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RESEARCH ARTICLE

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Why It Is Hard to Explain Chinese Face?—Face Measurement Models and Its Influence on Ecological Product Preference

Abstract Face in China is a well-known word but still lacks a precise and authoritative definition. Other than the counterpart connotation of social norms in western culture, Chinese face is also a cultural construct strongly connected with situational context. In order to explore the general context and the specific connotation of Chinese face, this paper focuses on comparing the difference between Reflective Models and Formative Models when measuring the construct of Chinese face. We find that RM is more reliable and stable than FM in terms of face measurement, but is inferior to FM in explaining the connotations of Chinese face. Moreover, we also explore the effects of different dimensions of Chinese face on consumer preference for ecological products. This study not only enriches the existing research on Chinese face, but also exploratively answers a controversial problem in this area. Furthermore, the findings in this study also provide theoretical support for building an environmentally-friendly society in China.

Keywords face, reflective model (RM), formative model (FM), ecological product preference

1 Introduction

People often behave similarly to those around them but sometimes also want to be different from others because of the identity signaling effect (Berger and Heath, 2007; Chan et al., 2012). This is a worldwide phenomenon emerging not only in the west but in eastern countries such as China as well. However,

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compared to social identity in the west, people in eastern cultures are more likely to be concerned about face. They care more about others' opinions and the social effects resulting from their own behavior. This kind of social effect manifests as face (Li and Su, 2007). Not only is it something to be gained through human interaction with specific situational characteristics (Ho, 1976; Zhou et al., 1993; Hwang, et al., 2002), face also expresses some stable individual characteristics (Chen, 1982). So far, even though research on face has attracted numerous scholars, the meaning and dimensions of face remain unsettled, and a universal definition with popular recognition is lacking. Therefore, researchers incline to use their own measurement methods to explain face. For example, Zhang (2012) uses a reflective model (RM), which consists of generalized indicators, while Bao and Zhao (2009) and Shi et al. (2012) use a formative model (FM) constructed from situational indicators instead. In fact, both models have advantages and disadvantages in consistency and the interpretation of latent variables with their differences shown through empirical studies (Diamantopoulos and Winklhofer, 2001). Scholars in China and abroad have shown more interest in both RM and FM models in recent years. Zhou et al. (2007) studied the relationship between suppliers and retailers in Chinese marketing channel which led to a discussion about testing the internal validity and discriminant validity of a formative scale. As well, when exploring the dependence and conflicts in China's marketing channels, Zhou et al. (2007) specified that the measurement of dependence of suppliers on retailers is formative and vice versa. However, few scholars have discussed the utilization of FM and RM with regards to research on face.

In addition to research on measurement tools, research on the effect of face on ecological consumption is also insufficient. The rapid increase of poor air quality in many areas in China has triggered enormous social consciousness. Unprecedentedly, reference to one type of air pollution, PM2.5, was included in the 2012 official government work report. Ecological consumption consequently generated considerable interest from the Chinese government and scholars as a way to address current pollution problems. As a matter of fact, Chinese consumers' consumption is deeply influenced by face culture (Jap, 2010). Nevertheless, most existing research on face concentrates on luxury goods consumption (e.g. Bearden and Etzel 1982; Wong and Ahuvia, 1998; Zhang, 2012; Wang et al., 2012) instead of ecological consumption. Importantly, Shi et

al. (2014) preliminarily have shown that the concept of face has strong predictability for ecological consumption as a moderator, while four separate dimensions of face fail to show the same moderating effect. The authors suggest two possible explanations: conceptual reason and methodological reason. The conceptual explanation is mainly rooted in the integrity, coordination, simultaneity and dynamics of face consciousness, indicating that face is a concept that cannot be divided. On the other hand, a methodological explanation notes that at present, no scales and models for measuring face are generally accepted. Thus, if one is seeking to understand the underlying mechanism between face and ecological consumption, an important first step is to locate a more scientific and precise scale.

This paper aims to resolve two problems with research on face. First we examine the advantages and disadvantages of FM and RM. We examine the use of a RM of face in study 1. Then, in study 2, we run an empirical test to compare RM and FM particularly with regards to stability and validity. By selecting a better measurement scale as a result of study 2, we expect that the connation between face and ecological consumption will be more understandable. Hence, we will investigate the effect of face on ecological product preference in study 3.

2 Literature Review

2.1 Measurement Models

Measurement models are one part of structural equation modeling (SEM), which demonstrates the relationship between indicators and latent variables. Normally, a latent variable is defined and measured by a group of indicators and questions. In short, a change in latent variables leads to a change in indicators (Diamantopoulos and Winklhofer, 2001). In this case, the indicator is called a reflective indicator or effect indicator and the corresponding measurement model is known as a reflective model (RM). However, Blalock (1964) believed that in certain circumstances, the change to the indicator may be the cause of the change to the latent variable and as a result, formative indicators or causal indicators (MacKenzie et al., 2005) and the corresponding formative model (FM) are formed. Unfortunately, in the existing literature, especially in the field of psychology, most scholars seldom critically consider the relationship between indicators and latent variables, and they usually uncritically adopt RM to conduct research (Jarvis et al., 2003).

As shown in Figure 1 and Figure 2, factor loadings λ shows the relationship between the indicator and latent variables in RM, while weighted coefficient γ plays the part in FM.

Formulation: $x_i = \lambda_i \eta + \varepsilon_i$; Formulation: $\eta = \gamma_1 x_1 + \gamma_2 x_2 + \cdots + \gamma_i x_i + \varsigma$.

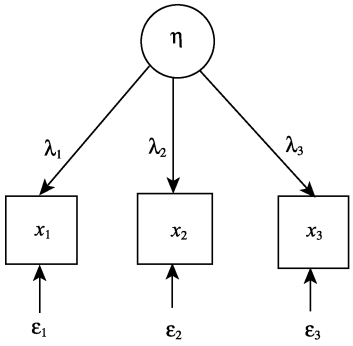

Figure 1 Reflective Model (RM)

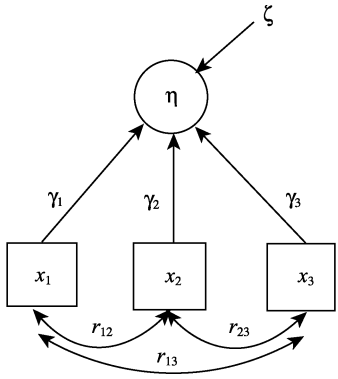

Figure 2 Formative Model (FM)

Distinctions between RM and FM include whether measurement indicators influence the latent variables or the other way around, whether all the indicators are interchangeable and their different measurement errors (Diamantopoulos 2006; MacKenzie et al., 2005). However, choosing a measurement model is not an either-or thing. In some cases, either RM or FM is insufficient, whereas the most precise model is the combination of both (Bollen and Lennox, 1991). Also, choosing RM or FM is not related to the nature of the variables, and what truly matters is the researcher's own theoretical understanding and definition of the latent variables. Apart from the simplest first-order RM and FM models shown in Figure 1 and Figure 2, Diamantopoulos et al. (2008) discussed a more complicated second-order measurement model. In a second-order model, some latent variables are made of multiple dimensions and every single dimension can be measured by indicators such as a latent variable. Since both indicators and latent variables could be either reflective or formative, four types of measurement models are accordingly generated: (1) first-order formative and second-order formative, (2) first-order reflective and second-order formative, (3) first-order formative and second-order reflective, and (4) first-order reflective and second-order reflective.

In addition to the differences in definition, RM and FM vary in empirical

analysis, too. For one thing, the processes for reliability analysis are various. Specifically, within RM, there is a completed analytical paradigm, in which internal consistency is indicated by common indicators such as CITC and Cronbach's α. However, in FM internal consistency is not applicable because the correlation among measurement indicators could be positive, negative or zero (Diamantopoulos and Winklhofer, 2001). In fact, the reliability analysis of FM is controversial. Some think there is no necessity for testing reliability in an FM model (Rossiter, 2002) while Diamantopoulos (2005) argued that test-retest reliability is advisable. For another, the processes of validity analysis are also different. Specifically, the validity of RM is normally judged by AVE and factor loadings, but in FM, coefficient γ (Figure 2) plays this part. γ indicates the effect on latent variables driven by indicators and simultaneously reflects validity (Bollen, 1989). If γ shows no significance, indicators are invalid and ought to be removed. Nevertheless, Diamantopoulos and Winklhofer (2001) and MacKenzie et al. (2005) introduced an overall generality indicator as a possible way to test validity, arguing that the validity between correlated indicators and overall indicators becomes the final validity for the whole FM model. Moreover, model estimation and fitting vary as well. Supposing that FM is analyzed as RM, it will lead to deviation on parameter estimation as well as error on defining latent variables (Jarvis et al., 2003; MacKenzie et al., 2005; Petter et al., 2007), causing a less effective or scientific result.

2.2 Research on Face

Face is an essential part of Chinese traditional culture. As Lin (1935) stated in his book "My Country and My People," face is the subtlest standard in Chinese behavioral norms and it impacts Chinese behavior in a profound way. Face includes complicated connotations as well as a variety of meanings. Researchers find it extremely hard to define face precisely, only reaching a consensus that face is a motive for behavior. Goffman (1967) proposed that face is gained from others in some specific social interactions, and it refers to a social positive value that others think one should gain, a self-portrait depicted by approved social attributes. Ho (1976) defined face as respect and reverence acquired from others based on decent behaviors in line with one's identity and social status. Obviously, Chinese face is not only a psychological construct (individual image claimed by

oneself or approved by the group), but also a social construct (reputation, status and respect authorized by the group). As well, it is a popular belief that face has multiple dimensions. Early in the scholarly discussions on face, Hu (1944) divided face into *lian* and *mian*. *Lian* represents the respect received from the group because of one's morality and *mian* represents social status received from society based on one's success and identity. Following Hu's theory, King and Myers (1997) defined the concepts as "moral face" and "social/status face." Zhu (1987) also thought that face consists of at least personal success and morality, similar to the face duality that includes social and moral face. Through an explorative study, Bao and Zhao (2009) highlighted three dimensions of individual need for face, which are ability-based, relationship-based and morality-based. Among them, morality-based face need refers to individual's expectation of his/her character and morality being recognized by others, initiating from self-constraint. Instead of originating from inner moral standards, ability-based face need and relationship-based face need are gained from external social groups according with social norms, and include social status, politics power, personal success, strong social networks, etc. Interestingly enough, the morality dimension is in line with the concept of *lian* (Hu, 1944) while the dimensions of ability and relationship are comparable to *mian*. Later, Shi et al. (2012) developed 4 dimensions of face: morality-oriented, ability-oriented, status-oriented and social relationship-oriented, whereby morality-oriented face serves as the only dimension of *lian*, while the other three serve as dimensions of *mian*. In this paper, we adopt a definition of face that is constructed by *lian* (moral face) and *mian* (social face) (Shi et al., 2012). In other words, face itself is a second-order formative model.

Nonetheless, this article emphasizes a first-order measurement model and measurement indicators of those four dimensions. Even renowned Chinese writers have difficulty in providing a precise explanation of face, thinking it abstract and untouchable (Lin, 1935). In addition, it contains both situational (Ho, 1976; Zhou, 1993; Hwang, 2002) and chronic (Chen, 1982) characteristics. Hence, some scholars put situational indicators into use, building the FM of face (Bao and Zhao, 2009; Shi, 2012). For example, indicators like "able to achieve something that others are unable to," "betray and sell out your friends" and "not bring enough money when treating others" are situational indicators causing one to have/lose face. They designate the cause of face, and are logically reckoned as

causal indicators in FM, manifesting different dimensions of face. However, other scholars utilize RM to test the concept of face through general indicators which serve as consequences owing to face, such as "I long to possess something people desire to own but do not" and "I hope in others' eyes, I have a better life than the majority." Those indicators are the effect of valuing face seriously, thus recognized as effect indicators in RM. When studying face empirically, most researchers first choose RM because of its strong stability. Yet there is no scientific evidence to prove whether RM is superior to FM. Therefore, this paper conducts an empirical analysis, presenting the distinctions between RM and FM on stability and validity in terms of capturing face. We summarize the scales of FM and RM in academic research (Table 1).

Table 1 Summary of Measurement Scales on Face

Scholars (Year)	Genre of Measurement Scale	Item Number	Dimensions
Chen (1982)	RM	40	Love face (i.e. concerned about face a lot), Thin face (i.e. easy to feel ashamed when losing face)
Chou (1996)	RM	50	Protective face orientation, Acquisitive face orientation
Chan et al. (2009)	RM	8	Concern for face
Bao and Zhao (2009)	FM	35	Ability-based face need, Relationship-based face need and Morality-based face need
Shi et al. (2012)	FM	22	Morality-oriented face, Ability-oriented face, Status-oriented face and Social relationship-oriented face
Zhang et al. (2012)	RM	11	Desire to gain face, Fear of losing face

This article adopts the scales developed by Chan et al. (2009) and Zhang et al. (2012) as they are more recent and simplified with at most 11 items. In addition, Li and Su (2007) developed 9 explorative measurement items for how face influences consumption. Li and Su (2007) connected face and consumption behavior that matches the definition of a reflective indicator. Therefore, Li and Su's measurement items are taken into account, too. As well, for accuracy, another in-depth interview is conducted to deepen the development of RM for measuring the concept of face. As for FM, since Shi et al. (2012) expanded the study of face measurement on the basis of Bao and Zhao (2012)'s work, we follow Shi et al. (2012) directly. To conclude, our research fully uses the scale of

Shi et al. (2012) for FM and the scales of Zhang (2012), Chan et al. (2009), and Li and Su (2007) as part of the measures of RM.

Study of the influence of face mechanisms on consumer behavior include two streams, exploring face as a whole concept or in separate dimensions. As a whole, face influences quite a number of consumer behaviors, such as conspicuous consumption (Zhang, 2012), luxury consumption and exclusive consumption (Wang et al., 2012), gift giving, etc. Chinese consumers purchase products because of the need of face in most situations (Jap, 2010) and the need for social approval in social interactions (Chen, 1982). It can be easily deducted that consumers with strong face consciousness are more concerned about extrinsic attributes of a product (brand, reputation and price) rather than intrinsic attributes (function and quality), so that they can gain face or avoid losing face (Belk, 1988). Face helps promote consumers' brand awareness so that price sensitivity may be lowered. Beyond that, face has an impact on the personal understanding of luxury ads (Shi et al. 2012). As well, separating face into *lian* and *mian*, scholars have further studied the effect of these two dimensions on consumer behavior. Analyzing the difference and sameness between *lian* and *mian*, Zhai (1995) built the model of Chinese face consciousness at the same time. Taking this one step further, Shi et al. (2011) proved a significant difference between *lian* and *mian* through grounded theory, which reflects distinctive psychological cognition across diverse product categories. Moreover, Shi et al. (2011) found that consumers who have high *mian* consciousness have a predilection for brands from developed countries. They pursue famous brands, high prices and fashionable design. Namely, they hold much more explicitly positive attitudes towards foreign brands over domestic ones. However, Chinese consumers consider purchasing Japanese cars as "gaining *mian* but losing *lian*." Incongruent with patriotism, buying Japanese goods violates national morality. As a result, compared to Japanese brands, consumers hold implicit positive attitudes to Chinese brands. It also demonstrates that instead of *lian* (moral face), *mian* (social face) is the reason for the desire to chase after status goods and luxury goods (Bearden and Etzel, 1982; Wong and Ahuvia, 1998), and importantly, again it shows that face is a multidimensional construct.

Above all, there is no universal definition or a recognized measurement scale of face since it is complicated. As a result, scholars use both FM and RM to measure face. Even though no evidence can prove that RM is better than FM,

scholars tend to choose RM owing to its strong stability. In terms of the influence of face on consumption behavior, current studies are mainly divided into two streams, viewing face as a whole construct or a multi-dimension construct. Furthermore, most are connected to luxury good consumption while ecological consumption is ignored.

3 Study 1: A Re-exploration of a Reflective Model of Face

The purpose of study 1 is to re-explore reflective measurement scales, achieve a reflective model (RM) of face through explorative factors analysis, and conduct confirmatory factor analysis to lay the foundation for study 2.

3.1 Questionnaire Design

First, based on the existing reflective measurement scales of face (Zhang, 2012; Chan et al., 2009; Li and Su, 2007), combining some modifications, we initially reorganized 12 questions. Next, for accuracy, we held individual in-depth interviews about these 12 questions respectively with 21 MBA students. After discussion within the research group summarizing the questions that addressed similar meanings, we developed 13 new questions. Integrating these two steps, 25 questions were eventually established, and each index mark is shown in Table 2.

Table 2 Measure Indicators Combined with Previous Findings and In-depth Interviews

Indicators	Detail Description	Source
GF1	I hope that I can solve problems others cannot.	Zhang (2012)
GF2	I long to possess something people desire to own but do not.	
GF3	I want others to think well of me.	
GF4	I hope I can let others know I have some friends with high status.	
GF5	I hope in others' eyes, I have a better life than the majority.	
GF6	I will try my best to conceal my drawbacks in front of others.**	
GF7	I am concerned about others' attitudes towards me.	Chan et al. (2009)
GF8	I am concerned about others' criticism towards me.	
GF9	I am concerned about others' looking down upon on me.	
GF10	My identity and social status are essential to myself.**	

(*To be continued*)

(*Continued*)

Indicators	Detail Description	Source
GF11	What I consume should correspond to my identity and social status.**	Li and Su (2007)
GF12	When buying a gift for someone, I am usually concerned about the prestige of the gift. *	
GF13	I hope in others' opinion, I perform better than the majority.**	Organized by in-depth interviews
GF14	I hope compared with others' possessions, I own something of higher class.	
GF15	I think no matter how hard it is, one should maintain the same consumption level as others.**	
GF16	I hope I know a lot of people.	
GF17	I hope I have friends with high status.	
GF18	I hope my friends will give me a hand unhesitatingly when I have trouble.*	
GF19	I hope I can have good conversation and interaction with others during social activities.	
GF20	I hope I can behave well.	
GF21	I hope I can become a model others look up to.	
GF22	I pay attention to my performance in public.*	
GF23	I am concerned about whether what I do accords with my identity.	
GF24	I am concerned about whether my behavior meets the social norms.	
GF25	If I do something indecent, I will feel embarrassed.	

Notes. * indicates that the question was excluded after SPSS reliability analysis; ** indicates that the question was excluded after LISREL exploratory analysis.

3.2 Exploratory Analysis

This study uses a convenience sampling survey. Hard-copy questionnaires were distributed to two MBA classes at a university in Guangzhou. 121 questionnaires were distributed, and 114 were collected with 110 valid copies. The collection rate and effective rate are 94.2% and 96.5% respectively.

Reliability Analysis. In general, the value of the Corrected Item-Total Correlation (CITC) coefficient of a reliable indicator should be more than 0.3. Thus, indicators that could not meet this standard were omitted and that tempered the overall Cronbach's α value. Accordingly, GF22, GF18 and GF12 were removed, with 22 indicators remaining; overall Cronbach's α value was raised from 0.907 to 0.910. After the first revision, the scale showed a good internal consistency.

Principal Component Analysis. Kaiser-Meyer-Olkin measure of sampling

adequacy and Bartlett's Test of Sphericity were run in SPSS17.0, in order to determine whether the data proved suitable for factor analysis. The results showed that the KMO is 0.835, greater than 0.7, and Bartlett's Test of Sphericity was significant at the 0.01 level. Hence, the sample data was suited for factor analysis. Then, the LISREL analysis was used for principal component analysis, and 10 principal components were assumed at the beginning. According to the results, the total explained variance for the first four factors was 62.57%, over 60%. Since in this study, the FM of face is constructed on the measurement model of four dimensions created by Shi et al. (2012), we followed the structure of the four factors for the exploration of RM of face for better comparison.

Exploratory Factor Analysis. Through the LISREL analysis, we calculated the varimax-rotated factor loadings. Next, indicators were removed in the following circumstances: 1) factor loadings of which are less than 0.4; 2) simultaneously landing on multiple factors; 3) not falling on any factor. Accordingly, after deleting GF6, GF10, GF11, GF13 and GF15, 17 measurement indicators were reserved. Then, we ran an exploratory factor analysis again, with a KMO outcome of 0.827. Bartlett's Test of Sphericity remained significant at 0.01. The reliability analysis and exploratory factor analysis results are shown in Table 3, which obviously demonstrates that the second revision is better with a higher internal consistency of the scale.

Table 3 17 Measurement Indicators of Exploratory Factor Analysis

Factors	Indicators	Factor Loadings	CITC	Cronbach's α	Eigenvalues	Interpretable Variance
Factor 1	GF3	0.76	0.871	0.898	7.88	35.84%
	GF7	0.82	0.860			
	GF8	0.82	0.859			
	GF9	0.72	0.882			
Factor 2	GF4	0.71	0.733	0.792	2.55	11.60%
	GF16	0.62	0.741			
	GF17	0.87	0.648			
	GF19	0.53	0.807			
Factor 3	GF1	0.52	0.840	0.827	1.83	8.33%
	GF2	0.81	0.731			
	GF5	0.62	0.817			
	GF14	0.80	0.722			

(*To be continued*)

(*Continued*)

Factors	Indicators	Factor Loadings	CITC	Cronbach's α	Eigenvalues	Interpretable Variance
Factor 4	GF20	0.53	0.789	0.799	1.50	6.80%
	GF21	0.52	0.790			
	GF23	0.74	0.737			
	GF24	0.75	0.734			
	GF25	0.71	0.745			

According to the analysis results, the RM measurement scale for face was supported. In factor 1, all four indicators described personal concerns about others' attitudes and compliments towards oneself, associated with individual identity and social status. Therefore, we named this group status-oriented face. In factor 2, four indicators showed one's relationship with others, named social relationship-oriented face. Within factor 3, four indicators were related to personal capability, such as having a better life, so this group was named ability-oriented face. Finally, the five indicators of factor 4 were related to personal morality, and were named morality-oriented face. Status-oriented face, social relationship-oriented face and ability-oriented face are three constituent dimensions of *mian*, while morality-oriented face is the only component of *lian*, consistent with the findings of Shi et al. (2012).

3.3 Confirmatory Factor Analysis

MBA students and a small portion of undergraduates at a university in Guangzhou participated in the convenience sampling survey. 260 surveys were handed out with 247 questionnaires returned, a collection rate of 95%. A questionnaire with 10 answers that were the same in a row was invalidated. After excluding invalid questionnaires, 236 valid ones were retained, with an effective rate of 95.5%. In order to facilitate follow-up research, 17 measurement indicators were re-labeled. In addition, in front of every indicator, "RM" was put so as to distinguish the measurement indicators from FM.

SPSS 17.0 and LISREL software were used to test the reliability and validity of the RM of face (Table 4). It was apparent that the CITC corresponding to every factor was greater than 0.5, and all the Cronbach's α values were greater than 0.7, which indicates the scale has good reliability. Furthermore,

$\chi^2/df=2.44<3$, CFI=0.94, IFI=0.94, NFI=0.90, NNFI=0.92, RMSEA=0.068<0.08. As well, the standardized basic factor loadings were greater than 0.5. All coefficients were entirely within the acceptable range. Accordingly, the data had excellent fit.

Table 4 Reliability and Validity Analysis Results for the RM of Face

Latent Variable	Dimensions	Indicators	Factor Loadings	CITC	Composite Reliability	Cronbach's α	
Face	Morality-Oriented Face	RMF1	0.85	0.773	0.875	0.873	0.899
		RMF2	0.81	0.704			
		RMF3	0.79	0.734			
		RMF4	0.64	0.615			
	Ability-Oriented Face	RMF5	0.72	0.686	0.873	0.871	
		RMF6	0.70	0.662			
		RMF7	0.74	0.711			
		RMF8	0.91	0.812			
	Status-Oriented Face	RMF9	0.82	0.720	0.9114	0.910	
		RMF10	0.91	0.840			
		RMF11	0.88	0.819			
		RMF12	0.82	0.787			
	Social Relationship-Oriented Face	RMF13	0.78	0.746	0.899	0.898	
		RMF14	0.77	0.722			
		RMF15	0.88	0.816			
		RMF16	0.83	0.769			
		RMF17	0.84	0.790			

Then, we calculated the value of an average variance extracted (AVE) and composite reliability (CR) of four factors (Table 5). We can see that the RM of

Table 5 AVE and CR of the RM of Face

	Morality-Oriented Face	Ability-Oriented Face	Status-Oriented Face	Social Relationship-Oriented Face
Morality-Oriented Face	**0.7656**			
Ability-Oriented Face	0.312**	**0.7966**		
Status-Oriented Face	0.306**	0.463**	**0.8490**	
Social Relationship-Oriented Face	0.309**	0.414**	0.403**	**0.8310**
AVE	0.5861	0.6345	0.7208	0.6905

Notes. ** indicates the two-tailed tests are significant at the 0.01 level; * denotes the two-tailed tests are significant at the 0.05 level. The value on the diagonal is the square root of AVE, and below the diagonal is correlation coefficient value between latent variables.

face has good convergent validity and discriminant validity. Accordingly, the RM of face in study 1 has good reliability and validity, which is scientifically acceptable.

4 Study 2: Comparative Analysis of Two Measurement Models

4.1 Analytical Methods and Indicators

Via exploratory analysis and confirmatory analysis, study 1 supports the use of RM for measuring face. The purpose of study 2 is to look into the differences between the two models, particularly with regards to the models' stability and the ability to interpret the concept of face. We introduce the FM of face built on Shi et al.'s (2012) work.

With regards to a data analytical method, currently partial least squares regression (PLS) is relatively more recognized by scholars (Fornell and Bookstein, 1982; Coltman et al., 2008). Unlike covariance matrix analysis, PLS analysis does not require the data to present normal distribution, so even with a small sample size, PLS is practical (Fornell and Bookstein, 1982; Gudergan et al., 2008; Baxter, 2009). Also, it can be carried out in the presence of independent variable regression modeling where there is multicollinearity. Therefore, it is easier to explain the regression coefficients in each variable (Anderson and Gerbin, 1988) and to avoid potential issues such as factor indeterminacy or the model not being recognized (Fornell and Bookstein, 1982). Generally, common PLS analysis software includes LV-PLS, PLS-Graph, Smart-PLS, etc. We used Smart-PLS software for this study. Previous research on the fitness of statistical indicators for FM is integrated and summarized in Table 6 (Chin, 1998; Diamantopoulos and Winklhofer, 2001; Jarvis et al., 2003; MacKenzie et al., 2005).

To promote the rigor of comparison, both RM and FM were analyzed using PLS. As well, following Diamantopoulos and Winklhofer (2001) and MacKenzie et al. (2005), we brought in six generalized measurement indicators for the overall concept and dimensions of face. According to Table 6, stability is determined by factor loadings λ or weighted coefficient γ, and a statistically significant T value, while the validity is evaluated by the correlation coefficient between the latent variables and R^2.

Table 6 Indicators for Judging the Goodness of Fit for FM

Category	Content	Judgments
Statistically Significant Index	-Significance of latent variable index weighted coefficient γ	-T value is significant, and the absolute value is greater than 1.96
	-Significance of latent variable path coefficients	-T value is significant, and the absolute value is greater than 1.96
	-Chi-square significance	-should not be significant
	-GFI	-ideal value is greater than 0.9
Statistical Validity Index	-latent variable index weighted coefficient γ	-generally greater than 0.6, preferably greater than 0.7
	-latent variables standardized path coefficient	-generally greater than 0.2, preferably greater than 0.3
	-regression coefficient of determination (R^2)	-generally greater than 0.2

4.2 Questionnaire Design

We kept the basic FM of face congruent with Shi et al.'s (2012) framework. However, we added six more generalized measurement indicators. Two of them are general indicators of overall face ("In daily life, I care about my own face" and "Overall, I think I care about face a lot"), and four are generalized indicators corresponding to four dimensions ("When I am questioned on my conduct by others, I feel I have no face," and so on). Questionnaires used a 7-point Likert scale. The indicators were labeled to make analysis easier. For example, "FM" was added ahead of every single indicator for FM to increase distinguishability. Two newly incremental overall indicators were labeled as ALLF1 and ALLF2, as well as four indicators labeled AMF1, AAF1 and ASF1, ARF1 (Table 7). The questionnaire for study 2 was distributed along with the questionnaire from study 1. Thus, the procedure for data collection is exactly the same and in total 236 valid questionnaires were retrieved as reported for study 1.

4.3 Comparative Analysis Results

First, using Smart-PLS analysis, we obtained factor loadings λ (RM), weighted coefficient γ (FM) and significance (T value) of every measurement indicator and latent variables, as well as the CR and AVE of latent variables (Table 8). To ensure a clear comparison, as both models include the same 4 dimensions, we

replaced the indicator labels from FMF (Table 7) and RMF (Table 4) with MF, AF, SF and RF (Table 8), representing morality-oriented face, ability-oriented face, status-oriented face and social relationship-oriented face. It is apparent that factor loadings in the RM of face are greater than 0.7, and significant at the 0.01 level. However, in FM, some weighted coefficients γs were insignificant, and many of them are only marginally significant. Thus, the stability of RM is superior to FM in measuring face.

Table 7 Indicators for the FM of Face and Incremental Generalized Measurement Indicators

Dimensions	Indicators	Description
Morality-Oriented Face	FMF1	I behave indecently in public.
	FMF2	I was told that I am immoral.
	FMF3	I have uncivilized behavior.
	FMF4	Bad habits are known by others.
	FMF5	I quarrel with others in public.
	FMF6	I have no shame, doing something low and cheap.
Ability-Oriented Face	FMF7	Compared with my peers, I lead a worse life.
	FMF8	My child or I am not able to enter a university.
	FMF9	I am bad at learning/ working.
	FMF10	Friends are talking about a topic that I know nothing about.
Status-Oriented Face	FMF11	I work in a small company.
	FMF12	My income is low.
	FMF13	My housing conditions are poor.
	FMF14	I always take a crowded bus to work.
Social Relationship-Oriented Face	FMF15	People openly criticize me.
	FMF16	I get refused when turning to people for help.
	FMF17	I don't bring enough money when treating others to a meal.
Generalized Measurement Indicators	ALLF1	In daily life, I care about my own face.
	AMF1	When my conduct is questioned by others, I feel I have no face.
	AAF1	When I am not as capable as others, I feel I have no face.
	ASF1	When I do not have the same social status as others, I feel no face.
	ARF1	When I am embarrassed in social interactions with others, I feel I have no face.
	ALLF2	Generally, I think I care about face a lot.

Table 8 Comparison of the Results of Smart-PLS

Dimensions	Measurement Indicator	Reflective Model（RM）		Formative Model（FM）	
		Factor Loadings λ	*T* value	Weighted Coefficient γ	*T* value
Morality-Oriented Face	MF1	0.7955	8.3149	−0.0689	0.5655
	MF2	0.7196	5.9639	0.6438	**4.6195**
	MF3	0.7822	8.0402	0.2782	**2.0404**
	MF4	0.8249	11.3884	0.0710	0.7318
	MF5	0.8786	12.9011	0.0858	0.8057
	MF6			0.2346	**2.0409**
	CR	0.8997			
	AVE	0.6430			
Ability-Oriented Face	AF1	0.7844	15.6330	0.2490	**2.0040**
	AF2	0.8308	22.5111	0.2170	1.3950
	AF3	0.9029	40.1336	0.2442	1.8698
	AF4	0.8720	22.8262	0.5043	**4.3079**
	CR	0.9113			
	AVE	0.7203			
Status-Oriented Face	SF1	0.9217	66.0711	0.3830	**2.2965**
	SF2	0.9070	51.0724	0.0636	0.3246
	SF3	0.8594	25.0973	0.5008	**2.6671**
	SF4	0.8626	36.8282	0.1756	1.2490
	CR	0.9372			
	AVE	0.7887			
Social Relationship-Oriented Face	RF1	0.8569	38.7145	0.5015	**3.8842**
	RF2	0.8992	50.7292	0.3942	**3.5771**
	RF3	0.8699	36.4603	0.3466	**2.9411**
	RF4	0.8746	41.5258		
	CR	0.9291			
	AVE	0.7661			

The following step was to calculate the correlation coefficients, *T* values and the regression coefficient of determination R^2 between groups of: 1) four groups of indicators (AMF0, AAF0, ASF0 and ARF0) and increased four generalized indicators (AMF1, AAF1, ASF1 and ARF1); and, 2) four generalized indicators and overall face indicators (ALLF). Wherein, to simplify, AMF0 represents the combination of all MF indicators in either one of the measurement models.

Likewise, AAF0, ASF0 and ARF0 stand for AF, SF, RF indicators respectively. Besides, ALLF is the combination of ALLF1 and ALLF2. Table 9 shows that the correlation coefficients in both groups are significant. Nonetheless, the comparison shows that the correlation coefficients in FM are greater than the corresponding ones in RM, and that R^2 is the same, higher in FM than in RM. That is, with regards to the ability to interpret generalized indicators in all dimensions, FM is the better choice. Compared to RM, FM can provide a better picture of the construct of face. In addition, a significant positive correlation is found between the overall and four generalized indicators.

Table 9 Correlation Coefficients, *T* Values and R^2 of the Four Dimensions and Overall Concept of Face

Path	Reflective Model（RM）			Formative Model（FM）		
	Correlation Coefficient	*T* value	R^2	Correlation Coefficient	*T* value	R^2
AMF0—> AMF1	0.2148	3.6167	0.0461	0.6067	13.8279	0.3680
AAF0—> AAF1	0.2950	4.8311	0.0870	0.5683	11.2012	0.3230
ASF0—> ASF1	0.3694	6.4111	0.1365	0.6035	14.1563	0.3642
ARF0—> ARF1	0.3244	4.6899	0.1052	0.5901	11.9363	0.3482

Path	Correlation Coefficient	*T* value	R^2
AMF1—>ALLF	0.1409	2.0057	**0.346**
AAF1—>ALLF	0.2310	2.4341	
ASF1—>ALLF	0.3033	3.3470	
ARF1—>ALLF	0.2831	3.3180	

Overall, both RM and FM have their own advantages and disadvantages. FM offers a better interpretation of face, while RM has relatively high stability. RM is also superior with significant correlation coefficients between latent variables constructed of measurement indicators and four generalized indicators. To sum up, RM is better at measuring face compared to FM.

In addition, there is a significant positive correlation between the overall and four generalized indicators, and R^2, the explained variance reaches 34.6% (Table 9). With the data of the four generalized indicators completely collected, study 3 was developed to explore the influence of the diverse dimensions of face on ecological product preference.

5 Study 3: Effect of Different Dimensions of Face on Ecological Product Preference

In study 1 and study 2, we examined the differences between RM and FM, compared how well both models can describe the concept of Chinese face and also showed that face is composed of 4 dimensions. However, we have yet to show the link between face and consumption behavior. The purpose of study 3 was to test various effects of the different dimensions of Chinese face on preferences for the consumption of ecological products.

Since October 2011, the Chinese public has become more and more aware that haze, and in particular, of the serious health impacts of small particulate matter (PM2.5) which is small enough to pass through alveoli into the bloodstream. One of the sources of PM2.5 in everyday life is the vehicle exhaust emissions. The government and environmentalists in China have been promoting green transportation as one way to improve air quality, especially new energy passenger vehicles in light that over 27% new cars sold in 2015 all over the globe run on Chinese roads, according to the International Organization of Motor Vehicle Manufacturers. Therefore, we chose environmentally friendly cars as our study object.

Prosocial behavior, such as ecological product consumption, enables consumers to express social responsibility and personal concern for the environment (Connolly and Prothero, 2003), thereby improving the evaluation for their own reputation (Milinski et al., 2002). Face drives people to care about their image and how others evaluate them, so it may strongly affect ecological consumer behavior (Shi et al., 2014). However, there has been limited empirical research conducted on the impact of face on ecological consumer behavior, especially in terms of the cognitive differences between *lian* and *mian*, as most research has examined face as a whole concept associated with luxury goods consumption. Thus, exploring whether the different dimensions of face impact ecological product preference will aid us in understanding the mechanisms of face better.

5.1 Research Hypothesis

Intrinsic, extrinsic and image/reputation are three types of consumer prosocial behavior motivations (Bénabouand and Tirole, 2006). Image motivation

originates from consumer impression management, which guides individuals to present prosocial and moral behavior, so as to leave a positive impression on others (Griskevicius et al., 2010). Moreover, if individuals engage in prosocial behavior, they gain both a prosocial reputation and others' praise, a symbol of personal virtue (Griskevicius et al., 2010; Delmas and Lessem, 2014). Logically, when consumers proactively implement environmentally friendly behavior and embody the spirit of self-sacrifice, they will be certain to reap others' respect, appreciation and recognition. In addition, Peloza et al. (2013) combined the study of self-standard compliance and self-discrepancy theory, proposing that the morality of sustainable behavior is an important self-standard. However, in reality, actual behavior is not always in line with this standard. Therefore, when consumers have a strong sense of self-responsibility, they desire to meet their own internal ethical standards by choosing moral or environmental products. Thus, either for building a good reputation or for meeting inner moral requirements, consumers would choose ecological or ethical products rather than non-ecological ones.

Face can be split into *lian* and *mian* (Hu, 1944; King and Myers, 1977; Bao and Zhao, 2009). *Mian* represents social status won by extrinsic achievement, while *lian* stands for image and reputation gained from obeying moral standards (Zhu, 1987; Bao and Zhao, 2009). For the sake of gaining and maintaining one's face, it is easy for consumers to buy high priced products, attached to a conspicuous brand identity, manufactured by developed countries (Shi et al., 2011) and that are unique (Chan et al., 2009). Furthermore, rather than *lian*, *mian* provides the motivation for the craze about status goods and western luxury goods (Wong and Ahuvia, 1998; Wong and Zaichkowsky, 1999; Tse, 1996). Namely, *mian* is social-oriented and leads to concern about social status and financial strength, while *lian* is morality-oriented, and propels prosocial behavior. To put it formally, we present hypotheses H1a and H1b:

H1a. Compared with social-oriented face (*mian*), consumers with stronger morality-oriented face (*lian*) have a greater preference for ecological products.
H1b. Compared with morality-oriented face (*lian*), consumers with stronger social-oriented face (*mian*) have a greater preference for non-ecological luxury products.

5.2 Sample Analysis

Data for study 3 was collected along with the data for study 2 as well as study 1 (confirmatory analysis). Before answering the survey questions, participants were required to read the following manipulated purchase scenario. Predilection was measured on a 7-point scale and was worded, "If these two cars are of the same price and within your affordable range, which car would you prefer?," with endpoints "car A/car B." The specific situation was set as follows:

> Suppose that you are now ready to buy a car, and you find after research, there are two cars with the same market price. The following is the detailed description of two vehicles:
> A car is a product of a well-known brand. The car brand has always been an emblem of identity and status, world-renowned for its luxury, and it has become the first choice for the successful;
> B car is an environmentally friendly car of some brand. It can effectively reduce fuel consumption and exhaust emissions, favorable to the environment, and it has become the first choice for environmentalists.

For better determining whether the participants are of the target group we expect, we studied their demographic characteristics as follow. 129 males and 107 females participated, mainly middle aged and youth (born from 1974 to 1995), nearly 75% with a stable occupation, and 78.5% with an annual salary over RMB 60,000 (Table 10). The research object in study 3 was the environmental friendly car and participants are part of the demographic group most likely to purchase cars in China, thus representative.

Table 10 Study 3: Sample Descriptive Statistics

Gender	**Amount**	**Percentage**	**Education**	**Amount**	**Percentage**
Male	129	54.7%	Junior College	1	0.4%
Female	107	45.3%	Undergraduate	152	64.4%
Date of Birth	**Amount**	**Percentage**	Postgraduate and above	83	35.2%
1961–1973	17	7.2%	**Profession**	**Amount**	**Percentage**
1974–1984	113	47.9%	Full-time Students	52	22%

(*To be continued*)

(*Continued*)

Gender	Amount	Percentage	Education	Amount	Percentage
1985–1995	103	43.6%	Government and Institution Personnel	14	5.9%
After and within 1996	3	1.3%	State Enterprise Personnel	58	24.6%
Annual Salary	**Amount**	**Percentage**	Foreign Enterprise Personnel	45	19.1%
Below 50,000	53	22.5%	Private Enterprise Personnel	53	22.5%
50,001–100,000	25	10.6%	Self-employed Entrepreneurs and Freelance	8	3.4%
100,001–300,000	118	50%			
300,001–500,000	29	12.3%	Unemployed and others	6	2.5%
Over 500,001	11	4.7%			

ANOVA analysis showed that ecological product preference was not affected by demographic indicators at the 0.01 level, including gender (p=0.737), date of birth (p=0.083), annual salary (p=0.173), education (p=0.436) and profession (p=0.463).

5.3 Analysis and Results

Manipulation Checks. The manipulation of materials was measured on two 7-point scales and stated, "DV1: According to the material described above, which car do you think better reflects social status?" and "DV2: According to the material described above, which car do you think releases less pollution to the environment?," followed by endpoints "car A/car B shows social status more" and "car A/car B releases less pollution" respectively. The results of a T test indicate that manipulation is successful. As expected, car A reflected social status more ($M=2.25<4$, $p<0.01$) and car B was considered less polluting ($M=6.50>4$, $p<0.01$).

Main Effect. First, on the basis of study 2, study 3 took the four generalized indicators of face as grouping variables, in order to inquire into ecological product preference impacted by morality-oriented face (*lian*) and social-oriented face (*mian*). *Lian* represents the respect received from the group because of one's morality and *mian* represents social status received from society based on one's success and identity. Therefore, among the 4 dimensions, morality-oriented face from personal inner standards belongs to *lian* and ability-oriented face, status-oriented face and social relationship-oriented face, relevant to one's

success and identity, belong to *mian*, which follows the division in Shi et al. (2012)'s work. The first indicator, morality-oriented face is worded, "When my conduct is questioned by others, I feel I have no face." Ability-oriented face, status-oriented face and social relationship-oriented face, are expressed as: "When I am not as capable as others, I feel I have no face," "When I do not have the same social status as others, I feel I have no face" and "When I am embarrassed in social interactions with others, I feel I have no face." The latter three also constitute general social-oriented face.

Second, we divided participants into two groups according to the scores. Group 1 consisted of 97 participants who had a higher score in social-oriented face (versus morality-oriented face), coded as "0." Group 2 included 128 members scoring higher in morality-oriented face oppositely (versus social-oriented face), coded as "1." The remaining 11 participants had equivalent scores in both dimensions. To balance the samples, we attributed these 11 to group 1, which resulted in 108 samples in group 1 and 128 in group 2.

Besides, using ANOVA, we analyzed scores in ecological product preference (Table 11 and Table 12). The mean of the dependent variable of group 1 is 2.74, while group 2 is 5.52, with significance (F=150.622, p<0.01). H1a and H1b are therefore supported. Compared to social-oriented face (*mian*), consumers with stronger morality-oriented face (*lian*) prefer ecological products. In contrast, the ones with stronger social-oriented face (*mian*) have more interest in luxury goods.

Table 11 Mean Statistic in Study 3

	N	Means	Standard Deviation	Standard Error	95% Confidence Interval	
					Lower Limit	Upper Limit
Group 1	108	2.74	1.816	.175	2.39	3.09
Group 2	128	5.52	1.655	.146	5.23	5.81
Total	236	4.25	2.214	.144	3.96	4.53

Table 12 ANOVA Analysis in Study 3

	Sum of Squares	Degree of Freedom	Mean Square	*F*	Significance
Between Groups	451.036	1	451.036	150.622	0.000
Within Groups	700.709	234	2.994		
Total	1151.746	235			

6 Conclusion and Discussion

6.1 Conclusion

This paper innovatively explores both the advantages and disadvantages embedded in the reflective model (RM) and formative model (FM) in constructing face, and furthermore, analyzes the effect on ecological product preference of various dimensions of Chinese face. Initially study 1 finds through empirical study that the RM of face has a better reliability. Then, based on an existing FM of face (Shi et al., 2012), study 2 contrasts these two measurement models with regards to their stability and interpretation of face. Finally, according to the results from study 2, four generalized indicators of four dimensions of face were analyzed as grouping variables for study 3, so as to test whether different dimensions have differentiated effects on consumers' tendency to purchase ecological products.

Conclusions are as follows: 1) In study 1, the RM of face is verified as having high reliability, and is made up of four factors, namely, morality-oriented face, ability-oriented face, status–oriented face and social relationship-oriented face. 2) We conclude from study 2, RM has greater stability; however, FM is better at interpreting the concept of face. As well, the incremental four generalized indicators of the four dimensions show positive significance with the overall concept of face, along with explained variance R^2 at 34.6%. 3) Study 3 deepens study 2 and shows that the separated dimensions of face exert various impacts on consumer ecological product preference. Consumers who have stronger morality-oriented face (*lian*) rather than social-oriented face (*mian*) are more likely to purchase ecological products.

6.2 Contribution

This article makes both theoretical and practical contributions.

In terms of theoretical contributions, first, this paper explores the differences between measurement models of face and their influence, diminishing the confusion about choosing a model to measure face. As a vital component of eastern traditional culture, with both situational characteristics and general characteristics, face is extremely difficult to measure. In some cases, scholars emphasize situational indicators (i.e. causal indicators) to increase accuracy of

measurement (Bao and Zhao, 2009; Shi et al., 2012). Nevertheless, most use general indicators (i.e. effect indicators) to increase stability (e.g., Zhang, 2012; Chan et al., 2009). This is why there simultaneously exists FM of face and RM of face. Choosing the right measurement model is essential for a thorough understanding of a construct. It influences the corresponding empirical study and usage of a structural equation model. Moreover, specifying measurement models contributes to promoting Chinese scholars' empirical studies. Most scholars are keen to argue about causal variables of face as a whole concept, such as the effect of face on the consumption of luxury goods and exclusive goods. Yet most study put the dimensions of face and measurement models aside. Because every researcher has his or her own definition of face, lacking consideration of measurement models, they unintentionally adopt RM, a classic analysis paradigm. Addressing this gap in marketing research, this paper offers a new point of view to examine the detailed dimensions of face and its measurement, as well as develop a better understanding of the connotations of face. Also, this paper provides out-of-the-box thinking for subsequent scholars in exploring and selecting measurement models, with more scientific evidence to explain the mechanisms of face.

In addition, we further test the difference between *lian* and *mian* and their causal effects on consumer behavior. In Chinese traditional culture, consumption is not only a personal activity, but also a tool to gratify upper-class social needs. Products undoubtedly have instrumental functions, and yet people purchase them because of what they mean, too. Solomon (1983) argued that product purchases are relevant to social status, for people normally judge others by the products they own. Face consists of two dimensions, *lian* and *mian*. The former refers to image and reputation recognized by others gained because of obeying moral norms, and coming from inner morality and self-constrain. However, the latter refers to external personal success and social status, as recognized by the social group. Even though it is universally believed that face is a multidimensional construct, the majority of studies takes face as a whole concept to analyze its relationship to luxury good consumption, gifts consumption, human consumption and conspicuous consumption. Little research concentrates on the effect of different dimensions of face on consumer behavior, let alone variant effects on ecological product consumption. Through reviewing the relevant literature and empirical studies, this paper explores the difference between *lian* and *mian*,

theoretically and practically. As well, these differences directly contribute to differences in ecological product consuming behavior. As stressed again, compared to social-oriented face, consumers with morality-oriented face are more inclined to consume ecological products.

The practical contribution to marketing is distinct, too. Currently, "leading," "dignity," "success" and other words representing "elite" are frequently used in advertising for cars, emphasizing identity or social status. Based on our study, strong morality-oriented face contributes to a predilection for ecological products. Therefore, existing advertisements are probably not appealing to this kind of customers. Especially, present morality is declining so fast in real life that people are afraid to take social moral responsibility (e.g. helping the elderly when they fall down). Hence, there is a good chance that consumers with psychological dissonance and deep moral-self threatened feelings (Carrington et al., 2010), may be interested in other prosocial behavior (e.g. "tiny donation" through popular apps such as Wechat, purchasing low-emission cars). For the promotion of ecological cars, on the one hand, enterprises can take full advantage of consumers' need for *lian*. In advertising campaigns, instead of advocating for social identity, marketers can use terms such as "moral," "decent," "virtuous" to portray a social moral model figure owning an ecological car. On the other hand, companies can stress products' social attributes and moral attributes in the context of an immoral scenario to enhance consumers' social-oriented face needs. Products with outstanding social attributes and moral attributes may be favored by consumers to counteract feelings of unrest and anxiety originating from immoral behavior. So, to prime their ecological product preferences, companies should emphasize that eco-cars can embody social responsibility and generate respect from others.

6.3 Limitation

This paper presents a discussion on two measurement models (RM and FM) and fills the gap underlying the existing research, diminishing confusion about choosing measurement models and offering more scientific proof for the mechanisms of face. Especially, it has implications for policy-makers for Chinese ecological development that distinguishes the different effects of various dimensions of face on consumer ecological product preference. Limitations,

however, remain unavoidable.

(1) Discussion about FM and RM of face remains at an introductory level. Data was analyzed with Smart-PLS only once; however, it needs further investigation into the stability of the overall fit and model. As well, due to time considerations, we re-explored only RM while a more rigorous result would require the re-exploration of FM as well.

(2) Scholars claim that people tend to choose moral products mainly via three paths: 1) balance theory with regards to moral or ecological attributes or the halo effect; 2) impression management which cares for others' evaluation and approval of their character; 3) self-responsibility by which individuals hope to maintain their inner moral standards and avoid feelings of guilt. For the first path, companies can appropriately prompt consumer inclination to moral or ecological products, by highlighting the advantages of the other attributes or halo effect. Even though morality-oriented face affects the interest in ecological products through the second and third pathways, the paper did not discuss these mechanisms.

(3) Environmentally-friendly vehicles are selected as the object of study. Nonetheless cars belong to consumer goods which are consumed in public. Scholars believe that the second path produces its effect only in public (Griskevicius et al., 2010). Car-buying behavior is one of the most visible consumer actions, which is one of the reasons why we choose environmental friendly cars. Overall, there is a chance that the third path, self-responsibility, is not as affected by whether purchases are more or less visible to other people. In other words, consumers may be more interested in private ecological products (such as energy-saving air-conditioning) in order to meet internal ethical standards. However, we did not address this issue in this paper.

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