The Structure of Survey-Based Brand Metrics

To better understand how a brand is performing in the marketplace, firms employ a wide variety of measures, with consumer-based surveys often playing a central role. The authors identify some core dimensions of survey-based measures of brand performance, explore how they link to one another, and examine how they vary across both countries and categories. Studies in the United States and China of soft drinks, toothpaste, and fast food suggest that survey-based brand metrics can be categorized into six main dimensions that reflect a four-stage, hierarchy-of-effects awareness–interest–desire–action–type ordering: (1) comprehension; (2) comparative advantage, interpersonal relations, and history; (3) preference; and (4) attachment. Despite differences in culture and their history, these dimensions usefully portray different brands and products across the different countries.

ABSTRACT

Keywords: brand metrics, brand performance, brand measurement, global branding, international branding

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Because of the significant intangible value of brands, building and managing brand equity has become a priority for companies of all sizes in a wide variety of industries and markets. Consequently, monitoring brand metrics, which assess how a brand is performing in the marketplace, is critically important (Ailawadi, Lehmann, and Neslin 2003). Given the crucial role of consumers in a brand's success, many of these metrics are designed to capture various aspects of consumer beliefs, attitudes, and behaviors toward brands, often involving consumer surveys as input. Increasingly, such metrics are being summarized in an overall scorecard or dashboard for marketers and senior management (Kaplan and Norton 1992).

A key challenge in developing survey-based brand metrics and brand-metrics dashboards is the wide range of possible measures that could be employed and the potential diversity of geographical markets in which those brand metrics might be applied. Differences in survey responses from participants in different markets may result from different interpretations of questions, different beliefs about branding, or another underlying aspect of consumer behavior. Accordingly, our research goal is to suggest a parsimonious set of brand measures, and the relations among them, that can be used to measure brand performance regardless of the country market involved or the particular type of product or service being sold.

Cross-cultural research studies show that though there is considerable commonality across countries, significant differences often emerge. Much of the focus of cross-cultural research is on identifying commonalities and differences and the associated underlying factors explaining why these patterns emerge.

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Prior research in branding has shown that both similar and different effects can be found across cultures and countries. For example, in a meta-analysis of seven brand extension studies across multiple countries involving 131 different brand extensions, Bottomley and Holden (2001) find that though evaluations of brand extensions are a function of quality of the original brand, fit between the parent and the extension category, and the interaction between the two, the relative impact of each of these components varies by brand and culture. As another example, Zhang and Schmitt (2001) show how subtle differences in brand names affect brand ratings in different countries.

However, much of the published branding research has focused primarily on a single country—the United States—and often a single category. Given cultural differences across countries and consumer behavior variation across categories, it is not clear that the relevant measures and dimensions for brand metrics will be the same, much less be linked together in the same way, across disparate markets and distinct categories. Here, we examine consumers in two important but quite different settings, the United States and China, across three categories in two studies.

The purpose of Study 1 is primarily to refine the scale and to gain insight into the different possible measures of brand performance. Specifically, we examine two well-known, widely advertised, and physically similar brands (Coke and Pepsi), as well as a third smaller challenger brand (Dr Pepper or Sprite), on various brand-related measures to determine (1) how distinct the different possible measures of brand performance are and (2) whether the measured performance of brands differs significantly. To address cultural issues, we compare the measured brand performance of Coke and Pepsi in the United States and China.

In Study 2, we use the measures and scales developed in Study 1 to deduce an underlying structure of brand metrics. We group brand performance measures into distinct factors or core dimensions and explore their interrelationships. Study 2 also expands our investigation to brands in two other categories (Crest and Colgate toothpaste and McDonald's and KFC fast-food restaurants). In addition, we examine the relative contribution of brand, individual participants, category, and country-to-brand performance ratings.

STUDY 1

Measuring Brand Performance

We designed Study 1 to assess the broad range of potential brand performance measures. To gain some initial insights, we focused on a single category: soft drinks. To examine the impact of culture, we used two countries—the United States and China. Finally, much research in marketing and consumer behavior has shown that consumer response to marketing stimuli can be characterized along many different dimensions. In particular, research has shown that consumer response can vary from fairly low levels of brand awareness or familiarity to highly involved brand loyalty relationships based on affective, cognitive, and behavioral considerations (Haugtvedt, Herr, and Kardes 2008). Therefore, we examined several different research models and findings to ensure that we captured a wide range of possible consumer response and resulting differences in brand performance.

Specifically, we used three main sources. First, research by Aaker (1996), Fournier (1998), Keller (2002, 2008), and Keller and Lehmann (2003) suggests that consumer-based brand performance measures can be grouped broadly into five principal categories: awareness, associations (i.e., image and beliefs), attitudes, attachment (i.e., loyalty), and activity (e.g., purchase, consumption, word of mouth). Accordingly, we included aspects of each of the five principal categories of customer mind-set identified by these authors. Second, we added three specific elements of Ambler's (2003) brand health measures: quality, ambiance, and service. Finally, we reviewed three widely used commercial brand tracking approaches for additional measures:

- Young & Rubicam's Brand Asset Valuator (BAV), which originally measured four principal dimensions: relevance, differentiation, esteem, and knowledge;
- Millward Brown's BrandZ, which focuses on a pyramid of factors ranging from presence at the bottom to relevance, performance, advantage, and bonding at the top; and
- Research International's Equity Engine, which describes a structural model involving five constructs: authority (heritage, trust, and innovativeness), identification (bonding, caring, and nostalgia), approval (prestige, acceptability, and endorsement), attitude, and performance.

To generate scale items for the resulting 27 brand performance constructs, we began with scales in the *Handbook of Marketing Scales* (Bearden and Netemeyer 1998) and refined them using pilot tests and discussions with individual respondents, as well as input from market research suppliers that offer brand tracking and measurement services. This process resulted in the scales that appear in Appendix A (with sources indicated).

Method

Study 1 focused on a single category, soft drinks, which is both widely consumed and the subject of strong advertising and brand-building activities. Because one of our objectives was to develop brand metrics that could distinguish between functionally similar brands in a product category, we used both Coke and Pepsi as stimuli. To determine whether the structure of brand performance, as well as the ratings of two major brands, was similar across countries, we collected data in the United States (Chicago) and China (Shanghai). Finally, to determine how a comparatively weaker brand would be rated, we included a third well-known brand in each country (Dr Pepper in the United States; Sprite in China). Although different in formulation from each other, both brands represent established challenger brands in their respective markets.

Coke was introduced in the United States in 1886 and became the largest-selling cola drink by the turn of the century. Pepsi was introduced in the United States in 1898. Coke received a strong international push during and after World War II. Coke and Pepsi both secured permission to operate in China during the early 1980s as economic reforms developed. Pepsi was the first to market, with Coke close behind. Both brands sold (and sell) at significant price

premiums in China, where consumers consider "value for money" very important (Yang et al. 1999).

Research International collected data using a shopping mall intercept approach. Respondents were 100 adults (age 18 years and older), evenly split between men and women, in each country. Respondents were paid for their participation. They rated the three brands on the 84 items in Appendix A on five-point scales, where higher numbers indicated greater agreement. In addition, they provided demographic data, consumption patterns, and appropriate dollar and yuan metric preferences among the three brands.

Findings

Scale Evaluation. The first step in the analysis was to determine whether the 27 constructs were internally consistent. We examined each construct by computing average item-to-item correlations both within and between each construct. We also computed coefficient alphas and reexamined question wording. This resulted in the following modifications:

1. Item 3 ("When you think of a soft drink, this brand comes to mind") did not fit well with the other presence variables. It also was not a good fit with the awareness variables. Therefore, we dropped it from the analyses.

2. Item 6 ("I am quite familiar with this brand") correlated better with the knowledge measures, and therefore we included it there.

3. Item 22 ("This brand lives up to its promises") was similarly related to performance and trust measures, and therefore we dropped it from the analyses.

4. Item 31 ("This brand has served me well") was moved to performance because it was better correlated there.

5. Item 64 ("There is a good substitute for this brand") had low correlations to other items, and therefore we dropped it from loyalty.

6. Items 74 and 75 ("positive associations, positive thoughts") added nothing to the other four measures of overall attitude, and therefore we dropped them to achieve parsimony.

7. Item 80 ("I am unlikely to change my opinion of this brand") was dropped from persistence because it focused on opinion versus action.

Table 1 shows the final 78 items included in each construct along with average interconstruct correlations and coefficient alphas. All the constructs appeared to have adequate reliability, as all coefficient alphas were .76 or greater. We used averages of the 78 remaining items to capture the 27 brand performance constructs. Given the nature of the task, it is not surprising that there was considerable correlation among the constructs; that is, a large component of consumer response was overall liking of the brand, reflecting a halo effect or common method variance.

Table 1.
Final Scale Items, Within-Construct Correlations, and Coefficient Alphas (Study 1)

Construct	Study 1 Items	Average Within-Construct Correlation		Coefficient Alpha	
		United States	China	United States	China
1. Presence	1, 2	.64	.63	.77	.77
2. Awareness	4, 5	.76	.78	.87	.91
3. Knowledge	6, 7, 8, 9	.69	.61	.96	.86
4. Relevance	10, 11, 12, 13	.75	.60	.92	.86
5. Difference	14, 15, 16	.67	.71	.86	.88
6. Esteem	17, 18, 19	.65	.52	.85	.76
7. Performance	20, 21, 31	.78	.59	.93	.80
8. Advantage	23, 24, 25	.83	.72	.93	.88
9. Bonding	26, 27, 28	.82	.75	.93	.89
10. Heritage	29, 30	.87	.70	.93	.82
11. Trust	32, 33, 34	.81	.55	.93	.77
12. Innovation	35, 36, 37	.73	.63	.89	.84
13. Caring	38, 39, 40	.73	.68	.89	.86
14. Nostalgia	41, 42, 43	.65	.75	.85	.90
15. Prestige	44, 45, 46	.74	.56	.89	.79
16. Acceptability	47, 48, 49	.58	.63	.79	.83
17. Endorsement	50, 51, 52	.78	.55	.91	.79
18. Quality	53, 54, 55	.81	.78	.93	.91
19. Ambiance	56, 57, 58	.78	.67	.91	.86
20. Service	59, 60, 61	.59	.65	.82	.85
21. Loyalty	62, 63	.74	.63	.85	.77
22. Intention	65, 66	.90	.87	.95	.93
23. Value for money	67, 68, 69	.80	.62	.92	.83
24. Attitude	70, 71, 72, 73	.89	.70	.97	.90
25. Extension potential	76, 77, 78	.75	.72	.90	.89
26. Persistence	79, 81	.62	.57	.76	.73
27. Activity	82, 83, 84	.73	.72	.89	.89

Predictive Power of the Dimensions of Brand Performance. We analyzed the predictive power of the measures of brand performance using two behavioral measures: past consumption and planned share of next ten purchases. Table 2 shows the simple correlations of the 27 brand performance constructs with these key behavioral measures. All the correlations are positive and significantly different ($p < .05$) from 0. In the United States, 23 of the correlations range from .5 to .6, suggesting a consistently strong relationship. These results indicate that there is a significant relationship of brand performance measures with both backward- and forward-looking behavioral measures.

Brand Profiles

If the 27 measures of brand performance are to be of much use within a product category, they must discriminate between brands. To determine whether they did, we computed the mean for each

Table 2.
Correlations Between Equity Dimensions and Product Usage (Study 1)

	United States		China	
Construct	**Consumption**	**Future Share**	**Consumption**	**Future Share**
Presence	.53	.51	.31	.28
Awareness	.21	.21	.23	.20
Knowledge	.38	.37	.32	.34
Relevance	.63	.64	.39	.44
Difference	.54	.58	.38	.45
Esteem	.57	.60	.35	.36
Performance	.60	.59	.43	.45
Advantage	.61	.63	.45	.51
Bonding	.65	.64	.45	.49
Heritage	.41	.40	.30	.28
Trust	.56	.53	.39	.41
Innovation	.52	.53	.34	.39
Caring	.45	.43	.25	.26
Nostalgia	.46	.46	.28	.26
Prestige	.53	.52	.29	.35
Acceptability	.61	.59	.31	.32
Endorsement	.59	.56	.36	.38
Quality	.50	.49	.24	.31
Ambiance	.57	.57	.32	.40
Service	.49	.50	.24	.26
Loyalty	.60	.62	.42	.39
Intention	.64	.68	.50	.46
Value for money	.42	.45	.30	.36
Preference	.60	.62	.37	.49
Extension potential	.54	.53	.30	.31
Persistence	.51	.49	.25	.32
Activity	.50	.45	.38	.35

brand and tested it for significant differences. In the United States, both Coke and Pepsi rated significantly higher than Dr Pepper on all 27 measures, with the smallest t-value greater than 3.[1] More interesting is the comparison of Coke with Pepsi (see Table 3). At least for the Chicago sample, respondents rated Pepsi higher on all the measures except heritage and nostalgia and significantly higher ($p < .05$) for eight measures: relevance, advantage, bonding, loyalty, value for money, overall, extension potential, and persistence.

In China, the picture was noticeably different. Coke was statistically significantly stronger on heritage and nostalgia than Pepsi ($p < .05$) and at statistical parity with Pepsi on the other 25 measures. (There were no significant differences and no patterns in the signs: 11 were positive, and 14 were negative.) This finding is consistent with the notion that given its brand development, Coke's relative advantage in marketing in the international arena is its his-

Table 3.
Within-Country Differences Between Coke and Pepsi Ratings (Study 1)

	United States		China	
	Mean Difference	t-Statistic	Mean Difference	t-Statistic
Presence	–.100	–.86	–.030	–.40
Awareness	–.045	–.62	.020	.38
Knowledge	–.025	–.28	.053	.71
Relevance	–.325	–2.25	–.073	–.84
Difference	–.267	–1.83	.023	.25
Esteem	–.223	–1.61	.030	.42
Performance	–.203	–1.36	.000	.00
Advantage	–.377	–2.23	–.050	–.56
Bonding	–.360	–2.1	–.090	–.88
Heritage	.135	1.25	.440	6.34
Trust	–.230	–1.55	.030	.43
Innovation	–.220	–1.63	–.017	–.22
Caring	–.147	–1.11	–.003	–.06
Nostalgia	.090	.73	.267	2.84
Prestige	–.083	–.6	.057	.83
Acceptability	–.187	–1.48	–.077	–1.13
Endorsement	–.197	–1.49	–.050	–.60
Quality	–.177	–1.43	.027	.42
Ambiance	–.210	–1.43	–.033	–.46
Service	–.217	–1.7	.010	.18
Loyalty	–.545	–3.1	.005	.05
Intention	–.360	–1.95	–.035	–.35
Value for money	–.273	–2.06	.027	.47
Overall	–.388	–2.36	.040	.47
Extension	–.293	–2.02	–.017	–.22
Persistence	–.335	–2.23	.015	.22
Activities	–.197	–1.47	–.087	–.99
Comprehension	–.173	–1.36	–.016	–.26
Product	–.374	–2.2	.003	.03
Interpersonal	–.343	–2.43	–.021	–.29
Attitudes	–.100	–.86	–.030	–.40
Commitment	–.045	–.62	.020	.38

tory. As in the United States, Coke and Pepsi were significantly stronger ($p < .05$) than the third brand (Sprite) for all 27 dimensions for Coke and for 25 of 27 dimensions for Pepsi.

Examining the differences between countries (see Table 4) is potentially informative, though some distinctions may be due to different response styles in the two locations and cultures. For Coke, it appears that only four measures are significantly higher in the United States than in China: knowledge, nostalgia, endorsement, and extension. However, for Pepsi, on 26 of 27 measures, the U.S.

Table 4.
Between-Country Differences
Between Coke and Pepsi
Ratings (Study 1)

	Coke			Pepsi		
	United States	**China**	**t-Statistic**	**United States**	**China**	**t-Statistic**
Presence	4.335	4.255	.65	4.435	4.285	1.28
Awareness	4.765	4.735	.36	4.810	4.715	1.08
Knowledge	4.640	4.215	4.29	4.665	4.163	4.97
Relevance	3.973	3.728	1.7	4.298	3.800	3.61
Difference	3.927	4.023	–.7	4.193	4.000	1.57
Esteem	3.997	4.077	–.65	4.220	4.047	1.36
Performance	4.063	4.123	–.46	4.267	4.123	1.06
Advantage	3.800	4.017	–1.51	4.177	4.067	.79
Bonding	3.673	3.483	1.12	4.033	3.573	2.81
Heritage	4.695	4.570	1.26	4.560	4.130	3.7
Trust	4.120	3.950	1.24	4.350	3.920	3.2
Innovation	4.090	3.957	1	4.310	3.973	2.8
Caring	4.090	3.960	.94	4.237	3.963	2.07
Nostalgia	4.360	3.423	6.44	4.270	3.157	7.72
Prestige	4.103	3.997	.82	4.187	3.940	1.91
Acceptability	4.133	3.880	1.93	4.320	3.957	3.1
Endorsement	4.173	3.687	3.48	4.370	3.737	4.95
Quality	4.310	4.193	.91	4.487	4.167	2.85

Table 4.
Continued

	Coke			Pepsi		
	United States	**China**	**t-Statistic**	**United States**	**China**	**t-Statistic**
Ambiance	3.993	3.900	.67	4.203	3.933	1.96
Service	3.880	3.780	.74	4.097	3.770	2.5
Loyalty	3.305	3.355	–.28	3.850	3.350	2.88
Intention	3.905	3.905	0	4.265	3.940	2.09
Value for money	3.887	3.840	.34	4.160	3.813	2.61
Overall	4.013	4.215	–1.44	4.400	4.175	1.74
Extension	3.790	3.433	2.3	4.083	3.450	4.37
Persistence	3.175	3.310	–.82	3.510	3.295	1.35
Activities	3.187	3.427	–1.5	3.383	3.513	–.82
Comprehension	4.062	3.867	1.6	4.236	3.883	3.03
Product	3.959	4.060	–.71	4.333	4.058	2.04
Interpersonal	3.364	3.381	–.13	3.707	3.402	2.29
Attitudes	4.335	4.255	.65	4.435	4.285	1.28
Commitment	4.765	4.735	.36	4.810	4.715	1.08

scores are larger, and 18 of these are significantly so. There are no measures in which Pepsi is rated significantly higher in China than in the United States. Again, this result suggests that Pepsi is not as strong a global brand as Coke in this context: Its image is significantly stronger in the domestic U.S. market than in the foreign Chinese market.

Summary

Overall, the results of this pilot study were encouraging. Specifically, we analyzed 27 measures of brand performance. As expected, these measures were highly correlated. In our samples, Pepsi's brand performance was stronger in the United States, but Coke's brand performance was stronger in China. For a more complete view of the measures of brand performance, in the next study we slightly modify the scales, examine the underlying factor structure to these measures, and explore how the resulting dimensions interrelate and vary across categories, brands, and countries.

STUDY 2

The second study had three key goals. First, we replicated Study 1's results on a new sample, employing multiple categories to enhance generalizability. Second, we explored the underlying core dimensions of brand performance and how they relate to one another. Third, we considered the sensitivity of brand performance measures with respect to different brands, categories, and countries. In addition, we controlled for differences in response styles and the halo effect by normalizing responses within respondents.

Method

Study 2 used the same 27 brand performance constructs as in Study 1. For simplicity and clarity, we used three items per construct for a total of 81 items. As a result, modest changes were made to 13 of the scales; 14 scales were unchanged (see Appendix A).

In addition to studying soft drinks, which allows for comparisons with the first study, we included fast-food restaurants and toothpaste. We used two brands per category to reduce the demands on the respondents. The specific brands used were Coke and Pepsi (soft drinks), KFC and McDonald's (fast food), and Colgate and Crest (toothpaste).

Adult men and women respondents were recruited in both the United States and China by Synovate, a leading market research firm. Specifically, 150 respondents were recruited using the same criteria as in Study 1 at shopping malls in both Chicago and Shanghai. Each respondent provided information on two brands in two product categories. The categories were combined into three different versions (soft drinks–fast food, soft drinks–toothpaste, and fast food–toothpaste). One-third of the sample (50) completed each version (four brands overall). These assignments resulted in a sample of 100 for each brand.

Results

Measurement Invariance. We first performed exploratory factor analyses to determine the structure among the 27 brand performance constructs. Each construct was measured by the average of the three items designed to measure it (see Appendix A). To compare constructs across countries, it is desirable to measure them consistently (He, Merz, and Alden 2008). To do so, we pooled the data

across countries to identify the factors. We compared this pooled factor structure with factor structures derived from separate analyses for each country. The results in Table 5 are generally consistent.[2] For example, of the 22 measures that loaded heavily (>.60) on a factor in the analysis of the pooled data, 15 of them loaded at least .50 on the corresponding factor in the analysis of both countries. In terms of exceptions, innovation was less closely tied (.38) to interpersonal relations and nostalgia was linked less strongly (.20) to history in the United States. In addition, persistence was not linked to history in the two countries when the data were pooled but was (.67 and .70) when analyzed separately.

Because the factor structure of brand performance is quite stable across countries, we pooled data across categories (soft drinks, fast food, and toothpaste) and countries (United States and China) and ran a varimax, orthogonally rotated factor analysis on this combined data set. There were only two eigenvectors greater than 1, which is not surprising given the length of the survey and the logical correlation of the constructs. The first factor alone accounted for 64% of the variance, suggesting again that simple brand affect or common method variance accounts for most of the responses.

Factor Structure. From (1) theoretical reasons for expecting more factors, (2) the observed distribution of the eigenvectors from the scree plot, and (3) the interpretability of the results, we decided to examine the factor structure in more detail. Appendix B describes our approach in deciding on the number and the nature of the factors. This approach yielded a six-factor solution as the best (see Table 5). The six factors accounted for at least 71% of the variance in each of the 27 constructs and overall accounted for 79% of the total variance. Twenty-two of the constructs loaded cleanly (greater than .6) on a single factor. The groupings of constructs, along with our name for the factors, are as follows:

1. *Comprehension*: presence, awareness, and knowledge;

2. *Comparative advantage*: difference, esteem, performance, advantage, and acceptability;

3. *Interpersonal relations*: caring, prestige, service, and innovation;

4. *History*: heritage and nostalgia;

5. *Preference*: bonding, loyalty, intention, value for money, overall attitude, and extension potential; and

6. *Attachment*: persistence and activity.

Of the other constructs, relevance loaded on both comparative advantage and preference; trust loaded on both comparative advantage and interpersonal relations; and endorsement, quality, and ambiance loaded on both interpersonal relations and preference. Therefore, to maintain as much discrimination as possible among the factors, we did not include these constructs in any of the six factors.

Table 5.
Factor Loadings by Country
(Study 2)

	Performance			Interpersonal Relations			Comparative Advantage			Comprehension			Attachment			History			
	Total	United States	China	Total	United States	China	Total	United States	China	Total	United States	China	Total	United States	China	Total	United States	China	Commonality
Presence	.15	.20	.15	.18	.11	.15	.24	.19	.29	.76	.74	.76	.21	.18	.23	.15	.27	.08	.76
Awareness	.10	.11	.11	.22	.18	.20	.17	.16	.24	.88	.86	.84	–.04	–.05	–.10	.06	.11	.07	.86
Knowledge	.21	.15	.27	.15	.21	.19	.27	.24	.28	.79	.86	.75	.05	.06	.15	.26	.04	.17	.83
Relevance	.49	.50	.45	.14	.24	.18	.57	.49	.47	.28	.38	.32	.15	.25	.27	.32	–.01	.21	.78
Difference	.24	.28	.26	.40	.29	.24	.60	.67	.65	.29	.24	.37	.34	.34	.19	.04	.17	.10	.78
Esteem	.36	.46	.29	.30	.23	.30	.64	.56	.70	.32	.36	.32	.25	.33	.13	.14	.13	.10	.81
Performance	.34	.42	.28	.28	.21	.27	.69	.64	.71	.33	.40	.33	.16	.19	.18	.17	.09	.10	.84
Advantage	.39	.48	.31	.36	.21	.33	.63	.63	.63	.23	.21	.58	.25	.28	.13	.02	.14	.04	.79
Bonding	.73	.77	.71	.34	.29	.36	.22	.24	.15	.16	.16	.22	.24	.25	.19	.13	.16	.20	.80
Heritage	.14	.15	.23	.31	.30	.24	.24	.12	.20	.36	.47	.23	.04	.17	.15	.64	.67	.79	.72
Trust	.32	.40	.39	.55	.31	.43	.48	.53	.46	.28	.25	.27	.08	.10	–.10	.18	.50	.36	.75
Innovation	.20	.34	.15	.60	.38	.54	.42	.50	.36	.29	.20	.40	.20	.19	.09	.22	.51	.24	.75
Caring	.23	.27	.16	.67	.66	.66	.30	.44	.32	.17	.15	.21	.19	.15	.31	.33	.27	.18	.77
Nostalgia	.25	.21	.18	.27	.70	.30	.08	.02	.04	.15	.33	.04	.20	.31	.63	.80	.20	.50	.85
Prestige	.33	.35	.33	.64	.67	.63	.23	.29	.34	.24	.28	.18	.25	.24	.07	.26	.17	.26	.76
Acceptability	.37	.39	.35	.31	.30	.23	.60	.60	.67	.30	.38	.22	.21	.23	.26	.23	.09	.17	.78
Endorsement	.55	.59	.45	.55	.50	.66	.25	.38	.20	.19	.23	.16	.13	.09	.29	.26	.13	.08	.79

Table 5.
Continued

	Performance			Interpersonal Relations			Comparative Advantage			Comprehension			Attachment			History			
	Total	United States	China	Total	United States	China	Total	United States	China	Total	United States	China	Total	United States	China	Total	United States	China	Commonality
Quality	.59	.62	.64	.49	.29	.42	.37	.47	.38	.20	.18	.17	.12	.06	.86	.07	.27	.13	.78
Ambiance	.50	.52	.38	.55	.56	.61	.24	.34	.24	.16	.18	.18	.21	.19	.31	.27	.09	.18	.74
Service	.42	.43	.36	.67	.59	.71	.20	.41	.21	.24	.23	.22	.17	.08	.18	.15	.11	.07	.77
Loyalty	.69	.67	.70	.24	.26	.23	.15	.18	.18	.05	.03	.12	.44	.43	.40	.08	.03	.18	.77
Intention	.78	.81	.77	.17	.17	.19	.29	.22	.21	.20	.22	.26	.23	.28	.21	.16	.11	.15	.84
Value for money	.61	.58	.69	.27	.35	.19	.33	.30	.40	.18	.20	.13	.24	.28	.17	.17	.09	.17	.67
Overall attitude	.66	.69	.70	.31	.20	.33	.45	.43	.38	.19	.25	.16	.13	.16	.12	.16	.25	.12	.82
Extension potential	.60	.61	.61	.26	.27	.26	.29	.34	.24	.12	.15	.09	.41	.41	.52	.26	.20	.52	.76
Persistence	.39	.42	.38	.13	.14	.17	.25	.30	.26	.08	.09	.12	.70	.67	.70	.21	.67	.70	.77
Activity	.32	.29	.43	.25	.23	.36	.20	.18	.37	.06	.04	.10	.78	.82	.46	.07	.12	.46	.82
Variance explained after rotation	5.42			4.18			4.05			3.21			2.31			1.99			21.16
% Variance accounted for	.20			.16			.16			.12			.09			.07			.78

Convergent and Discriminant Validity. Next, we created composite measures of the factors by averaging scores on the constructs identified previously as related to the factors. To test for convergent and discriminant validity, we examined average construct-to-construct correlations (see Table 6) between and within the factors, as well as computed coefficient alpha when appropriate (i.e., when three or more constructs belonged to a factor). Although all pairs of factors had statistically significant and positive correlations, the average intrafactor item correlations were significantly larger than the average interfactor item correlations, and the interfactor correlations were significantly less than 1. Thus, these results suggest that the six factors have both convergent and discriminant validity (Churchill 1979; Peter 1981).

As a further test of discriminant validity, we selected eight pairs of constructs with the largest pairwise correlations and, therefore, the pairs most likely not to have discriminant validity. In Study 2, several pairwise correlations exceeded .70. The largest were as follows: ambiance–endorsement = .79, quality–overall attitude = .77, acceptability–performance = .77, intention–attitude = .79, intention–bonding = .78, difference–advantage = .78, esteem–performance = .82, and knowledge–awareness = .76.

In line with Fornell and Larcker's (1981) procedure, we calculated the average variance extracted for each latent construct and then estimated the correlation between the pair of constructs at the latent construct level in a confirmatory factor model. Discriminant validity would be supported if both constructs' average variance extracted was greater than the squared correlation between them. Seven of the eight pairs satisfied this test. The one pair that did not was esteem–performance, the pair with the highest pairwise correlation. These findings suggest that there is technically discriminant validity for the constructs, though the high correlations suggest that a parsimonious subset can capture most of the information in them.

The Structure of Brand Performance

The six factors varied in content and valence in a way that appeared to be consistent with an awareness–interest–desire–action hierarchy-of-effects structure (e.g., Howard and Sheth 1969; Lavidge and Steiner 1961). Therefore, we examined the links between factors using a structural model. We used item averages to measure the 27 constructs and construct averages to measure the factors. Because the model is recursive, we used ordinary least squares regression to estimate the links. It is significant that the results can be related to prior consumer behavior research (see Figure 1).

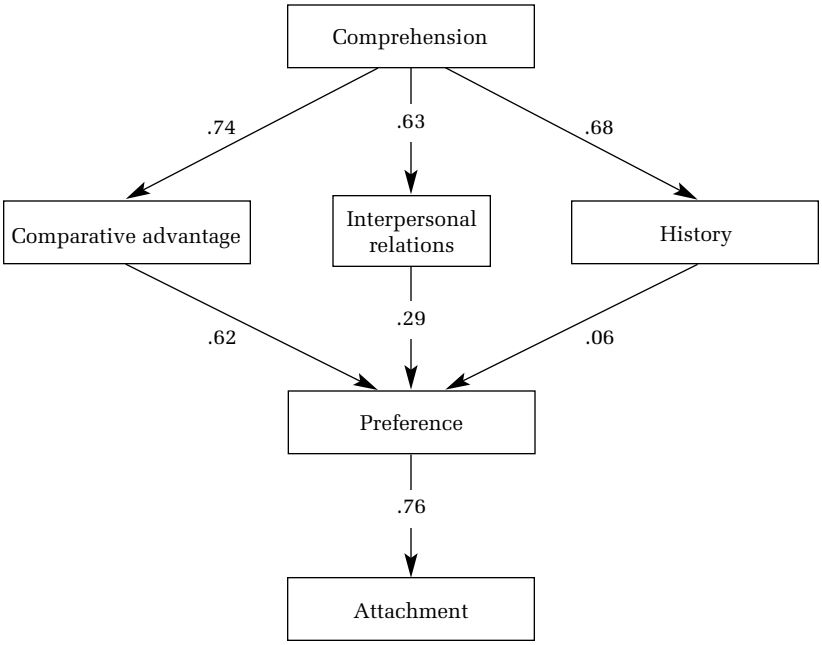
The first factor, comprehension, is strongly and significantly positively related to comparative advantage, interpersonal relations, and history (β = .74, .63, and .68; t = 32.2, 25.4, and 23.8, respectively; $p < .001$). Of these three factors, comparative advantage is most strongly related to preference (β = .62, t = 23.9, $p < .0001$), followed by interpersonal relations (β = .29, t = 10.1, $p < .0001$), with history having a much smaller but still significant relationship (β = .06, t = 3.0, $p < .01$). As expected, preference is strongly related to attachment (β = .76, t = 30.9, $p < .0001$).[3]

This analysis leads us to conclude that brand performance can be thought of in terms of four stages: (1) awareness, (2) image and

Table 6.
Pearson Correlation Coefficients of Factors (Study 2)

	Comprehension	History	Comparative Advantage	Interpersonal Relations	Preference	Attachment
Comprehension	1.00	.55	.67	.58	.52	.33
History	—	1.00	.58	.67	.58	.45
Advantage	—	—	1.00	.78	.82	.61
Interpersonal	—	—	—	1.00	.76	.55
Preference	—	—	—	—	1.00	.65
Attachment	—	—	—	—	—	1.00

Figure 1.
Hierarchy-of-Effects Relationship Among Brand Equity Factors (Standardized Ordinary Least Squares Coefficients)



associations (which encompasses comparative advantage, interpersonal relations, and history), (3) preference, and (4) attachment. The sequence suggested by these four stages closely resembles the traditional awareness–interest–desire–action–type hierarchy-of-effects models found in much previous research, as well as the conceptual model of brand value creation put forth by Keller and Lehmann (2003). Thus, brand performance can be captured largely by a small number of core dimensions that are interrelated in a logical structure among themselves.

What Affects Performance Ratings?

A question has been raised as to whether many of the effects ascribed to brand performance are at least partly due to category characteristics. For example, all soft drinks may be viewed as "fun," all cars may provide "freedom," and so on. Therefore, we explored the extent to which brand performance ratings are driven by category versus individual, brand, or country factors by examining the source of variance in the responses to both the 27 constructs and the six factors.

Specifically, we performed separate analyses of variance on each of the constructs (and factors). In these analyses, we allowed for the effects of country, category, and brand × category interaction (because brand is nested within category), as well as category × country and category × brand × country interactions (to determine whether the results were unique to countries). We also included a variable to control for individual differences in average responses (e.g., to capture yea-saying).

The results (see Table 7) are instructive. Half the communal variance comes from individual differences, which captures true differences as well as halo effects and response style–based common

Table 7.
Sources of Variances in Brand Responses (Sums of Squares) (Study 2)

	Main Effects		Interaction Effects				
Attribute	**Country**	**Category**	**Category × Country**	**Brand × Category**	**Category × Brand × Country**	**Individual**	**Error**
Presence	17.21	11.11	3.97	7.08	8.27	613.26	575.64
Awareness	36.89	12.76	1.53	1.35	4.86	734.25	406.50
Knowledge	67.15	16.14	.29	.93	7.47	668.15	499.58
Relevance	25.93	3.58	6.00	.69	15.60	829.17	878.57
Difference	.62	5.79	8.38	.35	8.33	730.76	675.40
Esteem	4.58	3.27	6.19	.38	10.68	731.15	684.12
Performance	15.71	4.39	15.50	.87	13.52	770.47	777.66
Advantage	.29	4.52	12.98	2.99	11.37	684.94	793.65
Bonding	4.38	7.22	3.97	4.98	18.05	810.49	901.12
Heritage	99.08	13.20	2.56	8.06	9.90	721.14	665.44
Trust	9.34	16.85	11.49	.88	6.36	713.47	762.37
Innovation	18.46	.82	9.66	.13	7.09	609.58	687.48
Caring	21.69	.23	16.35	.94	1.49	798.02	701.25
Nostalgia	204.91	21.12	4.80	8.37	6.77	1120.70	887.54
Prestige	1.32	7.51	18.43	2.56	8.00	696.47	624.23

Table 7.
Continued

	Main Effects		Interaction Effects				
Attribute	**Country**	**Category**	**Category × Country**	**Brand × Category**	**Category × Brand × Country**	**Individual**	**Error**
Acceptability	24.72	7.33	6.56	.94	7.08	690.58	731.18
Endorsement	23.54	9.51	17.32	.92	8.52	759.32	716.00
Quality	3.75	29.27	31.76	1.52	8.50	709.51	717.80
Ambiance	5.62	10.01	22.90	.22	10.94	814.86	695.43
Service	3.82	1.82	25.32	.97	4.10	793.22	651.65
Loyalty	31.69	12.34	14.58	4.25	11.95	1048.58	977.77
Intention	.44	5.63	8.95	9.09	34.48	772.36	1072.80
Value for money	10.32	18.03	16.03	2.71	8.81	866.28	761.06
Attitude	7.56	2.89	19.81	3.06	19.62	764.57	898.98
Extension	16.75	15.40	13.17	2.29	5.30	1016.56	787.84
Persistence	.44	11.60	1.81	1.09	7.20	1093.42	819.08
Activity	62.53	6.80	4.98	.16	3.17	1188.95	811.44
Average percentage explained	1.65	.60	.70	.16	.68	50.1	45.3

method effects. On average, the treatment factors account for an additional 3.7% of the variance, leaving 46.3% as unexplained variance or "noise."

Of the treatment factors, country had the largest effect on 14 of the constructs, and country interactions were largest in ten cases. Country accounted for the largest amount of variance explained (1.65%), followed by category (.60%) and brand within category (.16%). The country-specific interactions accounted for .70% and .68%. Thus, there is far more variance within than between country. Because the specific brands studied herein are all well known and established, they produced relatively similar responses.

Examining each of the 27 constructs individually produces an interesting pattern. Many of these are primarily country driven (e.g., awareness, knowledge, heritage, nostalgia, acceptability, activity). For example, brand has its impact not by category but by country and category. In other words, brand effects were country specific. Constructs with the largest systematic brand component, relative to the others, were bonding, intention, and overall preference, all of which loaded on the same (evaluative) factor. This is illustrated by the relatively small differences in mean ratings between the two brands studied in each country.

Unsurprisingly, the two major brands in each category—given their maturity and the competitive nature of the categories—are similarly rated, on average, in terms of the six factors (see Table 8). In large part, brand performance is due to overall liking. However, there are some significant differences on several factors between Crest and Colgate, with Crest showing some superiority in the United States and Colgate showing some superiority in China. This indicates that these brand performance dimensions can capture different images for the major brands in a category.

Furthermore, note that the Coke and Pepsi results are generally consistent with Study 1's results. Specifically, in the United States, Coke had a positive, albeit insignificant, advantage on the history factor (heritage and nostalgia), whereas, in general, respondents had a more positive attitude toward Pepsi. In China, Coke also has a significant advantage in terms of the history factor and is essentially equivalent on the other five factors.

DISCUSSION

Summary and Implications

Perhaps because of its importance, brand performance has been approached in several different ways by several different researchers employing several different measures. We examined a broad range of these measures to explore their overlap and to uncover core underlying dimensions and the structure of brand performance metrics, which balances parsimony and completeness. We also explored how different dimensions of brand performance and profiles of leading brands might vary by country.

Study 1 showed that 27 measures or constructs of brand performance can be identified with satisfactory validity. In terms of understanding how profiles varied by country, there were large differences between major and lesser brands and smaller—but significant—differences between the two major brands, Coke and

Table 8.
Average Brand Ratings on the Six Factors (Study 2)

	Comprehension	History	Comparative Advantage	Interpersonal Relations	Preference	Attachment
United States						
McDonald's	4.52	4.17	3.72	3.66	3.60	3.16
KFC	4.37	3.81**	3.69	3.62	3.46	3.09
Coke	4.45	4.10	3.76	3.91	3.48	3.16
Pepsi	4.52	3.96	3.97	3.84	3.85**	3.31
Colgate	4.24	3.78	3.78	3.85	3.62	3.00
Crest	4.35	3.96	4.06**	3.99	3.95**	3.14
China						
McDonald's	4.22	3.33	3.73	3.81	3.53	3.25
KFC	4.19	3.29	3.75	3.81	3.57	3.22
Coke	4.11	3.59	3.83	3.75	3.79	3.35
Pepsi	4.10	3.36*	3.75	3.64	3.76	3.26
Colgate	4.07	3.19	3.72	3.62	3.66	3.66
Crest	3.73***	2.97	3.41**	3.38**	3.28***	2.85**

Notes: Significant differences between paired comparisons of brands: *$p < .10$, **$p < .05$, and ***$p < .01$.

Pepsi. Country differences between the United States and China were also evident in the ratings, providing some insights into the globalness of these globally marketed products.

Just as Deshpandé and Farley (1998) review different scales of market orientation to derive a simplified set of measures that parsimoniously capture the dimensions of market orientation (see also Deshpandé, Farley, and Webster 1993; Kohli, Jaworski, and Kumar 1993; Narver and Slater 1990), we attempted to accomplish, as much as possible, a similar task here for brand performance. What then are the core dimensions of brand performance? The results suggest that brand performance can be usefully characterized according to six factors:

1. *Comprehension*: how much the brand is seen and thought of;

2. *Comparative advantage*: how favorably regarded and well differentiated the branded product is;

3. *Interpersonal relations*: interpersonal and social aspects;

4. *History*: past brand-related events, episodes, and emotions;

5. *Preference*: consumer attitudes toward the brand and its purchase; and

6. *Attachment*: how strongly consumers connect to and interact with the brand.

This six-factor structure informs several key issues about brands, branding, and brand performance. First, the six factors tap into a broad range of aspects of the brand and vary in terms of tangibility, relationship to the product, level of abstraction, and self-orientation. For example, comprehension is a fairly direct, nonevaluative, product-related measure; in contrast, attachment is a higher-order personal and evaluative response. The remaining factors fall somewhere in between.

Thus, our analysis reinforces the observation that no single measure fully captures the richness of brand performance. For marketers to gain a full understanding of their brand performance, multiple sets of measures and factors must be employed. Even some of the well-known industry models may not provide a full portrayal of brands given that they lack certain measures. For example, the four original dimensions of Young & Rubicam's BAV tap into comprehension, comparative advantage, and preference but seem much further removed from interpersonal relations, history, and, to some extent, attachment. The recent addition of the energy dimension to the model partially, but not completely, rectifies this limitation.

Second, there is a logical sequence to the brand performance factors: (1) comprehension; (2) comparative advantage, interpersonal relations, and history; (3) preference; and (4) attachment. The relationships among the six factors are consistent with classic models

of consumer decision making (Lavidge and Steiner 1961) and brand building (Keller 2008) that involve a hierarchy of effects—from simple, basic aspects of brand awareness and knowledge to more involved consumer loyalty relationships. Of the best-known industry models, BrandZ most explicitly incorporates a hierarchy-of-effects–type structure. We suggest that capturing the links among the factors is important in itself.

Third, the study results point out the importance of brand intangibles. In an increasingly less differentiated world, marketers may need to transcend physical product to create more abstract associations. In this study, we identified two factors of brand image that are not directly related to product performance—history and interpersonal relations—and deserve greater attention.

History is a function of heritage and nostalgia and clearly offers an opportunity for differentiation; it is impossible for a new firm or brand to "turn back the hands of time" to achieve equivalence on this factor. As long as this history can be made relevant, it can play a role in helping position a brand. However, the danger with heritage and nostalgia is that the brand can seem old-fashioned and not up-to-date, making it difficult to attract new, younger customers. Ideally, a brand would be viewed as timeless—classic but contemporary at the same time.

Interpersonal relations involve caring, service, and prestige, as well as innovativeness. This dimension reflects how the customer believes he or she is treated by the brand. Increasingly, these types of brand associations are necessary to create differentiation in the absence of more tangible or direct product differences. With consumers becoming increasingly empowered, companies will be judged more frequently on their attitudes and behaviors toward customers. In other words, consumers will value brands that provide something special in terms of how they treat customers (caring and service); how other customers see the brand (prestige), which is related to social approval; and what new offerings they introduce.

Finally, the results show that the structure of brand performance is similar across countries. However, although the ratings of the brands within categories varied significantly, country and category factors explained more variance than the specific major brands. In other words, there is a clear distinction between categories and between leading and secondary brands, but not necessarily as much distinction between the strongest top brands within a category, at least with the brands we studied.

Limitations and Further Research

There are important limitations to this study. The substantive results are based on specific consumer products in two countries in a particular sampling frame. Generalizability of our results is not broadly demonstrated, though the methodology seems to be applicable across country and product categories. For example, the finding that there is relatively little difference among leading brands may reflect just the particular brands chosen. Furthermore, more noticeable differences may emerge if respondent burden is reduced or if customers loyal to one brand are surveyed and analyzed sepa-

rately. Additional methodological work could provide even more rigorous tests of construct validity and measurement invariance, employing larger and diverse samples, alternative question formats, and more extensive statistical tests.

Still, the results should provide both a standard of comparison and guidance for further research. Researchers should consider more closely how brand metrics vary by countries, categories, and brands. Do different factors play different roles for different types of countries, categories, or brands? Are certain factors (e.g., comprehension) especially critical in entering a new geographic market or in economies, such as China, that are transitioning from command to market focus? How do the three different image factors work in different settings, and are there any interaction effects among them? We hope that these and related questions provide fertile ground for future work.

Appendix A: Brand Performance Constructs and Items (with Sources in Parentheses)

	Study 1	Study 2
1. Presence (Millward Brown)		
1. I often encounter this brand.	*	*
2. There are a lot of ads and other information about this brand.	*	*
3. When you think of a soft drink, do these brands come to mind?	*	
This brand is easy to find.		*
2. Awareness (Aaker)		
4. I am generally aware of this brand.	*	
5. I am aware of this brand.	*	*
6. I am quite familiar with this brand.	*	
I have heard of this brand.		*
Most people are aware of this brand.		*
3. Knowledge (BAV)		
7. I have a detailed understanding of how this brand works.	*	
8. I have experience using this brand.	*	*
9. I know a lot about the brand.	*	*
I am familiar with this brand.		*
4. Relevance (BAV, Millward Brown)		
10. The brand is relevant to me.	*	*
11. The brand is relevant to my family and/or close friends.	*	
12. This brand is a good one for me.	*	*
13. This brand fits my lifestyle.	*	*
5. Difference (BAV)		
14. This brand stands out from its competitors.	*	*
15. This brand stands for something unique.	*	*
16. This brand is in a class by itself.	*	*
6. Esteem (BAV)		
17. I hold the brand in high regard.	*	*
18. The brand has earned a strong reputation.	*	*
19. This brand respects me.	*	*
7. Performance (Millward Brown, Research International)		
20. The brand performs well.	*	*
21. The brand is effective.	*	*
22. This brand lives up to its promises.	*	
This brand has served me well.		*
8. Advantage (Millward Brown)		
23. This brand is better than others.	*	*
24. This brand offers a clear advantage vs. the competition	*	*

Appendix A. Continued

	Study 1	Study 2
25. In terms of the important attributes of a soft drink, this brand is better.	*	*
9. Bonding (Millward Brown, Research International, Fournier 1998)		
26. I am strongly committed to this brand.	*	*
27. This brand shares my values.	*	*
28. This brand has earned my confidence.	*	*
10. Heritage (Research International)		
29. This brand has a long history.	*	*
30. This brand has been around for a long time.	*	*
31. This brand has served me well.	*	
My parents used this brand.		*
11. Trust (Research International)		
32. You can count on this brand.	*	*
33. This brand produces a product to high standards.	*	*
34. I trust this brand.	*	*
12. Innovation (Research International, BAV)		
35. This brand is a leader in its field.	*	*
36. This brand is innovative.	*	*
37. This brand constantly improves its product.	*	*
13. Caring (BAV)		
38. This brand cares about its customers.	*	*
39. This brand has the interests of its customers at heart.	*	*
40. This brand is committed to me as a customer.	*	*
14. Nostalgia (BAV)		
41. I remember this brand from my youth.	*	*
42. This brand reminds me of the good old days.	*	*
43. I have happy memories of this brand.	*	*
15. Prestige (BAV)		
44. This brand is recognized as the standard.	*	*
45. This brand is prestigious.	*	*
46. Using this brand gives one a touch of class.	*	*
16. Acceptability (BAV)		
47. You never go wrong selecting this brand.	*	*
48. This brand is accepted by friends, family and associates.	*	*
49. Almost no one dislikes this brand.	*	*
17. Endorsement (BAV)		
50. This brand is recommended by people I respect.	*	*
51. I would recommend this brand highly.	*	*
52. I hear good things about this brand.	*	*
18. Quality (Ambler 2003)		
53. This brand is of high quality.	*	*
54. This brand consistently satisfies its users.	*	*
55. This brand is made to high standards.	*	*
19. Ambiance (Ambler 2003)		
56. This brand contributes to a pleasant lifestyle.	*	*
57. Using this brand makes me feel good about what I am doing.	*	*
58. I feel comfortable with this brand.	*	*
20. Service (Ambler 2003)		
59. I can count on good service from this brand.	*	*
60. This brand deals with problems quickly and well.	*	*
61. If a problem with this brand arose, the company would quickly fix it.	*	*
21. Loyalty (Keller)		
62. I would pay extra for this brand.	*	*
63. If a store didn't carry this brand I would go to another store.	*	*

Appendix A.
Continued

	Study 1	Study 2
64. There is a good substitute for this brand.	*	
I feel loyal to this brand.		*
22. Intention (Keller)		
65. I plan to buy this brand in the future.	*	*
66. If I buy a soft drink, I am likely to buy this brand.	*	*
I always try to buy this brand.		*
23. Value for Money (Keller)		
67. This brand is reasonably priced.	*	*
68. This brand represents excellent value for the money.	*	*
69. This brand is a very good buy.	*	*
24. Overall Attitude (Research International)		
70. This brand is: bad–good.	*	*
71. My opinion of this brand is: negative–positive.	*	
72. This brand is: undesirable–desirable.	*	*
73. My opinion of this brand is: unfavorable–favorable.	*	*
74. I have positive associations with this brand.	*	
75. When I think of this brand, I have positive thoughts.		*
25. Extension Potential (Keller and Lehmann 2003)		
76. I would be tempted to buy any product that they made.	*	*
77. I would be likely to buy any product sold by….	*	*
78. I can imagine this brand selling products in other categories.	*	*
26. Persistence (Fournier 1998)		
79. If I had a bad experience with this brand, I would still use it again.	*	*
80. I am unlikely to change my opinion of this brand.	*	
81. I would forgive this brand if occasionally the product seems sub-poor.	*	*
This brand doesn't always have to be perfect for me to buy it.	*	*
27. Activity (Keller)		
82. I talk about this brand with my friends.	*	*
83. I look for more information about this brand.	*	*
84. I like to read about this brand.	*	*

APPENDIX B: FACTOR IDENTIFICATION

In exploratory factor analysis, the common approach for identifying the number of "significant" factors is to use an eigenvalue equal to 1 as the cutoff. The logic behind this is that if there were k independent (uncorrelated) variables, a principal components analysis would generate an eigenvalue equal to 1 for each variable. Thus, a factor should explain at least as much as an independent random variable (i.e., have an eigenvalue $\delta \geq 1$).

This logic makes sense under the assumption that the observed variables (x's) are reflexive indicators of a set of factors (f's). However, in many cases, the observed variables all (also) may be influenced by a single determinant (d). In this case, much of the common variance (covariance, correlation) among the observed variables may be due to d (i.e., in essence, it is spurious). The cause may be methodological (e.g., common method bias) or substantive (e.g., overall attitude or halo can influence all the beliefs about a product; Beckwith and Lehmann 1975). The impact of the common determinant is that the first eigenvector (and eigenvalue) will be large and the rest will be smaller. Therefore, if the focus is on finding groups of variables that explain at least as much as a variable that is independent from the others after the (spurious) impact of d is adjusted for, the cutoff should be lower than 1.0.

There are at least three ways to deal with this. First, and probably the oldest, is to simply ignore the first eigenvalue and vector (which is largely driven by d) and concentrate on eigenvalues 2 through k (e.g., looking for an elbow in the scree plot). A second alternative is to remove the effect of d on each of the X variables through regression and then to analyze the residuals. This approach (essentially two-stage least squares) makes sense if there are measures of d, but if d is a factor rather than a precisely measured variable (i.e., not measured without error), this approach has problems of its own.

A third approach, which we introduce here, is a simple adjustment to help determine the cutoff value. We assume that the first eigenvalue, δ_1, is driven primarily by overall attitude or brand halo in our data. Thus, logically, δ_1 largely represents halo, and the total remaining amount of variance available in the k variables is $k - \delta_1$. Under this assumption, an otherwise independent variable would explain $(k - \delta_1)/k\%$ of the variance. This approach provides a different lower bound than the standard cutoff rule. For example, with 27 variables, if the first eigenvalue is 18 (i.e., explains two-thirds of the variance, as is the case here), the cutoff becomes $(27 - 18)/27 = .33$.

This approach is logical rather than statistical, in keeping with the logic-based "eigenvalue greater than 1" rule. It is also true that some portion of δ_1 may represent correlation among the X's that are not due to d. To the extent this is true, the proposed cutoff should be adjusted upward. Nonetheless, it is important to remember both that the main objective of factor analysis is to derive a simple structure that represents the data and that multiple criteria (e.g., the loading pattern, the scree plot) are relevant. Therefore, rather than arguing for a single "right" number, we suggest considering using a cutoff close to $(k - \delta_1)/k$ as well as interpretability as criteria for identifying factors.

NOTES

1. Here, we report the conservative and less powerful independent t-test rather than the paired t-test, which accounts for the repeated measures nature of the data. The paired t-tests are even more significant.

2. We also ran a factor analysis on the data with the subject means removed to account for one aspect of method bias. There were four eigenvalues greater than 1, accounting for 62% of the variance. For reasons of interpretability, and because the first eigenvalue still dominated and accounted for 42% of the variance, we again examined a six-factor solution. This solution accounted for 68% of the variance. Because the factor structure seemed to be largely consistent even when we accounted for individual differences, we report the raw data results here.

3. When we used the data with the subject means removed, the same pattern of results emerged, albeit with somewhat smaller coefficients.

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