A Pilot Study of Communication Matrix
for Evaluating Artworks

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Abstract. The use of information technology in multimedia is becoming common and accessible to users. Artistically literate citizens apply a variety of artistic media, symbols and metaphors to independently create and perform work that expresses their own ideas and communicates their life experience. The arts are the media which provide powerful and essential means of communication. Thinking about art as a process of social interaction, how the artist's performances are conceived, developed, delivered and received, and how the viewer is attracted, accurately understanding the artwork, and affected by the artwork need to be studied. Therefore, the purpose of this study is intended to derive and validate the cognitive factors that affect artworks, and to propose a communication matrix for evaluating artworks. The results suggested that the communication matrix approach will be validated in more testing and evaluating of artworks in further study.

Keywords: Communication matrix · Evaluating artworks · Micro film · Cognitive engineering

1 Introduction

Social networking is a relatively new term that has emerged over the last decade. It may appear to be a new concept that is a regrouping of the previously known concepts of social interaction, communication and language. Social networking has received increased attention in the academic and business communities over the past decade (Lenhart and Madden 2007). Both academics and practitioners emphasized that the role of social networking in relationship development relates not only to the human community, but also to aspects such as business, management, arts, and even in different fields of therapy (Dwyer et al. 2007; Livingstone 2008; Pempek et al. 2009; Trusov et al. 2009). The arts are the media which provide powerful and

essential means of communication (Trivedi 2004). However, we now live in a small world with social networking. Social communication has been a recent shift from traditional ways to a technological approach based on discovering new opportunities in social networks. Companies are now more focused on adapting new technologies and combining them in ways that create new experiences and value for customers. With the development of industrial tendencies, most companies gradually realize that the keys to "word of mouth" communication are not only market and technology aspects but also service innovation design (Trusov et al. 2009).

The use of information technology in multimedia is becoming common and accessible to users. Artistically literate citizens apply a variety of artistic media, symbols and metaphors to independently create and perform work that expresses their own ideas and communicates their life experience. Thinking about art as a process of social communication, this article intends to study how the relationship between the artist and the audience is potentially altered in social networking (Peterson 2004; Pratt 2012; Shelley 2002). Previous studies have indicated that the communication studies were effective in evaluating comprehension of human behavior. However, the capability of tradition evaluating tools depends on whether the underlying rating factors have been chosen properly, as for example, communication style inventory (De Vries et al. 2011; Gameren and Vlug 2009), communication matrix (Rowland 2011), and cognitive style (Allinson and Hayes 1996; Cools and Van den Broeck 2007).

In the social networking era, connections between artist and audience have become increasingly close. For the artworks to be effective in communication, they need to be meaningful, understandable, memorable, etc., (Porter et al. 2011). In order to evaluate artworks, it is necessary to find out the cognitive factors affecting them. These factors can then be used as the basis for evaluating artworks during the creation stage. Most of the studies are focused on the evaluation after the artworks is completed. Very few have ever mentioned the approaches of artworks evaluation at the creation stage to ensure the artworks for communication (Trivedi 2004). The importance of communication studies is shown repeatedly in several studies of evaluating artworks. Despite the recognized importance of social interaction between artist and audience, they lack a systematic approach to explore it. (Peterson 2004; Pratt 2012; Shelley 2002; Trivedi 2004). Therefore, the purpose of this paper is to study factors affecting the evaluation of artworks. Then, these factors are analyzed and discussed in order to establish a communication matrix to understand the perceptions of artist and audience.

2 Research Framework

For the evaluation of artworks, we need a better understanding of artist-audience communication not just for taking part in the social context, but also for developing the interactive experience between artist and audience (Goldman 2004; Trivedi 2004). Lin et al. (2009) proposed a framework for examining the way designers interact across cultures and the interactive experience of users in the design process. Furthermore, Chen et al. (2014, 2015) devised a research framework to investigate the cognition of emotional responses and visual scenes when turning poetry into painting. In addition,

the research framework seems to be a better way to provide a possible solution for exploring the feeling of turning poetry into painting that is clearly worthy of further research (Gao et al. 2016). For the communication study, three levels of problems are identified in the study of communication: technical, semantic, and effectiveness. The technical level requires getting the viewer's attraction for the recognition through his/her senses. The semantic level requires letting the viewer accurately realize the meaning of the message through his/her realization. The effectiveness level concerns the ways in which the viewer is made to take the right reflection through his/her affecting (Craig 1999; Fiske 2010; Jakobson 1987).

Jakobson (1987) proposed six constitutive factors with six functions in a communication model. The six constitutive factors are as follows: addresser, addressee, context, message, contact, and code. Each of these factors determines a different function in each act of communication: emotive, conative, referential, poetic, phatic, and metalingual. (Fiske 2010; Jakobson 1987). Norman (2013) proposed a conceptual model that includes three parts: design model, user's model, and system image. When a designer designs a product for a user, the designer expects that the user will understand and use it in the desired way, meaning that the user's model is identical to the design model. For emotional design, Norman (2005) proposed three levels of design processing—visceral, behavioral, and reflective design that represents three kinds of user's experience that is aesthetic, meaningful, and emotional experience. Based on previous studies (Fiske 2010; Jacobson 1987; Lin et al. 2009, 2015, 2016), a research framework combining communication theory with communication and mental models was proposed to explore the issue of communication matrix as shown in Fig. 1.
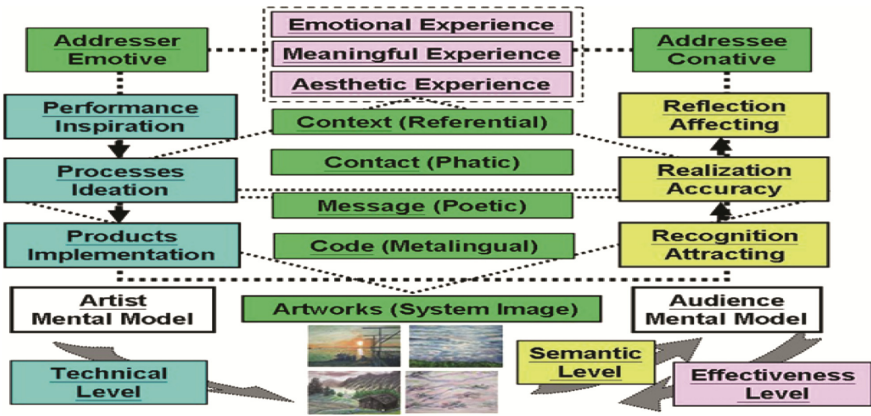

Fig. 1. A framework for communication research

For evaluating artworks, the artist involves three key stages to express significance through his or her artworks: performance (inspiration), process (ideation), and product (implementation). Performance is the inspiration to produce a kind of significance that the artist's intentions can be expressed through the artwork. Process represents the artist's ideation that through the artwork, the artist's imagination, thoughts, and feelings

can be reproduced. Product is the implementation of signification and expression which can then be transmitted to the viewer while the artist's and the viewer's thoughts are identical (Lin et al. 2009, 2015, 2016). For the viewer, there are three key steps to understanding the meaning of an artwork: recognition (attracting), realization (accuracy), and reflection (affecting). Recognition requires letting the viewer receive a message through perception, such as seeing, hearing, touching, or even feeling as the ways in which the viewer can accurately receive a message through the artwork. Realization requires letting the viewers understand the meaning of the message without misinterpreting, misunderstanding, or not understanding at all. The degree of realizations measures how accurately the transmitted message expresses the desired meaning. Reflection concerns the ways in which the viewer is made to take the right actions showing how effectively the message affects conduct in the expected way (Chen et al. 2014, 2015).

This study was designed to take into account the changing nature of social communication issue, resistance to artworks evaluation and the context for evaluation and impact assessment. It involved literature reviews, derivation of the matrix, and validation on artworks as the following steps:

(a) A review of current claims for artistically literate citizens in relation to impact and arts practice and a mapping of good practice.
(b) Exploration of the purpose and nature of evaluation and impact assessment.
(c) Development of an evaluation framework and tools for assessing the impact of artworks.
(d) Recommendations for development of the framework and evaluation of communication matrix.
(e) Validation of the communication matrix for evaluating artworks.

3 Study I: Derivation of the Communication Matrix

3.1 The Method

Study I involved using questionnaire interviews to derive the cognitive factors that affect evaluating microfilm as shown in the Fig. 2. Fifteen art-related professional designers were equally assigned to groups A, B and C. Another 15 subjects from the Graduate School of Creative Industry Design were assigned to group D. This study consisted of three different sessions. Each session was separated by at least one week.

Session 1: Subjects in group A were asked to describe in their own words any item that would influence the microfilm about technical problems, and group B and C would describe any item that affects the microfilm about semantic and effective problems respectively. The descriptions of the three subject groups were analyzed and summarized.

Session 2: A questionnaire consisting of the summarized items derived from subject group A and B were given to the subjects group D. The subjects were requested to rate each item by its importance to the audience on a rating scale from 1 to 7. Based on these importance ratings, subjects were asked to rank these items. The rating and ranking data were used to determine the statistically important attributes for evaluating microfilm.
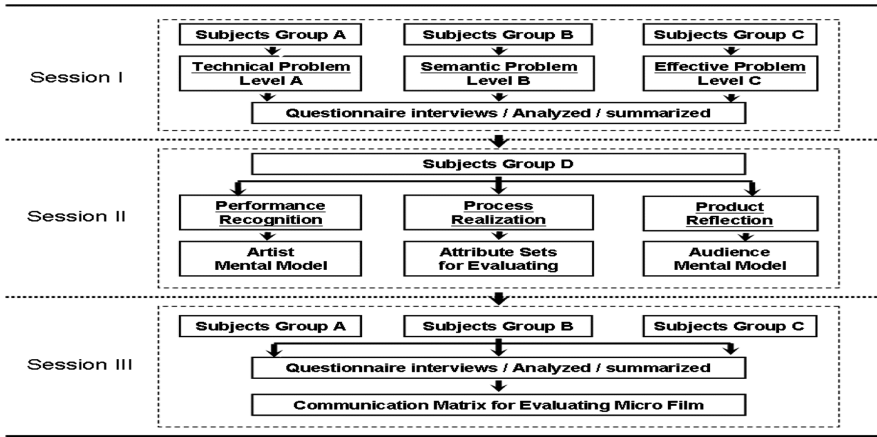
Fig. 2. Procedures for derivation of the communication matrix

Session 3: The attribute sets derived from session 2 were listed on another questionnaire. Then, Group A, B, and C were requested to rank items according to their importance for evaluating micro film. The ranking data of the three subject groups were analyzed and summarized in a communication matrix.

3.2   The Results

Session 1 and session 2 employed two subject groups to cross-test important items for icon recognition and design. In session 1, subject groups A, B and C listed 32, 28 and 26 items respectively that were thought to have an influence on microfilm. These items were summarized into 12 items each for tree level, technical, semantic and effective, respectively. In session 3, through the ranking data of the 12 items of each group, items that had an estimated median significantly smaller than the median of 12 were classified as "Important" items. There were 9 important items selected for each group as shown in Table 1.

Table 1.   The attribute sets for evaluating microfilm

Group A	Group B	Group C
A1 Appropriately captured	B1 Curiosity raising	C1 Topic and acknowledgement
A2 Creative and clever	B2 Desire exploring	C2 Going beyond reality
A3 Video effects	B3 Emotion stirring	C3 Affluence in life
A4 Well-paced	B4 Moving stories	C4 Thought provoking
A5 Touching plot	B5 Mood changing	C5 Deep planting
A6 Sensitive settings	B6 Atmosphere bulging	C6 Immersion
A7 Well defined personalities	B7 Richly culturally-loaded	C7 Emotional resonance
A8 Skillful and appealing	B8 Realistic characteristics	C8 Authentic experience
A9 Warm touching	B9 Role identity	C9 Mental simpatico

3.3 The Communication Matrix

Based on Table 1, the subjects groups A, B and C were discussed and integrated into the three dimensions for evaluating microfilm as shown in Table 2. In contrast with existing evaluation tools, this communication matrix is a multi-dimensional evaluating tool that places the artist and artistically literate citizen's values at the core of the matrix. Its first dimension facilitates the identification of the core values involved in any artworks, including performance, processes and products. Its second dimension facilitates identification of the related theory that may need to be taken into account in assessing outcome and impact. These include communication theory, mental model and information processing. The third dimension is flexibility, as the matrix can be adapted to the needs and priorities of the different context of the artist, viewer and artworks. It allows relevant measures and indicators of quality and impact to be identified.

Table 2. The communication matrix for evaluating microfilm

	Artist (Coding)			
	Performance Inspiration	Processes Ideation	Products Implementation	
Level C	C7-1: Topic and Acknowledgement	C8-1: Thought provoking	C9-1: Emotional resonance	Reflection Affecting
	C7-2: Going beyond Reality	CE-2: Deep planting	C9-2: Authentic experience	
	C7-3: Affluence in life	C8-3: Immersion	C9-3: Mental simpatico	
Level B	B4-1: Curiosity raising	B5-1: Moving stories	B6-1: Richly culturally-loaded	Realization Accuracy
	B4-2: Desire exploring	B5-2: Mood changing	B6-2: Realistic characteristics	
	B4-3: Emotion stirring	B5-3: Atmosphere bulging	B6-3: Role identity	
Level A	A1-1: Appropriately captured	A2-1: Weil-Paced	A3-1: Well defined personalities	Recognition Attraction
	A1-2: Creative and clever	A2-2: Touching plot	A3-2: Skillful and appealing	
	A1-3: Video effects	A2-3: Sensitive settings	A3-3: Warm touching	
	Aesthetic experience	Meaningful experience	Emotional experience	
	Audience (Decoding)			

4   Study II: Validation on Microfilm

4.1   The Method

Study II was conducted to validate the communication matrix for evaluating microfilm in which 9 attributes of three cognitive factors 27 were used. A microfilm for promoting amature artists served as the stimulus. The research was designed to take into account the communication matrix to evaluate the content and impact assessment between artist and audience. It involved the following five steps.

(a) Exploration of the purpose and nature of the communication matrix for evaluating the microfilm.
(b) Development of an evaluation framework and questionnaires for assessing the microfilm.
(c) Conducting a microfilm of promoting amature artists for artistically literate citizens
(d) Validation of the communication matrix for evaluating the microfilm.
(e) Recommendations for development of the framework and evaluation of the communication matrix.

4.2   The Nature of the Communication Matrix

Based on the communication matrix, an effective approach to assessing the impact of the microfilm must address the following three questions:

- What are the key factors and which need most attention: technical, semantic or effective level?
- What are the different values that are important to artist and audience?
- What are the key stages in the process of an art project and where do the evaluation and assessment processes need to play a part?

Based on the framework shown in Fig. 1, how the artist's performances are conceived, developed, delivered and received, and how the viewer is attracted, accurately understands the artwork, and is affected by the artwork need to be studied. In Table 2, both the artist's coding of the artwork and the viewer's subsequent decoding need to be studied in the evaluation of artworks. Combining the key factors in the communication matrix, nine questioners was developed for evaluating the total image of the microfilm as follows:

- A-1. The scenes of the film are appropriately-captured, and the video effects are creative and clever which provide the audience with unique video effects.
- A-2. The story of the film is well-paced and has a touching plot exhibiting moving sensitive settings.
- A-3. The characters in the film have well-defined personalities, and the performances of the actors are skillful and appealing presenting a deeply moving experience.
- B-4. The film arouses people's curiosity and stimulates the desire to explore the film which has an effect of stirring emotions.

- B-5. The film has a touching story, transforming the audience's mentality and reaching the state of atmosphere bulging.
- B-6. The characters in the film are richly culturally-loaded and realistically drawn to serve the purpose of role identity.
- C-7. The film has a clear topic and acknowledgement, and its creativity goes beyond reality contributing to an experience of an affluent life.
- C-8. The plot of the film is thought-provoking and plants its moral deeply in the minds of people leading to an immersive cinematographic experience.
- C-9. The film has emotional resonance and creates an authentic experience in order to achieve mental simpatico.

In addition, communication study involves the three key levels: Level A, B and C for the audience, and three key factors: performance, process and product for the artist. Performance is the expressive production of artworks to produce artworks. Process is the understanding and use of art elements to effectively convey messages for a variety of interactions within a variety of contexts and with a variety of audiences. Product refers to the use of non-verbal and verbal communication combined to express and respond to the expression of artworks. To study the communication issue, another nine questions were used to rate the key factors of total performance as followings:

- A1-1. Please rate the fitness of "Appropriately Captured" for the film.
- A1-2. Please rate the fitness of "Creative and Clever" for the film.
- A1-3. Please rate the fitness of "Video Effects" for the film.
- B4-1. Please rate the fitness of "Curiosity Raising" for the film.
- B4-2. Please rate the fitness of "Desire Exploring" for the film.
- B4-3. Please rate the fitness of "Emotion Stirring" for the film.
- C7-1. Please rate the fitness of "Topic and Acknowledgement" for the film.
- C7-2. Please rate the fitness of "Going beyond Reality" for the film.
- C7-3. Please rate the fitness of "Affluence in Life" for the film.

4.3 Conducting a Micro Film for Evaluating

Recently, artistically literate citizens apply a variety of artistic media, symbols and metaphors to independently create and perform work that expresses their own ideas and communicate their life experience. In order to promote the concept, a microfilm entitled – Amateur Artists Enrich the Retired Life" was conducted and used as the stimulus to be evaluated. The microfilm together with the questionnaire was established on the website:

https://www.youtube.com/watch?v=8mYh5uf2hNc, Questionnaire website: https://docs.google.com/forms/d/e/1FAIpQLSczDpZh2YvY_iJnXfAS1gMVtH_vCUVrhDevoQ40t2OA3lruMQ/viewform

This study was conducted on the internet. Social network groups (e.g., Face Book, Line, WeChat) were invited to participate as subjects and who agreed to follow the experimental procedure. On the website, the purpose of the experiment was explained to the subjects and the microfilm was presented. The subjects were then asked to rate the total image of the microfilm and then rate its key factors. Generally, the subject completed the experiment within 15 min.

4.4   The Results and Discussions

All subjects were volunteers from Taiwan and mainland China. Of a total of 206 subjects: 106 were from Taiwan and 100 from mainland China. For the Taiwan subjects group: 57 were males and 49 females. 14.2% were under 30 and 85.8% over 31 years of age. The majority (89.6%) of the subjects were from non-art professions while 10.4% of the remaining subjects held professional backgrounds in art-related fields.

For the China subjects group: 42 males and 58 females the ages of under 30 (45%) and between 31–50 (55%) participated in the study. The majority (77%) of the subjects were from non-art professions while 23% of the remaining subjects held professional backgrounds of art-related fields.

Table 3 summarizes the rating of the total image of the microfilm and key factors of the performance of the two groups. The comparison of the two groups is also listed in the same table. The column of "total image of microfilm" indicates the rating of the two groups and their comparison. For Question A1, the average rating of "Total Image of Microfilm" was 81.44% for the China group and 75.94% for the Taiwan group. The paired t-test results show that the average matching rate of 81.44% for the China subjects group is significantly higher than that for the Taiwan subjects group at 75.94% ($t = 2.48$, $p < .05$). The column of "Key Factors of Performance" indicates the rating of two groups and their comparison. For Question A1-1, the average rating of "key factors of performance" was 82.19% for the China group and 76.69% for the Taiwan group. The paired t-test results show that the average matching rate of 82.19% for the

Table 3. Summary of rating data and comparison with two groups

Subjects	N	Total image of microfilm				Key factors of performance			
		Q.	Mean	sd	t value	Q	Mean	sd	t value
Taiwan	105	A1	75.94	16.50	2.48*	A1-1	76.69	14.84	2.79**
China	100		81.44	15.15			82.19	13.38	
Taiwan	105	A2	78.02	14.20	2.57*	A1-2	74.19	15.85	1.95
China	100		82.85	12.60			78.42	15.25	
Taiwan	105	A3	74.79	16.22	3.16**	A1-3	78.82	13.93	2.84**
China	100		81.53	14.32			83.97	11.94	
Taiwan	105	B4	78.08	14.44	2.97**	B4-1	79.83	13.30	2.89**
China	100		83.46	11.24			84.68	10.65	
Taiwan	105	B5	76.39	15.84	3.57***	B4-2	80.06	12.70	3.05**
China	100		83.18	11.06			85.06	10.72	
Taiwan	105	B6	77.45	15.43	3.17**	B4-3	77.50	13.38	3.68***
China	100		83.62	12.21			83.86	11.25	
Taiwan	105	C7	76.90	15.60	2.06*	C7-1	75.42	16.83	3.35***
China	100		81.34	15.19			82.35	12.37	
Taiwan	105	C8	75.50	14.62	3.18**	C7-2	78.71	12.31	3.78***
China	100		81.99	14.62			84.81	10.71	
Taiwan	105	C9	76.68	15.00	2.98**	C7-3	78.32	15.00	3.36***
China	100		82.61	13.52			84.32	10.22	

*P < .05,**P < .01,***P < .001

China subjects group is significantly higher than that for the Taiwan subjects group at 76.69% (t = 2.79, p < .01).

For communication style, previous studies have indicated that it was effective in evaluating comprehension of human communication behavior (De Vries et al. 2010, 2011). But the capability of communication depends on whether the underlying rating dimensions have been chosen properly. De Vries et al. (2010) proposed the following six main dimensions of communication styles: verbal aggressiveness, expressiveness, preciseness, assuredness, supportiveness, and argumentativeness. Furthermore, a six-dimensional model of communication styles, each consisting of four facet-level scales, was proposed by De Vries et al. (2011) and operationalized using as the Communication Styles Inventory (CSI). Based on the concept of CSI, the results from Table 3 could be re-arranged in Table 4 using the communication matrix to explore the relationship between the artist and audience. Further studies are needed.

Table 4. The relationship between artist and audience in communication matrix

	Artist (Coding)			
	Performance Inspiration	Processes Ideation	Products Implementation	
Level C	C7	C8	C9	Reflection Affecting
	T:76.90(15.60)*	T: 75.50(14.62)**	T: 76.68(15.00)**	
	C:81.34(15.19)*	C: 81.99(14.62)**	C: 82.61(13.52)**	
Level B	B4	B5	B6	Realization Accuracy
	T: 78.08(14.44)**	T: 76.39(15.84)***	T: 77.45(15.43)**	
	C: 83.46(11.24)**	C: 83.18(11.06)***	C: 83.62(12.21)**	
Level A	A1	A2	A3	Recognition Attraction
	T:75.94(16.50)*	T:78.02(14.20)*	T: 74.79(16.22)**	
	C:81.44(15.15)*	C:82.85(12.60)*	C: 81.53(14.32)**	
	Aesthetic experience	Meaningful experience	Emotional experience	
	Audience (Decoding)			

The rating data focusing on the key factors of performance were re-arranged in the communication matrix as shown in Table 5 because it seems to be a better way to explore the relationships between artist and audience.

Table 5. The key factors of performance between artist and audience

	Artist (Coding)			
	Performance Inspiration			
Level C	C7-1	C7-2	C7-3	Reflection Affecting
	T:75.42(16.83)***	T: 78.71(12.31)***	78.32(15.00)***	
	C:82.35(12.37)***	C: 84.81(10.71)***	84.32(10.22)***	
Level B	B4-1	B4-2	B4-3	Realization Accuracy
	T:79.83(13.30)**	T: 80.06(12.70)**	T: 77.50(13.38)***	
	C:84.68(10.65)**	C: 85.06(10.72)**	C: 83.86(11.25)***	
Level A	A1-1	A1-2	A1-3	Recognition Attraction
	T:76.69(14.84) **	T:74.19(15.85)	T: 78.82(13.93)**	
	C:82.19(13.38) **	C:78.42(15.25)	C: 83.97(11.94)**	
	Aesthetic experience			
	Audience (Decoding)			

5   Conclusion

In evaluating artworks (e.g., microfilm), understanding how an audience evaluates an artwork is as complex as understanding the artworks perception itself. Because the cognitive factors that affect the appreciation of artwork have not been properly analyzed, the evaluation of artworks is typically ill-defined. For example, Shelley (2002) argued for the two key factors of character and role of principles in the evaluation of art. Sullivan (2006) argued that art practice can be conceptualized as a form of research that can be directed towards a range of personal and public ends. This study used communication matrix as a technique for evaluating microfilm. It is suggested that the communication matrix approach will be validated in more testing and evaluating of artworks in further study.

In the present study, two pilot studies were conducted to explore the communication matrix as an approach for evaluating micro film. Study I obtained the key factors which were used to establish a communication matrix for evaluating microfilm. Then, the communication matrix was validated in study II using a microfilm. The results showed that a communication matrix could be applied for evaluating the micro film effectively and could provide artists with an idea of how to concentrate their efforts at the creation stage in order to communication easily with the audience. The communication matrix approach appears to have an advantage over the subjective interpretation of artworks. Although the idea of using a communication matrix to explore the evaluation of artworks is quite simple, this study is only the first step in testing the utility of communication

matrix as an approach for understanding the creation and recognition of artworks and is clearly worthy of more in-depth study.

For example, why there was a significant difference between Chinese and Taiwanese responses or what that difference implies for analyzing art works. There must be some important reasons for such significant differences?

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