diet)		0.005	1	0.005	0.035	0.857
	Facial Expression (Nuts)		0.215	1	0.215	1.599	0.242
	Appearance (Tea)		1.355	1	1.355	10.078	0.013**
	Aroxemics (Water)		0.860	1	0.860	6.392	0.035**
Still-Image Appeal	Pseudo Language(Coffee)	Purchase Intention	0.228	1	0.228	0.624	0.448
	Posture (Diet)		0.782	1	0.782	2.142	0.174
	Facial Expression (Nuts)		0.065	1	0.065	0.179	0.681
	Appearance (Tea)		0.403	1	0.403	1.105	0.318
	Aroxemics (Water)		0.435	1	0.435	1.192	0.300

Table 6 T-test Results for Visual Attention of Non-verbal communication Group

	Mean		Standard Deviation		t-value	Mean Difference	Sig.
	CIA	SIA	CIA	SIA			
Brand AOI	1.64	2.00	1.09	2.17	−0.574	−0.35	0.572
Product AOI	3.61	3.66	3.56	2.86	−0.042	−0.05	0.967
Message AOI	3.13	3.36	2.34	2.02	−0.296	−0.24	0.772

4 Discussion and Conclusion

The present paper was a study on what kind of effect non-verbal communication had on purchase intention and visual attention in mobile electronic commerce of agrifood.

The results of this study can be summarized as follows:

First, as for visual attention, the experimental group mostly had shorter means of Fixation Length in Message AOI, Brand AOI, and Product AOI in comparison with the control group; but in Brand AOI in facial expressions, appearance, and spatial behavior of the experimental group shows longer average time than the control group. Second, in the experimental group, appearance and spatial behavior influenced purchase intention; but in the control group, they did not influence purchase intention at all. Third, t-test on visual attention of the experimental group and the control group shows there was no statistically significant difference between the two groups.

Theoretical contribution of the present study can be found first in the fact that it suggested non-verbal communication in mobile shopping environment has effect on purchase intention in the areas of spatial behavior and appearance. therefore, cinemagraph image is appropriate for non-verbal communication. Second, it conducted survey and eye-tracking research method simultaneously so that it could provide a supplement through experimental research to the limitation of the survey.

Practical contribution of the present study could be found first in the fact that it carried out research in mobile agrifood shopping environment. Because in the rapidly increasing mobile shopping market trend, the importance of the mobile environment in which agrifood is traded, the present study can be assessed that it carried out timely research. Second, it selected 5 food samples and shopping models foe this study. Since the foods selected were based on the foods sold the most in social commerce in 2014, the results of the present study could be helpful to the food marketers of Internet business companies who try to sell foods in mobile market.

Further discussion should be followed in areas as follows: Jiseob Park (2014) maintained that when Motion cue is inserted into the cinemagraphic photo of food, there was improvement in brand attitude, perceived monetary value, and perceived flavor, perceived freshness, and purchase intention. The present study has found out that not the food photos themselves but various non-verbal forms of communication of the shopping mall model to explain the food too influence purchase intention. The present study shows that although the participants had shorter average Fixation Length on cinemagraphs than on still images, only the group that watched cinemagraph images showed significant effect on purchase intention. With this fact in mind, it is assumed that food advertisement using cinemagraph images will be more effect in explaining food than advertisement using ordinary images. Therefore, this means further research is needed on advertisement using cinemagraph images in order to draw up measures to expand on-line food sales.

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