



Exploration of Action Figure Appeals Using Evaluation Grid Method and Quantification Theory Type I

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ABSTRACT

Contemporary toy is characterized by accelerating social, cultural and technological change. An attractive action figure can grab consumers' attention, influence the latent consuming preference and evoke their pleasure. However, traditional design of action figure is always dependant on designer's opinion, subjective experience and preference. It could be a selling risk in the marketing in terms of new action figure. Therefore, how to objectively extract the appeal information of action figure is an important topic for aiding designers to develop an action figure of satisfying consumers. This study explores the task of action figure appeal to consumer psychological perception. A series of investigation is conducted to collect the action figure appeals including the abstract psychological perceptions and concrete factor/feature descriptions by means of the existing action figures based on the procedure of Evaluation Grid Method. Then, the Quantification Theory Type I is used to establish the relationship between the abstract consumer psychological perceptions and the concrete action figure appeal factors. The results show that the action figure appeals can be objectively and systematically extracted, and provide designers with useful design information to develop a particular action figure for satisfying consumers.

Keywords: action figure, consumer psychological perception, EGM, QTT1, toy

INTRODUCTION

Background and Motivation

Contemporary toy is characterized by accelerating social, cultural and technological change. Similarly, the field of action figure is being rapidly transformed through the introduction of social prevalent trends, cultural issues, advanced production technologies or materials, and so forth. An attractive action figure can grab consumers' attention, influence the psychological satisfaction, evoke their pleasure, awaken memory and inspire the latent consuming preference. Intuitively, it seems reasonable to suppose that a consumers' pleasure

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State of the literature

- This study has employed both the qualitative-based evaluation grid method (EGM) and the quantitative-based Quantitative Theory Type I technique to explore the likely action figure appeals to consumer psychological perceptions.
- Five original factors with their corresponding features are induced by using the in-depth interview-based EGM and the focus group method to illustrate the fundamental characteristic of action figure appeals in the current study.
- The critical factors associated with the specific consumer psychological perception domains have been extracted experimentally in the current study for assisting the action figure designers to create the desirable action figures.

Contribution of this paper to the literature

- One of major contributions of this study consists in proposing an integrated procedure based on the advantageous combinations of qualitative-based EGM and the quantitative-based QTT1 technique.
- This integrated procedure has been demonstratively implemented for exploring the likely action figure appeals to consumer psychological responses and manifesting the feasibility applied in the field of action figure design.
- The result of this study provides useful insights for designing the action figure which more closely matches the expectation of consumer psychological perception.

or satisfaction with an action figure derives from a discriminable set of factors or a specific sub-set of features. However, the evolution of an action figure during the design process is typically governed by the designer's individual opinions, preferences and creative instincts. It could be a risk with no absolute guarantee of success for developing a new action figure. Therefore, how to objectively extract the appeal information of action figure is an important topic. It is of fundamental interest to designers to identify the important appeal factors/features of action figure during the early stages of the design process such that they can generate the suitable design concepts of action figures which are more closely aligned with the target consumer expectations.

Exploring Approaches for Action Figure Appeal

In generally, the effectiveness of exploring the action figure appeals is crucially determined by the extraction of the factors/features used to describe the action figure appeals and the choice of analytical technique used to analyze the correlation between the action figure appeals and the corresponding consumer responses. Many researches have proposed several approaches, e.g., Focus Group Method (McDonagh et al, 2002; Jug and Vilar, 2015), Evaluation Grid Method (Dong, 2010; Ma et al, 2014), Factor Analysis (Chang and Chen, 2014) and Grey Prediction Approach (Lin, 2013), to minimize the requirement for designer's subjective judgments and to objectively relate the factors/features of a product appeal to the consumer in recent years. Of these approaches, Evaluation Grid Method (EGM) has emerged as one of

the most direct and handy approach for capturing and tabulating consumers' perceptual concepts based on the technique of in-depth interview and the form of a three-layer hierarchical structure, i.e. upper-layer, original layer and lower-layer. It is mainly derived from Kelly's the concept of repertory grid technique (Kelly, 1955). By using this approach, researchers can establish the three-layer hierarchical diagrams including abstract consumer responses (psychological perceptions) (upper-layer), original factors (original-layer), and relational concrete features or descriptions (lower-layer) to initially comprehend the relations between the abstract consumer responses and the original factors/ concrete features by observing the result of three-layer hierarchical diagrams. It has been successfully applied in numerous fields such as game design (Chen et al, 2012), picture book design (Ma et al, 2014), animation design (Chen and Hsu, 2007), product design (Dong, 2010) and so forth.

Analytical Techniques for Constructing Action Figure Appeals - Consumer Psychological Perception Models

In choosing a suitable analytical technique with which to model the relationship between the action figure appeals and the consumer psychological perceptions, techniques such as Multiple linear regression (Chen and Chang, 2009), Taguchi method (Chang and Chen, 2014), Conjoint Analysis (Tung et al, 2009) and Quantitative Theory Type I (QTT1) (Lin et al, 2012) are commonly employed to interpret the relationships between the independent and dependent variables. QTT1 is particularly useful since it is easy, simple and transparent, and it has good approximation when modeling the relationship between the action figure appeals and the consumer psychological perceptions. Moreover, QTT1 can also be used to calculate the weights of the original factors in this study. From the discussions above, it seems reasonable to suppose that combining the EGM approach with the QTT1 analytical technique represents a suitable solution to explore the factors/features of action figure appeals and to model the relationship between the action figure appeals and the likely consumer psychological perceptions in the objective and effective manner.

Overview of Study Organization

This study treats the task of action figure appeal as an investigative activity. A series of investigation is conducted to collect the action figure appeals including the abstract psychological perceptions and concrete factor/feature descriptions by means of the existing action figures based on the procedure of EGM. Then, the QTT1 is used to establish the relationship between the action figure appeals and the consumer psychological perceptions for action figure. The remainder of this study is organized as follows: Section 2 presents the method and implementation procedure of this study. Section 3 interprets the results of QTT1 analysis and the extraction of critical factors for action figure appeal. Section 4 and Section 5 offer a discussion and a brief conclusion, respectively.

							
No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8
							
No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16
							
No.17	No.18	No.19	No.20	No.21	No.22	No.23	No.24
							
No.25	No.26	No.27	No.28	No.29	No.30	No.31	No.32
							
No.33	No.34	No.35	No.36	No.37	No.38	No.39	No.40
							
No.41	No.42	No.43	No.44	No.45	No.46	No.47	No.48
							
No.49	No.50	No.51	No.52				

Figure 1. Fifty-two sample pictures of action figure

METHOD AND IMPLEMENTATION PROCEDURE

In-depth Interview and EGM

Samples and Participants

To explore the likely action figure appeals to consumers, this study commences by collecting a large number of pictures of action figures. In all, a total of 52 well-known action figure pictures are collected from magazines, catalogs and websites, as shown in **Figure 1**. These pictures are then reduced to individually display on an A5-sized card for the usage of subsequent in-depth interview based on the EGM procedure. 4 collectors, each with 2 years of experience in collecting existing action figures, and 8 individual consumers are individually invited to participate in the in-depth interview aimed at extracting the possible original factors of action figure appeal. In the EGM procedures, each participant divides the 52 action figure samples into 3 groups in accordance with his or her intuitive preference, from high to low. Then, the original factors (original-layer) are obtained by asking each participant about their preference reasons based on the action figure samples of the most preferred group. Further, each participant is subsequently questioned the original factor corresponding abstract psychological perceptions (upper-layer) and concrete features or descriptions (lower-layer).

Three-layer Hierarchical Diagrams of Action Figure Appeals

Based on the results of in-depth interview, the contents of the interview are recorded in accordance with each participant's opinion. To integrate the 12 participant's opinions of in-depth interview, the number of mentioned times of the same or similar meaning opinions obtained from 12 participant's individual record are summarized in the form of three-layer hierarchical diagram by using the discussions of focus group method comprising 2 researchers and 3 senior designers. As shown in **Figure 2**, the numbers in parenthesis of the appeal descriptions indicate the time totality for each appeal description of the three-layer hierarchy. For example, the original-layer "facial expression (12)" means that the description "facial expression" is listed 12 times from 12 participants. Finally, the five factors and the eighteen concrete features descriptions are chosen to represent the action figure appeals and are used as the independent variables when applying the QTT1 technique to construct the relationships between the action figure appeals and the four abstract consumer psychological perceptions in this study.

Defining the relation between investigative samples and action figure appeals

To distinguish the action figure appeal trait (factors and features) of each of 52 investigative samples, focus group method including 2 researchers and 3 senior designers is conducted to discuss a clear-cut definition for the purpose of interpreting the analytical results regarding the relationship between the action figure appeals and the four abstract consumer psychological perceptions. These appeal factors and features of 52 investigative samples are decided based on the following principles: (1) each action figure apparent trait must be

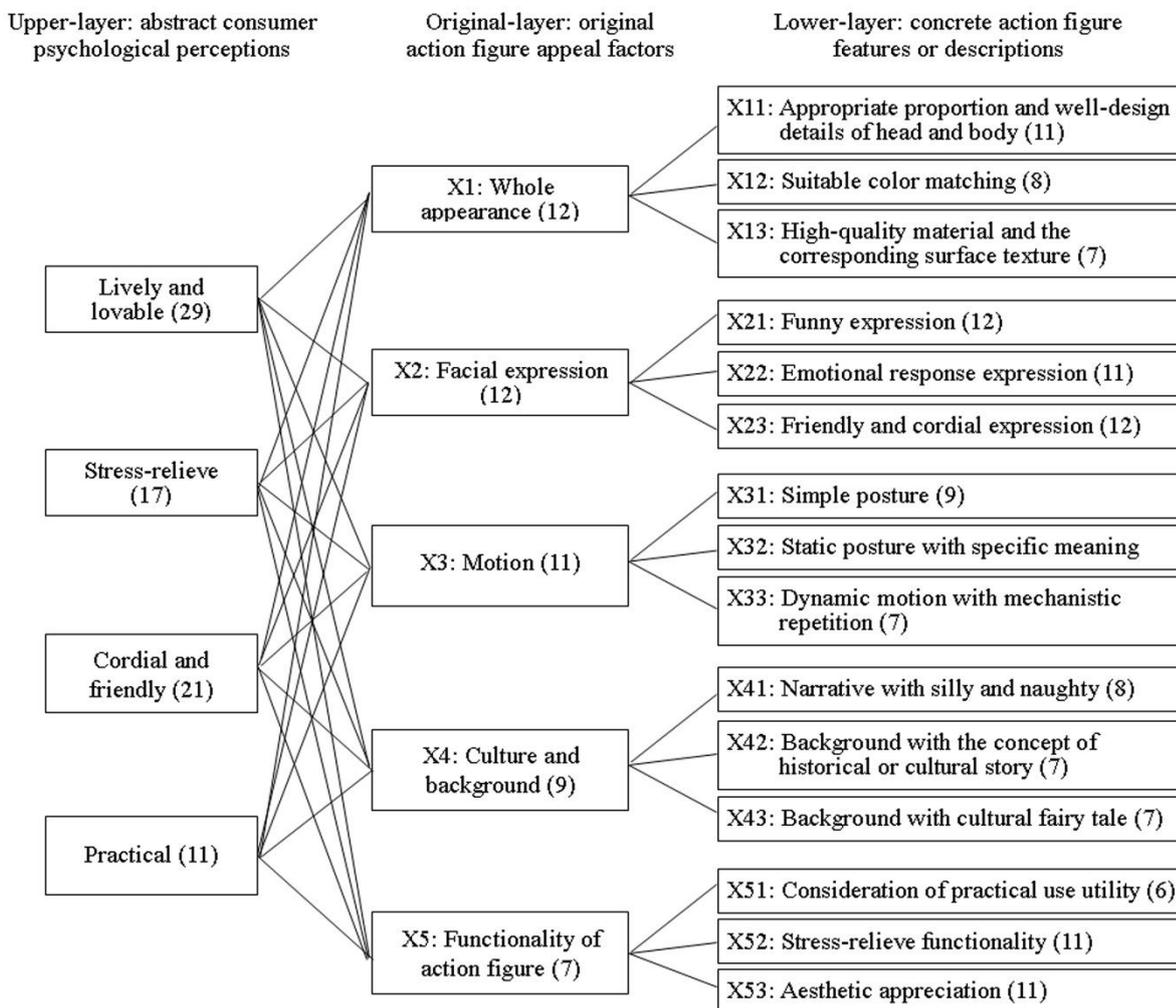


Figure 2. Three-layer hierarchical diagram based on EGM in-depth interview results

obvious and critical to action figure appeal; (2) the factors and features must be capable of explaining main characteristics in the action figure.

Table 1 shows the part of definition result for 52 investigative samples, with five factors and their corresponding features being identified. In the coding explanation of **Table 1**, for example, it can be seen that the “sample 1” appeal attribute is defined primarily by the “suitable color matching” feature (X12) for the “whole appearance” factor (X1), the “friendly and cordial expression” feature (X23) for the “facial expression” factor (X2), the “simple posture” feature (X31) for the “motion” factor (X3), the “background with the concept of historical or cultural story” feature (X42) for the “culture and background” factor (X4) and the “aesthetic appreciation” feature (X53) for the “functionality of action figure” factor (X5), respectively. As the example of “sample 1” described above, the five factors are used as the “items” (Kansei Engineering term) of independent variables, and their corresponding features

Table 1. Definition result of 52 investigative samples

Sample No.	Whole appearance (X1)	Facial expression (X2)	Motion (X3)	Culture and background (X4)	Functionality of action figure (X5)
1	X12	X23	X31	X42	X53
2	X12	X21	X32	X42	X53
3	X13	X23	X31	X42	X53
4	X13	X22	X31	X42	X52
5	X11	X23	X32	X42	X53
6	X11	X23	X32	X42	X53
7	X12	X22	X33	X42	X53
8	X13	X23	X31	X43	X52
9	X11	X23	X31	X41	X53
10	X11	X23	X31	X41	X53
49	X13	X21	X33	X42	X53
50	X12	X21	X32	X43	X52
51	X12	X21	X32	X43	X52
52	X13	X23	X31	X41	X53

are used as the “categories” (Kansei Engineering term) of independent variables when applying the QTT1 technique to construct the specific functional model. Note that whilst omitted here due to space constraints, the coding explanations of the other samples are interpreted via the coding signs of the **Table 1** in an analogous manner to that described above.

Investigation of action figure appeals

One hundred twenty eight subjects (age from 18 to 34 years old) are invited to evaluate the action figure appeals. The four consumer psychological perceptions are quantified using four 7-point Likert scales. The 52 action figure samples and the four 7-point Likert scales are integrated into an interface constructed using Visual Basic software, as shown in **Figure 3**. After each subject had evaluated all of the samples, the investigative data are recorded for subsequent QTT1 analysis.

RESULTS OF ANALYSIS

Examining the degree of unanimity among the various subject evaluations using Kendall's coefficient of concordance (Kendall's W)

To examine the validity and concordance of investigative data obtained from the evaluation of 128 subjects responses to 52 action figure samples in each of four consumer psychological perceptions before constructing the relationship models of action figure appeals to consumer psychological perceptions, Kendall’s coefficient of concordance (also known as Kendall’s W) is used to test the degree of unanimity among the various subjects’ evaluations. Kendall’s W test is a non-parametric statistic, and it can be used for assessing agreement or concordance among raters (subjects). Kendall’s W ranges from 0 (no concordance) to 1 (complete concordance). In other words, if the Kendall’s W is 1, then all the subjects have been unanimous. If Kendall’s W is 0, then there is no overall trend of agreement among the subjects,



Figure 3. Investigative interface for action figure appeal

Table 2. Result of Kendall's W test in each of four consumer psychological perceptions

Statistical descriptions					
Consumer perceptions	N	Kendall's W test	D.F	Chi-square	Significance (P-value)
Lively and lovable	128	0.651	51	4247.7	0.000
Stress-relieve	128	0.689	51	4499.1	0.000
Cordial and friendly	128	0.664	51	4333.5	0.000
Practical	128	0.605	51	3948.7	0.000

The "N" indicates the number of subjects, and the "D.F." indicates Degree of freedom.

and their evaluations may be regarded as essentially random. Intermediate values of Kendall's W indicate a greater or lesser degree of unanimity among the various subjects' evaluations when the significance test (P-value) of the Kendall's W is smaller than 0.05 (i.e. there exists the correlation among the various subjects' evaluations).

Table 2 summarizes the Kendall's W test statistical results for four consumer psychological perceptions. As shown in the third column of **Table 2**, the Kendall's W test results of four consumer psychological perceptions are 0.651 (Lively and lovable), 0.689 (Stress-relieve), 0.664 (Cordial and friendly) and 0.605 (Practical), respectively. Meanwhile, all the results of the Kendall's W significance test (P-value) are smaller than 0.05 (see the right column of **Table 2**). These results show the good consistency concerning the 128 subjects' evaluations to 52 action figure samples in each of four consumer psychological perceptions.

Table 3. QTT1 analysis results for “lively and lovable” and “stress-relieve” psychological perception domains

Consumer psychological perceptions		Lively and lovable		Stress-relieve	
Original factors	Features	PCC	CS	PCC	CS
X1: Whole appearance	X11	0.298	0.231	0.224	0.164
	X12		0.168		-0.134
	X13		-0.037		0.112
X2: Facial expression	X21	0.318	0.358	0.312	0.259
	X22		0.315		0.322
	X23		-0.177		-0.269
X3: Motion	X31	0.284	-0.581	0.302	-0.184
	X32		0.344		0.386
	X33		0.336		0.396
X4: Culture and background	X41	0.082	0.387	0.036	0.165
	X42		-0.106		-0.206
	X43		0.018		0.101
X5: Functionality of action figure	X51	0.102	0.146	0.176	-0.087
	X52		0.209		0.274
	X53		-0.355		0.136
Constant			3.138		3.817
R			0.963		0.944
R ²			0.928		0.892

Constructing the Relationship Models of Action Figure Appeals to consumer psychological perceptions

Based on the investigative results of the 52 action figure appeals to four consumer psychological perceptions, the QTT1 is used as a technique for modeling the relationship between action figure appeals and the corresponding consumer psychological perceptions. In this study, the independent variables correspond to the action figure appeals including original factors and their corresponding features (see the Figure 2: original-layer and lower-layer), while the dependent variables correspond to the four consumer psychological perceptions. **Table 3** and **4** indicate the relationships between the action figure appeals and the corresponding consumer psychological perceptions, and the four QTT1 functional models in each of the four consumer psychological perceptions can be constructed using the data presented in the “category score (CS)” columns of **Table 3** and **4**. As a whole, the R² values of each models are 0.928 (Lively and lovable), 0.892 (Stress-relieve), 0.954(Cordial and friendly), and 0.827 (Practical), respectively. These results show that the overall fits of these QTT1 functional models are good. Furthermore, the four QTT1 functional models in each of the four perception domains can be constructed directly using the data presented in the CS columns of **Table 3** and **4**.

Table 4. QTT1 analysis results for “cordial and friendly” and “practical” psychological perception domains

Consumer psychological perceptions		Cordial and friendly		Practical	
Original factors	Features	PCC	CS	PCC	CS
X1: Whole appearance	X ₁₁	0.242	0.228	0.104	-0.124
	X ₁₂		-0.188		0.043
	X ₁₃		0.172		0.210
X2: Facial expression	X ₂₁	0.388	0.258	0.216	-0.099
	X ₂₂		-0.136		0.130
	X ₂₃		0.377		0.269
X3: Motion	X ₃₁	0.380	0.518	0.198	0.144
	X ₃₂		0.266		-0.068
	X ₃₃		-0.221		0.057
X4: Culture and background	X ₄₁	0.207	0.356	0.080	0.163
	X ₄₂		-0.188		-0.008
	X ₄₃		0.266		0.086
X5: Functionality of action figure	X ₅₁	0.102	-0.146	0.388	0.387
	X ₅₂		0.238		0.194
	X ₅₃		0.387		-0.260
Constant			2.964		3.836
R			0.977		0.909
R ²			0.954		0.827

With respect to the explanations of these analysis results, the value of partial correlation coefficient (PCC) in **Table 3** and **4** indicates the relative influence of original factor of action figure appeal to consumer psychological perceptions. If the value is bigger, it will be more influence on consumer psychological perception. Furthermore, the absolute value of the CS determines the intensity of the effect, while its sign determines the nature of the effect and its value bigger will be more influence on consumer psychological perception. In other words, a positive value of the CS indicates that adjusting the corresponding feature in its positive technique reinforces the consumer psychological perception. For example, variable X11 is the “appropriate proportion and well-design details of head and body” for the “whole appearance (X1)” in the “Lively and lovable” perception domain. **Table 3** reveals that the CS value of this variable X11 is positive (0.231), which indicates that a refinement in the proportion and detail of head and body causes the action figure to be perceived as more “Lively and lovable”. Similarly, variable X21 is the “funny expression” for the “facial expression (X2)”. Its CS value (0.358) indicates that an amusing and funny depiction in the facial expression enhances the action figure to be perceived as more “Lively and lovable”. Variable X32 corresponds to the “static posture with specific meaning” for the “motion (X3)”. The CS of this variable is positive (0.344), and hence a more “Lively and lovable” perception is induced when the specific meaning posture (e.g. cute, comedic, foolish and so on) is emphasized in the body language of action figure. Variables X41 (CS= 0.387) and X52 (CS=0.209) correspond to the “narrative with silly and naughty” for the “culture and background” and the “stress-relieve functionality” for the “functionality of action figure”, respectively. These CS values indicate that a more “Lively and lovable” perception can be obtained by enriching the action figure narrative background

and by promoting the mental stress-relieve design of action figure functionality, respectively. Note that while not discussed here due to space constraints, the influences of these variables on the “Stress-relieve”, the “Cordial and friendly” and the “Practical” perception domains are interpreted via the signs of the corresponding CS values in an analogous manner to that described above for the “Lively and lovable” perception domain. Overall, the analysis results provide action figure designers or developers with the useful hints to understand the effects of main factors and features when he or she designing the action figures.

Extracting the Critical Factors of Action Figure Appeals

Due to the shortage of analysis result obtained from QTT1, it is difficult to objectively determine the critical factors based on the simple PCC values of original factors in each of consumer psychological perception. To extract the critical factors of action figure appeal to consumer psychological perception, the relative influence of each PCC to a particular consumer psychological perception is evaluated by normalizing the PCC values to a value within the interval [0, 1] in accordance with the following formulation:

$$NPCC = \frac{|PCC_i|}{\sum_{i=1}^n |PCC_i|} \quad (1)$$

where NPCC denotes the normalized PCC value, PCC_i is the PCC value of the i-th factor within the specified consumer psychological perception domain, and n is the total number of original factors. Specifically, the original factors are sorted in descending order based on their NPCC values, and the NPCC values are then added sequentially from the largest to the smallest until the cumulative total exceeded a predetermined threshold value. The corresponding original factors are then nominated as critical factors of action figure appeal. Note that the threshold value is assigned a value of 0.75, indicating that the corresponding critical factors accounted for 75% of the correlation between all the original factors and the consumer psychological perception. As in the procedure applied to identify the critical factors, the original factors are sorted in descending order based on their PCC values and these values are then added sequentially from the largest to the smallest until the cumulative total exceeded 75%. The corresponding original factors are then nominated as critical factors of action figure appeal. **Table 5** presents the NPCC percentage values for each of the four consumer psychological perceptions. Note that the underlined texts in the NPCC column denote the critical factors. This result provides the action figure designers or developers with valuable insights. For example, it can be seen that the “Lively and lovable” perception of action figure is imparted primarily by the “whole appearance (27.5%)”, the “facial expression (29.3%)” and the “motion (26.2%)”, respectively. Similarly, the action figure critical factors associated with the “Stress-relieve” and “Cordial and friendly” perception domains include the “whole appearance (21.3% and 18.3%)”, the “facial expression (29.7% and 29.4%)” and the “motion (28.8% and 28.8%)”, respectively. Note that when creating the “Practical” perception of action figure, the critical factors consist in the “functionality of action figure (39.4%)”, the “facial expression (21.9%)” and the “motion (20.1%)”. Consequently, if a designer wishes to create an

Table 5. Critical factors of action figure appeal to consumer psychological perception domains

	Lively and lovable		Stress-relieve		Cordial and friendly		Practical	
	PCC	NPCC	PCC	NPCC	PCC	NPCC	PCC	NPCC
Whole appearance	0.298	27.5%	0.224	21.3%	0.242	18.3%	0.104	10.5%
Facial expression	0.318	29.3%	0.312	29.7%	0.388	29.4%	0.216	21.9%
Motion	0.284	26.2%	0.302	28.8%	0.38	28.8%	0.198	20.1%
Culture and background	0.082	7.6%	3.6%	3.4%	0.207	15.7%	0.080	8.1%
Functionality of action figure	0.102	9.4%	17.6%	16.8%	0.102	7.7%	0.388	39.4%

action figure with a specific psychological perception, he or she can focus their attention on these critical factors.

DISCUSSION

In the absence of referable design information during the conceptual design stage, action figure designers have little choice but to use intuitive or subjective opinions when creating a new action figure designed to satisfy consumer psychological perceptions. The critical factors as shown in **Table 5** have been extracted for providing action figure designers with generality of action figure with a specific psychological perception in the current study. However, these critical factors in each of four consumer psychological perceptions only enable general cognitions in the action figure to be expressed and are therefore only of limited benefit during the conceptual design stage. Consequently, a requirement exists for the further discussion of action figure feature influencing consumer psychological perceptions such that the features of critical factors can be compared in an explicit manner. As shown in **Table 5**, although the “Lively and lovable”, “Stress-relieve” and “Cordial and friendly” perceptions indicate the same critical factors including “whole appearance”, “facial expression” and “motion”, it is observed that the features of critical factors is slightly difference between the three consumer psychological perceptions based on the “CS” columns of two consumer psychological perceptions (i.e. “Lively and lovable” and “Stress-relieve” shown in **Table 3**) and that of “Cordial and friendly” shown in **Table 4**.

Observing these CS values of “Lively and lovable” perception shown in **Table 3**, it is found that the features including the “appropriate proportion and well-design details of head and body (X11; CS=0.231)”, the “funny expression (X21; CS=0.358)” and the “static posture with specific meaning (X32; CS=0.344)” are positive and have stronger effects on the “Lively and lovable” perception than those of the other features corresponding to respective critical factor. This finding seem to imply that action figure designers could pay more attention to these features for facilitating the notional thinking when designing an action figure with the “Lively and lovable” perception in the conceptual design stage. Meanwhile, the “simple posture (X31; CS=-0.581)” and the “friendly and cordial expression (X23; CS=-0.177)” should avoid using in the conceptual design stage since their CS values are negative and have feebler

effects on the “Lively and lovable” perception. In regard to these CS values of the “Stress-relieve” perception of **Table 3**, it can be seen that the “Stress-relieve” perception of an action figure is imparted primarily by the features including the “appropriate proportion and well-design details of head and body (X11; CS=0.164)”, the “emotional response expression (X22; CS=0.322)” and the “dynamic motion with mechanistic repetition (X33; CS=0.396), respectively, since their CS values have stronger effects on the “Stress-relieve” perception than those of the other features. This result appears to suggest that designers should deliberate on the “appropriate proportion and well-design details of head and body (X11)” for “whole appearance (X1)”, the “emotional response expression (X22)” for facial “expression (X2)” and the “dynamic motion with mechanistic repetition (X33)” for “motion (X3)” for obtaining the “Stress-relieve” perception likely response to a particular action figure. In terms of the “Cordial and friendly” perception shown in **Table 4**, the CS values of the features for respective critical factors are 0.228 (X11), 0.377 (X23) and 0.518 (X31), respectively. The three features including the “appropriate proportion and well-design details of head and body (X11)”, the “friendly and cordial expression (X23)” and the “Simple posture (X31)” have significant effects on the “Cordial and friendly” perception than the CS values of the other features. This result indicates that the three features should be considered if an action figure with the “Cordial and friendly” perception is created in its conceptual design stage.

As to the CS values of the “Practical” perception shown in **Table 4**, it is found that these features including the “friendly and cordial expression (X23; CS=0.269)” and the “consideration of practical use utility (X51; CS=0.387)” are positive and have stronger effects on the “Practical” perception than those of the other features. Consequently, this result appears to suggest that designers should reinforce the presentation of these features for the sake of obtaining the “Practical” perception likely response to a particular action figure.

CONCLUSION

This study has demonstrated the use of the in-depth interview-based EGM and QTT1 technique to explore the original factors and the corresponding features for the action figure appeals. The results of this study are revealed in a three-layer hierarchical diagram shown in **Figure 2** for the action figure appeals by means of the in-depth interview-based EGM. Further, the critical factors and the corresponding features have been identified by using the QTT1 technique and NPCC calculation such that the efficacy of the design process in creating action figures which better match the expectations of the consumer psychological perception can be enhanced. Overall, the results of this study indicate that the action figure designers or developers should focus their attention more on the critical factors including the “whole appearance”, the “facial expression” and the “motion” if the objective of creating an action figure is to achieve the “Lively and lovable”, “Stress-relieve” and “Cordial and friendly” psychological perceptions. Note that when creating the “Practical” perception of action figure, the designers or developers should focus not only on the critical factors “Facial expression” and the “Motion”, but also on the “Functionality of action figure” factor. Furthermore, the results not only provides the designers with the ability to inspect the critical factors for action

figure appeal, but also provides them with an understanding of how these features of critical factors should be applied during the process of conceptual design stage in order to obtain or reinforce the desired perception of action figure.

One of the major contributions of this study consists in proposing an integrated approach based on EGM and QTT1 technique for constructing the relationship between action figure appeals and consumer psychological perceptions. Moreover, the concept of this integrated approach can also be extended to develop a computer decision support system to present the suitable factors and features for facilitating the conceptual design process of action figure. Notwithstanding this integrated approach has the superiority in developing and constructing the relationship between the action figure appeal and the consumer psychological perception, the relationship models based on QTT1 technique can only provide designers with the means to design the action figure of single consumer psychological perception, and cannot develop a suitable alternative when considering multiple consumer psychological perceptions simultaneously. Consequently, it would be worthwhile considering the integrated use of other multi-objective analysis techniques in future studies. For example, TOPSIS algorithm, AHP, or the integration of Fuzzy and AHP may provide a suitable means when developing the multiple consideration-based models or extracting the critical factors based on the multiple consumer psychological perceptions. Finally, although this integrated approach including its procedure presented in this study is proposed to explore the consumer psychological perception responses to the specific example of an action figure, it is reasonable to speculate that the notion of this integrated approach can be used to study other human cognitive response to a specific object or subject for academic research purposes.

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