The 'natural monopoly' effect in brand image data

Abstract

This paper provides evidence of a 'natural monopoly' effect in brand image data. We found that, within a product category, large salient brands have a *lower rate of category associations* than less salient brands. This replicates (a) what can be observed in purchase data, i.e. bigger brands showing a low category buying rate, because they are selected as category default by light users; (b) 'mirror effect' in memory, since high frequency words are more likely to be used when facing 'new' cognitive tasks (poor knowledge about the category). Implications of these findings for the comparison of purchase and brand image data are also discussed.

Key words: Natural monopoly, brand associations, brand salience, memory, and mirror effect.

Introduction

In 'Formal theories of mass behaviour,' McPhee (1963) found that the audience of less popular radio programs was mostly consisted of those who were heavy radio listeners. Conversely, light listeners tend to frequent the most popular programs. This pattern is observed in many situations; for example a study by Elberse (2003) found that monthly DVD rental selections of light users were primarily popular releases, while the 'heaviest' segment of customers was more inclined to rent less popular releases along with popular ones. McPhee (1963) defined this pattern the 'natural monopoly' effect, i.e. popular offerings tend to 'monopolise' light users. Schmittlein (1993) showed that the same pattern broadly held in repeat purchase markets, with high market share brands showing a lower category buying rate, due to their 'monopolisation' of light category users.

In contrast, work on brand image has generally not examined how brand and category associations vary between consumers. One exception can be found in Romaniuk and Sharp (2008), who examined the concentration of brand knowledge. The authors drew an analogy between purchase frequency and the average number of brand associations, showing that variations in brand knowledge are largely associated with different level of brand usage, similar to the Double Jeopardy and Pareto Share patterns observed in purchase data (Romaniuk and Sharp, 2008).

We now extend this line of research further to determine whether a 'natural monopoly' effect is present also in brand image data. We assess whether brands that are more salient generally tend to have a disproportionate share of category associations from consumers who have little knowledge about the product category. Comparing the consistency of this empirical pattern ('natural monopoly') across brand image and purchase data is part of a broader research agenda, which includes analysing similarities (and differences) in the underlying empirical patterns affecting brand equity and purchase behaviour. Understanding similarities and differences between brand equity and purchase behaviour is, in fact, necessary to clarify whether brand performance indicators based on brand equity components should be used as supplement or substitute of behavioural metrics. Moreover, we 'triangulate' this analysis with some key empirical findings from neuropsychology literature, which may also explain and justify the existence of a 'natural monopoly' effect in brand image data. This allows us a further benchmark to assess whether, despite any potential analogy in the underlying patterns,

measures of brand image may be a closer proxy of cognitive processes, rather than reliable indicators of brand performance.

Background

Similarity between brand image and purchases

Prior work on brand image data has uncovered similar underlying patterns found in purchase data. The most important is the Double Jeopardy phenomenon, which in purchase data maintains that small brands (low market share) are 'hit' twice, with fewer people purchasing them slightly less often than bigger brands (Ehrenberg, 1972). Barwise and Ehrenberg (1985) demonstrated that this pattern also affects brand image data: small brands usually obtained far fewer brand associations. This finding has been extensively replicated (Bogomolova and Romaniuk, 2006; Bogomolova and Romaniuk, 2007). Nevertheless, recent studies found that *deviations* from the Double Jeopardy pattern in image data (e.g. niche or change of pace brands) are hardly consistent with those apparent in purchase data (Stocchi, Wright and Guerini 2010; Stocchi, Nenycz-Thiel and Driesener 2011).

Another pattern characterising buying behaviour that replicates in brand image data is the Pareto Share rule, an empirical pattern characterizing the concentration of the contribution to sales by different segments of customers, which highlights the importance of 'light' users. Romaniuk and Sharp (2008) analysed whether the same pattern also described how concentrated *brand knowledge* was within a customer base, looking at the average number of brand associations held by light versus heavy users. Their results were consistent with the concentration of brand purchases as per Schmittlein, Cooper and Morrison, (1993): just under the half of the whole amount of brand associations scored by brands were provided by 20% of 'heavy mentioners' (i.e. those providing the highest number of brand associations), while the remaining half was spread across a large pool (80%) of 'light mentioners' (Romaniuk and Sharp, 2008).

Hypotheses on consumer memory relevant to brand image data

The neuropsychology literature has also produced considerable research relevant to understanding underlying patterns in consumer memory that can be analysed by looking at brand image data. First, people tend to short cut complex cognitive processes drawing upon *heuristics* (i.e. any single piece of information) held in memory or collected from the environment (framing) (Kahneman, 2003; Selten, 2002; Gigerenzer, 2004). This implies a set of assumptions about human memory crucial to the analysis of empirical patterns in brand image data. The hypotheses are known as *Featural Familiarity Hypotheses* and can be summarised as follows (Kamas and Reder, 1994):

- Memory is organised according to the Associated Network Memory theory framework proposed by Anderson and Bower (1973), as networks of interlinked concepts, with information processing occurring via activation of relevant concepts;
- There is varying strength of memory connections for long-term memory traces, as well as for information processed (activated) in the short-term, as a function of exposure to external stimuli or cues;
- Strength of memory connections is stable over time, increasing slowly during activation and decaying slowly afterwards, whereas activation builds and decays rapidly;
- Availability (cognitive prominence) of information is a function of recent activation;

- Retrieval is determined by the probabilistic process of matching a probe or cue in working memory with the structures in more permanent memory traces.

These assumptions are crucial in marketing to justify the role of brand information held in memory by consumers in underpinning brand choice (Bettman, 1979). Empirically, consumer surveys are used to measure the cognitive prominence of a brand (salience) and processing of brands information. Therefore, if we consider the context of a survey where respondents are prompted a list of brands and attributes for eliciting free memory associations ('pick-any'), brands that are highly salient have higher chances of being retrieved. Moreover, for consumers that have limited memory associations with regards to product category, highly salient brands would also represent a 'category stereotype', hence the 'easiest' pathway for retrieval (i.e. lowest cognitive load). This is linked with the so-called '*mirror effect*', which is defined in memory literature as a 'striking regularity' in recall and retrieval patterns (Greene, 1996). This pattern maintains that whenever two words differ in the number of memory associations or simply frequency of recall (low versus high), the odds of drawing upon them for a decision making task are higher for high frequency words, especially when facing a 'new' task (Glanzer, Adams and Iverson, 1991; Glanzer *et al.*, 1993; Hilford, Glanzer and Kim, 1997; Glanzer, Kim and Adams, 1998). As a result, if looking at a simple Y/N task such as providing or not providing an association in a survey, the following patterns would occur: (i) the likelihood ratios of drawing upon high versus low frequency words are binomially distributed; (ii) they are higher for high frequency words concepts when facing 'new' tasks; and (ii) lower when facing 'old' tasks. The following table clarifies the analogy with brand image data and memory, and indicates the corresponding patterns affecting likelihood ratios that constitute the mirror affect in memory (Glanzer, Kim and Adams, 1998):

Code	***Memory***	***Brand Image***	***Mirror effect***
P 'YES'	Proportion of 'YES'	Proportion of associations	
L	Low frequency word	Low share of associations	***P (L) < P (H)***
H	High frequency word	High share of associations	
N	'New' decision	Poorly knowledgeable customer	***P (LN) < P (HN) < P (HO) < P (LO)***
O	'Old' decision	Highly knowledgeable customer	

Now, if we consider brand image data collected with a 'pick-any' consumer survey, we might expect the following: if respondents know little about the product category (a 'new' task), they should draw upon the more prominent brand in memory (i.e. highest salience or simply high frequency word) and provide few associations with that one brand. If respondents know more about the category (an 'old' task), they do not necessarily need to draw upon more prominent brands in memory and are likely to provide also associations also with less salient brands. However, this pattern would imply that overall the proportion of category associations should be lower for highly salient brands. This is intuitively similar to the 'natural monopoly' effect in purchases, with light category users more likely to purchase only the largest brand(s) and heavy category users being more likely to purchase also the smallest brands.
Therefore, we summarise in the following research proposition the evidence from purchase behaviour and memory literature discussed so far:

P1*: We will observe a 'natural monopoly' effect in brand image data, with customers who know little about a product category concentrating their associations with the brands that are most salient for the whole product category.*

Method and data

We used one-year data from the UK market for three categories of hot beverages. The data included both brand purchases as well as multiple brand associations (pick-any). Sample sizes were around N = 8,000 respondents for each product category. To assess evidence of a 'natural monopoly effect in brand image data and to test our research proposition we calculated and compared the following metrics. For brand purchase data, based on the count of brand purchases we calculated: (i) **% of Market share**, i.e. proportion of a brand's sales out of the category total; and (ii) **Category Buying Rate**, i.e. average category purchases by brand buyers. For brand image data, based on the count of brand associations we calculated: (i) **% of brand salience**, i.e. sheer number of brand associations scored by individual brands relatively to competitors, given a certain sub-selection of brand attributes (selected drawing upon Romaniuk's (2010) guidelines); and (ii) **Category association rate**, i.e. the ratio between total number of category associations provided by the those who were brand 'mentioners' and the number of 'mentioners' for a brand ('mentioners' of a brand = the total number of respondents who provided at least one association).

The value of these metrics for all brands available in the data set have been compared using average observed values as benchmarks, as well as calculating Spearman's Rho correlation coefficients (moderate to high negative Rho values across both sets of metrics would identify evidence of a 'natural monopoly' effect in brand image data, consistently with purchase data). We then tested whether there was also evidence of a 'mirror effect', as per the evidence provided by memory literature. We firstly looked at the distribution of the frequency of category associations for more versus less salient brands to prove the first component of the inequality of the 'mirror effect', i.e. P (L) < P (H) (higher frequency of associations for more salient brands). We then also tested the full inequality of the 'mirror effect', i.e. P (LN) < P (HN) < P (HO) < P (LO), by looking at the relationship between the % of brand salience and the category association rate with a linear regression: a negative *b*-value and an R^2 close to 1 would confirm evidence of the 'mirror effect'.

Results

Evidence of 'natural monopoly' effect

Table 1: 'Natural monopoly' effect in brand image (tea)

	Salience (%)	Cat. Assoc. Rate
Brand A	20	15.0
Brand B	19	15.6
Brand C	15	15.0
Brand D	15	17.7
Brand E	12	17.6
Brand F	9	17.4
Brand G	7	18.1
Brand H	4	18.4
Brand I	3	18.8
Aver.	-	**17.1**
Rho	- 0.65, p<0.057	

Table 2: 'Natural monopoly' effect in purchase data (tea)

	Mkt Share (%)	Cat. Buying Rate
Brand G	29	8.0
Brand A	21	7.5
Brand B	19	7.3
Brand C	13	8.8
Brand E	5	8.3
Brand D	5	9.8
Brand H	4	10.1
Brand F	3	10.6
Brand I	0	9.3
Aver.	-	**8.9**
Rho	-0.79*, p<0.05	

Table 1 shows, for one of the three product categories analyzed, evidence of a 'natural monopoly' effect in brand image data. The brands are ranked according to their % of brand salience (overall share of brand associations) and it appears clear that the category association rate is systematically lower (below average) for more salient brands (Brand A, B and C) and higher (above average) for less salient brands (Brand G, H and I). This is also confirmed by a

moderate negative Spearman's Rho coefficient (-0.65) for percentage of salience and category association rate (approaching significance). Therefore, this pattern suggests that respondents who are poorly knowledgeable of a product category tend to provide few associations with brands that are more salient/more popular or simply better know, and this results in a lower category association rate for those brands. The same pattern is also apparent in purchase data. In Table 2 (brands ranked according to market share) larger share brands (Brand G, A and B) show lower category buying rate (below average) than low share brands (Brand H, F and I), confirmed by a high negative Spearman's Rho coefficient (-0.8) for percentage of market share and category buying rate (significant at $p<0.05$ level, two-tailed).

Evidence of 'mirror' effect

Figure 1: 'Mirror effect' (tea)

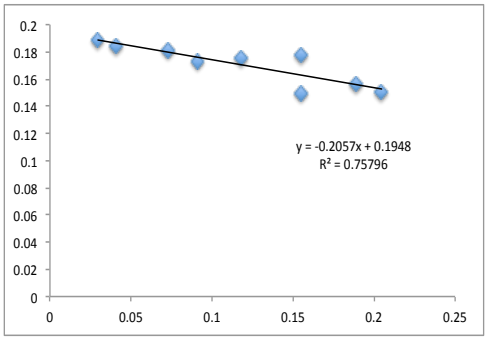


Figure 2:P 'YES' for highly and poorly salient brands (tea)

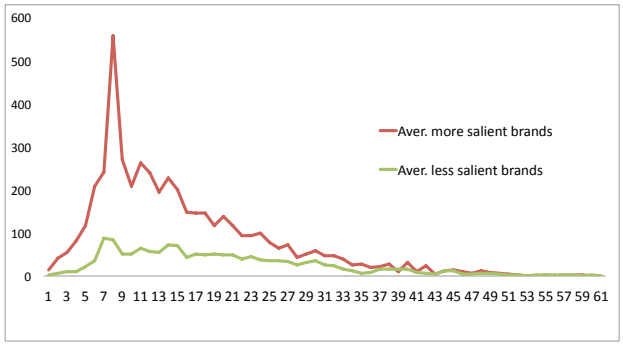


Figure 1 & 2 highlight a 'mirror' effect in the brand image data analyzed. Figure 1 shows the relationship between the % of brand salience and the category association rate, which is a straight line ($R^2 = 0.76$) of negative slope (-0.2), thus confirming the inequality of the 'mirror effect' P (LN) < P (HN) < P (HO) < P (LO). Figure 2 shows, instead, the aggregated frequency of P'YES' for the three most (upper line in red) and the three least (bottom line in green) salient brands, as a proxy of the underlying pattern in the likelihood ratios of being associated. Although the pattern follows the same shape (binomial), frequency of P'YES' (proportion of 'YES' answers or average association rate) is higher for the three more salient brands, confirming the other inequality of the 'mirror effect': P (L) < P (H).

Discussion and future research

In this study we showed that the 'natural monopoly' effect is apparent in brand image data with a double benchmark: comparison with purchase data and drawing upon memory literature, the 'mirror effect' in recognition judgements. This result is interesting for the following reasons. On the one hand, the confirmation of another similar underlying pattern across purchase and brand image data appears to revamp speculations on the possible similarities between purchases and brand equity components. On the other hand, it appears that the explanation for the recurrence of such patterns in brand image data may also find solid counterintuitive foundations in empirical research on memory. Therefore, brand image data may well be primarily a proxy of cognitive processing of brand knowledge. In fact, it even appears that more salient brands are used as 'category stereotypes' to simplify cognitive processing. Nevertheless, the key implication of this finding is that marketing and communication efforts should be primarily aimed in increasing the overall level of brand salience, because trying to target those who are poorly knowledgeable of the category would be ineffective (in line with Romaniuk and Sharp, 2008).

Reference list

Anderson, J.R. and Bower, G.H., 1973. Human Associative Memory*,* Winston & Sons, Washington.

Barwise, T.P. and Ehrenberg, A.S.C., 1985. Consumer Beliefs and Brand Usage. Journal of the Market Research Society 27 (No. 2, April), 81-93.

Bettman, J.R., 1979. Memory factors in consumer choice: a review. Journal of Marketing 43 (2), 37-53.

Bogomolova, S. and Romaniuk, D.J., 2006. Brand associations and usage: Is a 30-year-old empirical generalization still useful?

Bogomolova, S. and Romaniuk, D.J. (2007) In ANZMACDepartment of Marketing, University of Otago, University of Otago, Dunedin, New Zealand.

Ehrenberg, A.S.C., 1972. Repeat Buying: Theory and Applications*,* American Elsevier, New York.

Elberse, A. and Eliashberg, J., 2003. Demand and supply dynamics for sequentially released products in international markets: the case of motion pictures. Marketing Science 22 (3), 329-354.

Gigerenzer, G., 2004 Fast and Frugal Heuristics: The Tools of Bounded Rationality. In: Koehler, D. and Harvey, N. eds.) Blackwell handbook of judgment and decision making, Blackwell, Oxford, UK, pp. 62-88.

Glanzer, M., Adams, J.K. and Iverson, G., 1991. Forgetting and the Mirror Effect in Recognition Memory: Concentering of Underlying Distributions. Journal of Experimental Psychology: Learning, Memory, and Cognition 17 (1), 81-93.

Glanzer, M., Adams, J.K., Iverson, G. and Kim, K., 1993. The Regularities of Recognition Memory. Psychological Review 100 (3), 546-567.

Glanzer, M., Kim, K. and Adams, J.K., 1998. Response Distribution as an Explanation of the Mirror Effect. Journal of Experimental Psychology: Learning, Memory, and Cognition 24 (3), 633-644.

Greene, R.L., 1996. Mirror Effect in Order and Associative Information: Role of Response Strategies. Journal of Experimental Psychology: Learning, Memory, and Cognition 22 (3), 687-695.

Hilford, A., Glanzer, M. and Kim, K., 1997. Encoding, Repetition, and the Mirror Effect in Recognition Memory: Symmetry in Motion. Memory & Cognition 25 (5), 593-605.

Kahneman, D., 2003. Maps of Bounded Rationality: Psychology for Behavioral Economics. The American Economic Review 93 (5), 1449-1475.

Kamas, E.N. and Reder, L.M., 1994 The Role of Familiarity in Cognitive Processing. In: Lorch, R. and O'Brien, E. eds.) Sources of Coherence in Reading, Erlbaum, Hilsdale, NJ, pp. 177-202.

McPhee, W.N., 1963. Formal Theories of Mass Behaviour, The Free Press of Glencoe, New York.

Romaniuk, J. and Sharp, B., 2008. Where knowledge of your brand resides: the pareto share of brand knowledge. Ehrenberg-Bass Institute for Marketing Science, Adelaide.

Romaniuk, J. (2010). Brand Salience Measurement and Metrics. In Ehrenberg-Bass Institute Working Paper (pp. 21). Adelaide, South Australia: Ehrenberg-Bass Institute for Marketing Science.

Stocchi, L., Wright, M. and Guerini C., 2010. Is a 'niche' brand in the market also a 'niche' in consumers' mind? In ANZMAC Conference, Christchurch.

Stocchi, L., Nenycz-Thiel, M. and Driesener C., 2011. Private labels and the Double Jeopardy pattern: a brand equity perspective. In EMAC Conference, Ljubljana.

Schmittlein, D.C., Cooper, L.G. and Morrison, D.G., 1993. Truth in Concentration in the Land of (80/20) Laws. Marketing Science 12 (2), 167-183.

Selten, R., 2002 What Is Bounded Rationality. In: Gigerenzer, G. and Selten, R. eds.) Bounded Rationality: the adaptive toolbox, MIT Press, pp. 24-42.