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The Natural Monopoly effect in brand image associations

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ABSTRACT

The Natural Monopoly is a robust empirical generalisation that describes the tendency for more popular brands to attract light users of the product category. This study shows that this pattern can also explain the underlying 'trade-off' between associations that consumers hold in memory for a specific brand vs. other brands, given the same range of category cues or category entry points (e.g., purchase or consumption situations, core benefits etc.). Specifically, the Natural Monopoly can be extended to explain that consumers with limited knowledge of brands are more likely to memorise associations primarily in relation to the most popular brands of the category, which 'monopolise' category entry points. This is confirmed with broadly consistent results across three data sets, multiple time-periods and a total of six categories (including CPGs, services and mobile applications). As such, this study significantly expands the generalisability of the Natural Monopoly empirical law by showcasing it as a 'tool' to extend knowledge on brand image associations. The results also yield important practical implications for growing a brand's mental availability. For the most popular brands, the outcomes of this study highlight the relevance of reaching out to consumers with limited knowledge of brands within the same category; for the least popular brands, they indicate the importance of building associations with category entry points.

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1. Introduction

Consider the example of a consumer who hardly purchases soft drinks, but has been tasked with supplying some for a birthday party. Given their limited level of past experience, this consumer will most likely buy one of the most popular brands such as Coke or Pepsi, as opposed to less popular brands such as LA Ice Cola. Thanks to attracting the occasional 'one-off' purchases by consumers such as this party organiser, brands such as Coke and Pepsi gain and retain market share. That is, leading brands attract a disproportionate share of purchases from those consumers who are lighter users (buyers) of the category. This simple and logical mechanism is called the *Natural Monopoly* and is an empirical regularity discovered by McPhee (1963) in radio listening, subsequently detected and examined in buying behaviour (Ehrenberg et al., 2000, 2004).

A handful of studies have examined the Natural Monopoly in different contexts, including: Elberse's study (2008) on video rentals; Chrysochou and Krystallis's (2010) work on wine; Lynn (2013) and Sjoström et al.'s (2014) research on restaurants and food products, respectively; Scriven et al.'s (2015) paper on leisure activities;

and Gruneklee et al.'s (2016) piece on social marketing. However, these studies did not explore the Natural Monopoly in relation to non-behavioural aspects of consumption. Additionally, in most instances it was simply detected alongside other empirical patterns such as the Double Jeopardy pattern and the Duplication of Purchase Law (Ehrenberg et al., 2000, 2004; Sharp et al., 2012); it was not the main focus of the study. Nonetheless, the Natural Monopoly yields explanatory power, especially regarding the strategic importance of light users (or buyers) of a certain category for the pursuit of growth and the improvement of market performance.

In line with the above rationale, this study revisits the Natural Monopoly and extends its reach as an empirical marketing law by applying it to the analysis of *brand image associations*. Brand image associations capture the range of thoughts, ideas and perceptions that consumers associate with brands in their mind (Keller, 1993). This research demonstrates that it is possible to use the Natural Monopoly as a 'tool' to interpret the underlying 'trade-off' between associations that consumers hold in memory for a specific brand vs. other brands in the same category, given the same range of category cues or *category entry points* – i.e., purchase or consumption situations, core benefits etc. (Romaniuk and Sharp, 2016). In more detail, the present research draws upon the Natural Monopoly to address the following key research questions: *Do popular brands monopolise most associations with category entry points? If so, how can brands that are already associated with most (or all) category entry*

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points pursue growth, i.e. improve the chances of retrieval from memory in buying situations?

To answer these questions, this study analyses three large data sets, covering multiple time-periods and six categories (including CPGs, services and 'new' digital offerings such as mobile applications). We use a combination of descriptive statistical analyses and regression techniques (repeated for all sets of data) to detect and interpret the Natural Monopoly pattern in brand image associations, focussing on the analysis of two metrics: *mental market share*, i.e. a brand's percentage of associations out of the total associations for all brands in the category (derived from Romaniuk, 2013); and *category association rate*, i.e. the ratio between the overall number of associations for all brands in the category and the number of consumers who could retrieve the brand from memory (derived from Stocchi et al., 2016).

The contribution of this study is twofold. First, it revisits an important marketing law, showing the power of empirically based knowledge in resolving complex problems concerning market place behaviour. Specifically, this research adds to the literature on the Natural Monopoly pattern, which thus far has primarily concerned itself with behavioural matters. In contrast, this study focusses on the analysis of a cognitive aspect of consumption, i.e. brand image associations. Second, from a practical perspective, this research offers some clear guidelines that support brand management strategies, especially in relation to growing a brand's mental availability. A key 'take-away' from this work is the fact that, for the most popular brands, increases in mental availability can be attained by reaching out to consumers with limited knowledge of brands within the same category. This is because these consumers are likely to retrieve popular brands from memory and rely on them in the context of decision-making, which will ultimately enhance purchase probabilities. In contrast, managers of less popular brands should focus on building and maintaining associations with CEPs. This will assist them with building up, over time, associations in consumer memory, enhancing mental availability and thus brand purchase probabilities.

2. Background

2.1. The Natural Monopoly

In 'Formal theories of mass behaviour,' McPhee (1963) found that the audience of less popular radio programs and announcers mostly consisted of those who were heavy radio listeners. Conversely, light listeners showed the tendency to listen to the most popular programs and announcers. McPhee (1963) labelled this pattern *Natural Monopoly*, to explain the ways in which popular offerings 'monopolise' light users of those offerings. This seminal study suggested that, as an empirical law, the Natural Monopoly offers some key practical implications in relation to the analysis of sales concentration. In more detail, it reveals the strategic importance of light users, which are useful targets to maintain and enhance the popularity of certain offerings within a given competitive setting.

After McPhee's (1963) work, the pattern was hardly researched for nearly four decades. Ehrenberg et al. (2000; 2004) resumed work on the Natural Monopoly and examined it in the context of repeat purchase markets, revealing the following. Brands with a *high* market share (i.e., a high proportion of sales in comparison to the other brands in the same category) typically show a *lower* category buying rate (i.e., a lower frequency of category purchases made by the brand's buyers) due to the 'monopolising' of light category buyers (i.e., consumers who purchase from the category very infrequently). Similarly, Elberse (2008) found that monthly DVD rental selections of light users were primarily popular releases, while the heaviest segment of customers were more inclined to rent less popular releases along with popular ones. In the case of wine, Chrysochou and Krystallis (2010) compared the purchase patterns

of light and heavy wine buyers. Interestingly, their results showed counterintuitive tendencies with respect to the Natural Monopoly. That is, the authors found that the consumers who buy wine less frequently choose small, lesser-known brands; thus technically detecting an opposite effect. Nevertheless, the cut off point that the authors used to classify light and heavy buyers was somewhat discretionary (i.e., once a week for heavy and once a month for light), and was not based on the underlying frequency of purchase distribution as commonly done in other studies (c.f. Ehrenberg et al., 2000, 2004). Arguably, this analytical choice could have influenced the findings. It is also possible that the counterintuitive outcome emerged from the unique nature of the wine market in Greece (context of the analysis), which is characterised by many small winemakers.

More recently, the Natural Monopoly pattern featured in a limited number of additional studies, albeit without being the focus of the analysis and thus emerging as a rather incidental finding. For example, the focus of Bassi (2011) was on examining the methods of estimation procedure for the Dirichlet Model (see Goodhardt et al., 1984; and Sharp et al., 2012). However, the results of the analysis of the Italian beer market showed that the frequency with which consumers purchased beer increased as the penetration of individual beer brands decreased, indicating the existence of a Natural Monopoly effect. Lynn (2013) examined patterns in the choice of restaurants in the US and found that larger and more popular restaurants attracted a greater proportion of light category users than their smaller counterparts. Specifically, the aim of Lynn's research was to examine consumer choice for different types of restaurants, including: hamburger and pizza quick service restaurants; fast casual restaurants; full service casual restaurants; and table service restaurants. For all types of restaurants considered, the results consistently showed the Natural Monopoly effect, confirming that the law-like pattern applies to the hospitality industry. Similarly, the main purpose of Scriven et al.'s (2015) research was to examine the competitive structure of leisure market and to determine whether individuals engage with leisure activities in a predictable manner. The authors found that the most popular choice of leisure activities (e.g., watching television and spending time with family) attracted people with limited free time (i.e., technically the 'light users' of leisure activities), highlighting the existence of the Natural Monopoly pattern. Gruneklee et al. (2016) researched physical activity and found that individuals who exercise infrequently tend to prefer more popular activities such as walking, a finding that suggested the existence (and relevance) of the Natural Monopoly pattern in social marketing contexts. Lastly, Sjoström et al.'s (2014) findings indicated that known empirical marketing laws, including the Natural Monopoly, apply to CPGs brands carrying health claims (e.g., 'light' or 'fat free' products) and explain consumption patterns in relation to such brands just like they do for regular brands.

Table 1 offers a summary of the literature mentioned so far, and highlights that in most instances the identification and examination of the Natural Monopoly was not the main focus of the study. Moreover, existing works have focused exclusively on exploring behavioural aspects; there seems to be no study exploring cognitive aspects of consumption, which is somewhat surprising given that other empirical marketing laws such as the Double Jeopardy pattern have been successfully extended from the analysis of purchase behaviour to the examination of cognitive and psychological aspects of consumption (e.g., Stocchi et al., 2015).

Nonetheless, the Natural Monopoly clearly holds across a wide range of contexts and categories. In particular, Table 1 suggests that in addition to the analysis of repeat purchase markets (i.e., markets that are *stationary* in nature – see Goodhardt et al., 1984; Ehrenberg et al., 2000, 2004; Sharp et al., 2012), this pattern also occurs in leisure and physical activities; this indicates that there is scope to expand the application of this empirical marketing law. Accordingly,

Table 1

Summary of literature on the Natural Monopoly.

Authors and year	Research aim	Context of the analysis	Focus on Natural Monopoly	Behavioural vs. cognitive aspects of consumption
Ehrenberg et al. (2000); Ehrenberg et al. (2004)	Analysis of empirical patterns in repeat buying behaviour; customer concentration and underlying distribution of purchase frequencies (brands vs. product category)	Generic work on repeat purchase markets	Yes	Behavioural
Elberse (2008)	Analysis of DVD rentals behaviour	DVD rentals	In part	Behavioural
Chrysochou and Krystallis (2010)	Comparison between light and heavy buyers in relation to repertoire buying and loyalty structure	Wine	Yes (although opposite findings were revealed)	Behavioural
Bassi (2011)	Examining different procedures to calculate estimates for the Dirichlet model	Beer	No	Behavioural
Lynn (2013)	Analysis of restaurant choice in the U.S.	Restaurants	No	Behavioural
Sjostrom et al. (2014)	Comparison of brand performance measures of regular brands vs. brands featuring health claims (e.g., 'light', 'fat free' etc.)	Food products with healthy claims	No	Behavioural
Scriven et al. (2015)	Analysis of consumer behaviour in relation to the choice of leisure activities	Leisure activity category	No	Behavioural
Gruneklee et al. (2016)	Examination of a range of key empirical marketing laws (e.g., Double Jeopardy pattern, Duplication of Purchase Law, Natural Monopoly) to understand consumer behaviour in relation to physical activity	Social marketing context	No	Behavioural

this study extends the application of the Natural Monopoly to a novel non-behavioural context, i.e. to examining and understanding *brand image associations*, explained next.

2.2. From brand image associations to mental availability

Models theorising strategic brand building approaches such as Keller's Customer Based Brand Equity (1993) have introduced the notion of *brand image associations* – i.e., the collection of attributes, benefits and attitudes that consumers spontaneously associate to brands in memory. From a conceptual perspective, brand image associations are linked to cognitive psychology principles concerning how individuals retain and subsequently access information in memory, such as the Associative Network Theory (ANT) and the Active Control of Thought (ACT-R) theory (Anderson, 1983; Anderson and Bower, 1973; Anderson et al., 2004; Collins and Loftus, 1975). In line with these theories, it is assumed that brands are retained in memory in network-like settings, whereby the brand represents the focal concept and is surrounded by a range of associated concepts that constitute the overall image of the brand in consumers' minds (Keller, 1993). Accordingly, the theoretical (and practical) importance of brand image associations resides in the fact that they act as 'cognitive pathways' (Romaniuk and Sharp, 2004), which facilitate the consumer ability to access (or retrieve) a brand from memory, thanks to its prominence within the network of information related to it (see also Alba and Chattopadhyay, 1985, 1986; Alba and Hutchinson, 1987; Myers-Levy, 1989; Nedungadi, 1990).

Several works have extended the scope of brand image associations from theoretical concept to brand performance indicator, referring to it in terms of the quantity and quality of associations (e.g., Holden and Lutz, 1992; Krishnan, 1996). Other studies have re-labelled it as the propensity or likelihood to think of the brand in buying situations – see Romaniuk and Sharp's (2003, 2004) definition of *brand salience*. More recent developments have introduced the more inclusive notion of *mental availability* (Romaniuk and Sharp, 2016; Sharp, 2010). Importantly, Romaniuk (2013) explains how to conceptualise and measure mental availability through a set of brand performance metrics derived from consumer surveys questions, which capture the overall size and strength of the network of the brand image associations that consumers retain in memory in relation to a specific brand vs. other brands in the same category. This approach captures the chance of a brand becoming accessible in memory in the presence of multiple retrieval cues linkable to the

category, which Romaniuk and Sharp (2016) call *category entry points* (CEPs) – see Fig. 1 featuring an example for the soft drinks brands Coke and Pepsi. In further detail, CEPs are "...thoughts or influences at the start of the buying from the category, pre-brand" (p. 70), which include purchase and consumption situations, environmental and contextual factors, and needs or core benefits. Considering multiple CEPs offers a good understanding of the competition for access (or retrieval) that a brand faces in consumers' memory, given multiple cues. This is conceptually akin to psychological theories such as the aforementioned ACT-R (Anderson, 1983); therefore it is more theoretically robust than single-cue measurements such as brand awareness (Romaniuk and Sharp, 2016).

The concept of mental availability assumes that consumers access brands in memory primarily via CEPs. Hence, brands should be associated with as many CEPs as possible to maximise the chances of being retrieved from memory, and should 'conquer' new CEPs or reach out to more consumers to grow their market performance (Romaniuk and Sharp, 2016). This assumption yields several implications for brand growth strategies, because *de facto* the chances of brand retrieval cannot be further enhanced when brands are already associated with a broad range of CEPs. Hence, further

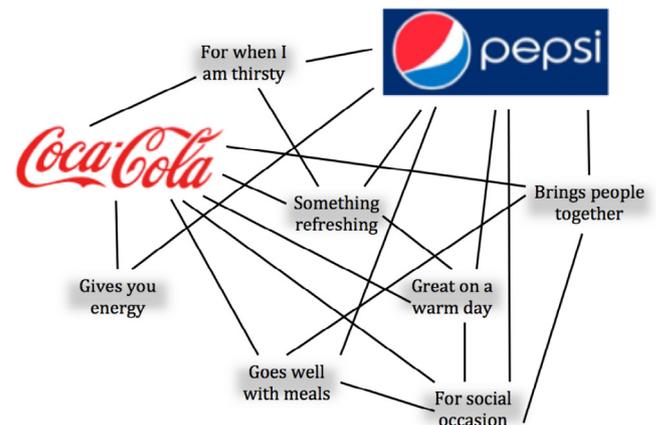


Fig. 1. Example of brand image associations for soft drinks brands. Note: concepts in grey are category entry points (own elaboration on the basis of Romaniuk and Sharp, 2016).

improvements in mental availability may only occur by reaching out specifically to consumers who know very little about the category, i.e. those who retain in memory only one or a few brands; not just any consumer. In contrast, less popular brands may struggle to 'conquer' CEPs at all, because these are most likely already linked to the most popular brands. Namely, even though they could successfully establish associations with CEPs, the competition for retrieval will be nonetheless very high, given that rivalry for access from memory is assumed to occur within the same 'pool' of CEPs where popular brands already enjoy many strong associations.

While the above argument certainly echoes with the Natural Monopoly in repeat purchase markets and other contexts (e.g., hospitality, leisure activities, radio listening etc.), it also suggests that there is an outstanding issue concerning the existence of an underlying 'trade-off' between associations that consumers hold in memory for a specific brand vs. towards the other brands, given the same range of CEPs. Specifically, existing literature is yet to clarify how to strike a balance between building associations with CEPs vs. reaching out to certain consumers to improve a brand's overall market performance. Therefore, extending the approach used in previous research (e.g., Romaniuk and Nenycz-Thiel, 2013; Stocchi et al., 2015), the present study addresses this issue by using the Natural Monopoly pattern (discussed earlier) as an analytical 'tool'. When doing so, it draws upon recent theoretical advancements explaining how consumers retrieve brands from memory to outline and test some key research propositions, explained next.

3. Research propositions

Recently, Stocchi et al. (2016) revealed the existence of alternative pathways according to which consumers retrieve brands from memory, in line with dual-process theories of memory (e.g., Reder et al., 2000, 2002), which in psychological research have superseded the ANT and ACT-R theories mentioned earlier. Specifically, the authors showed that sometimes brands that hold a great share of associations might be hard to access from memory, due to 'activation confusion' primarily affecting consumers who are very knowledgeable of the category. The authors were able to detect this effect by using a metric called *category association rate*, defined as the ratio between the total number of brand associations for all brands in the category and the number of consumers who could retrieve the brand from memory. The metric captures an approximate level of category 'knowledge', given a set range of CEPs and was cross-tabulated against Romaniuk's (2013) key mental availability metric, i.e. *mental market share*, defined as the percentage of a brand's associations out of the total number of associations for all brands in the same category. When comparing the average number of brand image associations across four groups of consumers showing high vs. low values of these two metrics, the authors found that for each given brand within a category: "of all respondents who give above average brand associations, the ones who give most associations are those who know relatively less about the category" (p.631).

When combined with the reflections on mental availability and CEPs introduced earlier, this outcome suggests that it is reasonable to expect that a brand's mental availability will be relative to the number of brands that different consumers can access from memory, given the same range of CEPs. That is, if consumers only know one or a few brands, then most CEPs would be somewhat 'conglomerated' around those few brands, and vice versa. Put formally, this would result in the following empirical pattern:

P1: A brand's level of mental availability is negatively correlated with a brand's category association rate.

While the above research proposition certainly mimics previous empirical findings from studies detecting the Natural Monopoly

pattern, this study examines this empirical marketing law purely from a cognitive perspective to shed light on 'network-level' characteristics of brand image associations; it does not consider it as a simple reflection of behaviour. This assumption is based on two reasons. First, Stocchi et al. (2015) found that although other empirical laws of marketing characterise brand image associations (e.g., the Double Jeopardy), exceptions and deviations from the expected pattern are somewhat 'reverse' to those typically observed in behaviour. Second, Romaniuk and Sharp (2016) state that while mental availability correlates to purchase behaviour (i.e., sales) there can be disparities, and such disparities highlight issues concerning specific aspects of marketing tactics (e.g., the use of an advertising approach too narrowly focused around a specific CEP). Moreover, long-standing empirical evidence has already discovered the following important patterns in relation to brand image associations:

- i) Buyers of a brand hold more brand image associations than non-buyers (Bird and Ehrenberg, 1970; Bird et al., 1970).
- ii) More popular brands (i.e., brands with greater market share) typically have more brand image associations (Barwise and Ehrenberg, 1985; Dall'Olmio-Riley et al., 1997; Romaniuk et al., 2012) and are linked to a broader range of CEPs (Romaniuk and Sharp, 2016).
- iii) Buyers of a certain category know more CEPs and know more about larger brands; however, CEPs are similar across all buyers, albeit reflecting their own encounters (Romaniuk and Sharp, 2016).

These empirical trends go beyond a mere reflection of behaviour (especially the last one), showcasing multiple effects of the same underlying pattern across a range of inter-related issues of practical relevance. Since this is not uncommon to empirical marketing laws (e.g., Sharp and Riebe, 2005), this research proposes that:

P2: The Natural Monopoly pattern is somewhat stronger in brand image associations than in purchase behaviour.

Nonetheless, in line with the array of existing empirical evidence discussed in Section 2.1, for completion, this research also assumes that the trend proposed in P1 is stable over time and characterises product and/or service categories conforming to the condition of *market stationarity*. Such condition is to be expected in consumer behaviour in repeat-purchase markets (Ehrenberg et al., 2000, 2004; Goodhardt et al., 1984; Sharp et al., 2012) and in relation to the other behavioural aspects that existing research on the Natural Monopoly has examined (e.g., leisure and physical activity). Put formally:

P3: The Natural Monopoly pattern in brand image associations is stable over time.

4. Methodology

4.1. Data

We use a total of three different sets of data, as follows:

1. *Direct comparison against purchase data.* We analyse a set of data featuring purchases and brand image associations for the same consumers, and for 27 brands in three CPGs categories (tea, instant coffee and roast coffee; $n = 8219$, $n = 7974$, $n = 6532$ respectively) collected in the UK in 2008 by a leading retailer.
2. *Comparison across multiple time-periods and across two types of markets, which by definition are stable over time (stationary), but show different levels of brand loyalty (i.e., frequency of purchase).* We analyse a set of longitudinal data comprising brand image associations for 36 brands in two repeat-purchase markets

representative of a typical repertoire and subscription context (see Sharp et al., 2002), i.e. soft drinks and banking ($n = 771$), collected in the UK 2012 by a commercial provider of market research. We do so to exclude any possible underlying effect of inherent differences in brand loyalty.

3. *Testing for any possible boundary condition imposed by the peculiarities of new domains of consumption.* We analyse a large set of Italian panel data collected in 2014 by a commercial provider of market research ($n = 2473$; all respondents current users of mobile devices) capturing brand image associations for 47 branded mobile apps (including free and paid ones). We chose to verify if the pattern held in this a 'new' consumption context, because of the increasing popularity of apps as 'brands in the hand' (Sultan and Rohm, 2005). Importantly, apps make all sorts of products and services available to consumers anytime and anywhere (Gao et al., 2013; Tojib and Tsarenko, 2012); yet very little is known about the general market-level conditions, especially in relation to stationarity.

4.2. Metrics and empirical tests

For all data sets, we calculated and compared two key metrics:

- *Mental market share*, calculated as the ratio between the total number of associations obtained by a certain brand vs. the total number of associations obtained by the other brands in the same category, given the same range of CEPs. Importantly, to derive this metric we followed all necessary steps described in Romaniuk (2013), whereby data on brand image associations are systematically reduced to ensure that the sub-set of associations used to compute the metric is unbiased (i.e., it does not include highly descriptive and/or evaluative associations; it offers a robust representation of brands of all sizes; and it does not capture overlapping memory structures).
- *Category association rate*, calculated in line with Stocchi et al. (2016) for each individual brand as the ratio between the total number of brand associations for all brands in the category and the number of respondents who could retrieve the brand from memory, given the same range of CEPs.

For the first data set (also featuring purchase data by the same consumers), we also calculated *market share* and *category buying rate* (see Ehrenberg et al., 2004 for details about these metrics) for a direct comparison with the Natural Monopoly pattern 'as we know it' (i.e., in buying behaviour).

To test the validity of our research propositions, we examined the above metrics using two key empirical tests¹, repeated for all sets of data and for all brands within each category. First, we used linear regressions analysing the *b*-coefficients and R^2 values resulting from plotting mental market share against the category association rate. Second, we considered the values of the Spearman's rank correlation coefficient (or Spearman's *rho*, see Armstrong and Green, 2001) as measure of statistical dependence between mental market share and category association rate. Specifically, we looked for negative *b*-coefficients, moderate to high R^2 values and moderate to high (significant) negative *rho* values across all data sets considered. In the specific instance of the second data set (featuring multiple time periods), we also conducted ANOVAs¹ to offer more robust conclusions on the stability, over time, of the Natural Monopoly pattern in brand image associations.

¹ Note: the above were applied also to the purchase-related metrics considered in the first data set, for the purpose of comparing the underlying pattern (Natural Monopoly) across brand image associations and buying behaviour.

5. Results

Comprehensively, across all sets of data, there is empirical support of the existence of the Natural Monopoly in brand image associations, with mental market share and category association rate showing significant and moderate-to-high negative correlations, in line with P1. The next sections explain in greater detail the results for each set of data considered, and specific results in relation to P2 and P3.

The analysis of the first set of data (three hot beverages categories) revealed that the Natural Monopoly pattern is present, with brands with a higher mental market share systematically showing a lower category association rate, confirming the validity of P1. This can be read from the values of the *b*-coefficients, which were always negative (ranging between -20.57 for tea and -29.13 for roast coffee); the high R^2 values (ranging between .76 for tea and .91 for instant coffee); and the negative *rho* values, which ranged between $-.845$ for tea and $-.966$ for instant coffee and were always statically significant – see Table 2. Importantly, this data set also included purchase data, which we analysed using market share and category buying rate (see Table 3). This direct comparison allowed inferring that the Natural Monopoly effect is somewhat stronger in brand image associations than in buying behaviour, thus confirming P2. This was signalled by the fact that the values of the *b*-coefficients and the R^2 were smaller in the analysis of purchase data (i.e., *b*-coefficients ranging between -3.07 for roast coffee and -9.30 for instant coffee; R^2 values ranging between .11 for roast coffee and .72 for instant coffee); also, the *rho* value for one category (roast coffee) was actually not significant and relatively low (.333). In greater detail, these results suggest that, for the most popular brands in these three CPGs markets, there is a greater 'concentration' of category associations than category purchases. That is, whilst these brands seem to heavily 'monopolise' associations in the mind of consumers in relation to a given range of category cues, this does not seem to correspond with the same extend of purchases 'monopolisation'. This intuitively suggests that, for popular brands, there is an array of untapped market potential represented by consumers with limited knowledge of the category, who could be 'converted' into light buyers. In contrast, less popular brands need to 'catch up' on associations with CEP in order to stand a chance to come to mind at all, and thus to consequently improve the chances of being purchased.

The same analysis performed on the second data set showed that the Natural Monopoly pattern occurs across two repeat-purchase markets that differ in the inherent level of brand loyalty (soft drinks and banking, examples of a repertoire and subscription market, respectively), and is stable across multiple time periods. This outcome confirms P1 and P3, and also indirectly confirms P2 given

Table 2

Results of the analysis of the first data set (brand image associations).

Categories	<i>b</i> -coefficients	R^2 values	Rho values
Tea	-20.571	.76	$-.845^{**}$
Instant coffee	-25.092	.91	$-.966^*$
Roast coffee	-29.133	.79	$-.854^{**}$

** Significant at .001 level (two-tailed); * = Significant at .005 level (two-tailed).

Table 3

Results of the analysis of the first data set (buying behaviour).

Categories	<i>b</i> -coefficients	R^2 values	Rho values
Tea	-8.784	.57	$-.758^{**}$
Instant coffee	-9.303	.72	$-.847^{**}$
Roast coffee	-3.075	.11	.333

** Significant at .001 level (two-tailed).

Table 4
Results of the analysis of the second data set.

Categories	<i>b</i> -coefficients	R ² values	Rho values
Soft drinks Time 1	-131.01	.87	-.901**
Soft drinks Time 2	-108.77	.77	-.937**
Soft drinks Time 3	-104.69	.79	-.953**
Banking Time 1	-51.28	.89	-.954**
Banking Time 2	-55.10	.91	-.979**
Banking Time 3	-58.58	.89	-.971**

** Significant at .001 level (two-tailed).

that there seems to be no marked difference between the two markets considered in terms of the underlying pattern in brand image associations, whereas typically in purchase behaviour these two markets differ quite markedly (see Sharp et al., 2002). Specifically, as Table 4 shows, all *b*-coefficients' values were negative and considerably large, and twice as large for soft drinks in comparison to banking (i.e., between -104.69 and -131.01 for soft drinks; and between -51.28 and -58.58 for banking). R² values were high and ranged between .77 and .87 for soft drinks, and .89 and .91 for banking. All rho values were significant (p-value < .001, two-tailed), negative and high (between -.901 and -.953 for soft drinks; and between -.954 and -.979 for banking). Additionally, given that this set of data included multiple time periods, to enhance the robustness of our conclusions in relation to P3, we conducted some ANOVAs. For both markets, the results returned non-significant differences in the values of mental market share (F(2,63) = 0.155, p > 0.05 for soft drinks; F(2,39) = 0.002, p > 0.05 for banking) and category association rate (F(2,63) = 0.142, p > 0.05 for soft drinks; F(2,39) = 0.039, p > 0.05 for banking) across the three time periods, which reinforces conclusions on the stability of the Natural Monopoly pattern across time and for both markets.

In practical terms, these outcomes suggest that, regardless of the category being a repertoire or a subscription market, popular brands 'monopolise' associations with CEPs more than they 'monopolise' purchases. Also, although this pattern is stable over time, it seems roughly twice as strong in repertoire markets, possibly due to the fact that additional encounters with brands at the point of sale further enhance brand image associations, especially in comparison to far less frequent service encounters with brands in subscription markets.

Lastly, the analysis of the third data set (panel data capturing information about branded mobile apps) revealed that the Natural Monopoly pattern characterises brand image associations also in more 'novel' consumption contexts (confirming P1). However, results in this category were a lot weaker than the other two sets of data considered. Table 5 shows that *b*-coefficients were negative for free apps as well as paid apps (-.094 and -.065, respectively) although very small (especially in comparison to the values of the same coefficients in the other two data sets). R² values were moderate (.36 and .37) (as opposed to high), and rho values were significant (p value < .005; two-tailed), negative and moderately high (-.602 and -.609).

Given that there is always directional support for P1, the much weaker results for apps do not necessarily constitute a boundary condition to the Natural Monopoly pattern in brand image associations. However, it is important to tease out some factors that

Table 5
Results of the analysis of the third data set.

Categories	<i>b</i> -coefficients	R ² values	Rho values
Free apps (22 apps)	-.094	.37	-.609*
Paid apps (25 apps)	-.065	.36	-.602*

* Significant at .005 level (two-tailed).

might have underpinned this outcome. Above all, a key possible explanation is the following. Mobile apps face very fast cycles of consumption, because consumers constantly try apps and then immediately dispose of them (c.f. Wenzel et al., 2012). This tendency would logically result in abnormal rates of apps' switching, breaching the condition of market stability (or stationarity) that characterises repeat-purchase markets as well as other contexts where empirical laws of marketing hold (e.g., the range of consumer behaviours that can be explained through the use of the Natural Monopoly). Also, the set of data considered included a broad range of free and paid apps, but among those apps we found some 'super apps', i.e. extremely popular apps with a very large base of users in comparison to all other apps – see the example of the Facebook app (free) and the WhatsApp Messenger app (paid). The presence of such strong apps could have resulted in abnormal 'clustering' of brand image associations around them, neutralising differences between all the other lesser known apps, including the next more popular apps (e.g., other free social media apps such as Instagram and other paid apps such as Candy Crush Saga).

Nonetheless, taken together, the analyses of all three data sets broadly confirm the research propositions introduced earlier, indicating that consumers who retain in memory only one or a few brands from a given category tend to retrieve the most popular brands (i.e., brands with high mental availability), because these brands 'monopolise' CEPs. This outcome is: i) consistent with buying behaviour, yet somewhat stronger than it; ii) much more marked/evident in markets that are broadly stable over time (i.e., stationary); iii) irrespective of different inherent levels of brand loyalty; and iv) potentially present also in more novel consumption contexts (apps), but weakened by specific characteristics of these contexts.

6. Discussion

6.1. Theoretical contribution

The theoretical contribution of this study is twofold. First, this research showed that a significant empirical marketing law about behavioural aspects of consumption, the Natural Monopoly, also applies to the analysis of brand image associations. This outcome extends the collection of empirical findings concerning this marketing law, which thus far have been confined to the analysis of behavioural aspects – not cognitive facets of consumption. Second, this research contributed to advancing the understanding of brand image associations. In particular, this research corroborates Stocchi et al.'s (2016) findings and suggests that the Natural Monopoly can arise from the different retrieval pathways that are expected from dual process theories of memory, and that brand retrieval is a bit more complicated than previously thought. The Natural Monopoly can be used to test and explain this complexity, enriching existing knowledge on brand image associations without abandoning the empirical base provided by prior works.

Furthermore, when considering possible theoretical explanations for the outcome of this study, it is possible to draw connections between this research and two other literature strands more closely linked with psychology, as follows.

First, the key finding of this research indirectly extends more generic research on the relationship between product category knowledge and brand retrieval, which offers empirical evidence (albeit not necessarily conclusive) of the existence of an underlying 'trade-off' between the overall level of knowledge that consumers hold in memory in relation to a certain category and their ability to bring back to mind brands from that category. For example, Chocarro et al. (2009) argued that consumers typically fall into two different groups depending on their level of product category knowledge: *experts* and *novices*. Experts are better acquainted with extrinsic cues such as brands and their features, and can more easily

process those cues during decision-making. In contrast, novices often experience limited or impaired ability to process extrinsic cues; this makes them less able to recall and evaluate brands in memory, which can delay or defer choice and shift preferences towards best known brands. In fact, novices would typically find decision-making harder and use different heuristics to simplify the process, such as relying upon popular brands as a 'lexicographic rule' (Coupey et al., 1998; Maheswaran and Sternthal, 1990). These findings clearly echo with the outcome of this research and the Natural Monopoly in brand image associations. However, the present study offers a much more generalisable empirical basis for further analytical developments, given that past research is mostly limited to the analysis of one single category at the time and has often omitted to offer explicit brand-level implications due to a focus on comparison between different segments of consumers. Second, the outcome of this study seems to correspond to some important principles from research in psychology. Specifically, as Mussweiler and Strack (2000) explain, in psychology *anchoring* is the assimilation of a judgment to a salient standard of comparison (p.1038), which enables judgment under uncertainty (see also Tversky and Kahneman, 1974). Importantly, anchoring comes down to carrying out seamless comparisons with plausible standards that individuals can retrieve from memory. Any 'anchor-consistent' information has greater chances of being retrieved and used for anchoring, which will occur by simply comparing a target (e.g., category) with a given standard (e.g., a popular brand from that category) and by determining the level of plausibility of the standard. If the standard is plausible, then anchoring occurs and there will be no need for additional information. Thus, individuals naturally prefer anchor-consistent standards, because they reduce time and effort allocated to thinking. Hence, when consumers are not very knowledgeable of the category (i.e., retain in memory only one or a few brands from it), an 'anchoring effect' may occur, whereby consumers consider popular brands as 'plausible standards' of the category, which thus 'monopolise' most CEPs.

Finally, this research also adds to the growing body of evidence (Romaniuk, 2013; Romaniuk and Nenycz-Thiel, 2013; Romaniuk and Sharp, 2016; Stocchi et al., 2015, 2016) indicating that similar underlying mechanisms characterise brand image associations and purchase behaviour. In more detail, an important implication of this research is the fact that, although we find the same underlying pattern, the 'strength' or extent of occurrence of this pattern is somewhat different. This showcases the value of empirical marketing laws as 'tools' for advancing knowledge in relation to specific aspects of consumption other than purchases; it also confirms that there is a lot to learn also from any potential discrepancy emerging from applying known patterns to 'new' contexts.

6.2. Practical contribution

From a practical perspective, this study suggests that whilst building a broad range of memory associations with CEPs may encourage brand retrieval, it may not be the most effective way to grow a brand's mental availability. In contrast, reaching out to light users of the product category with more limited knowledge of brands within that category may be a feasible way to activate the Natural Monopoly and to ensure that the brand's overall mental availability is bolstered, thanks to enabling light users to accessing the brand from memory. Managers of popular brands might therefore wish to include a proxy for their chance to be retrieved from memory by light category buyers as a key performance metric. Similar to category buying rate, this could be a key source of future growth for brands in many markets. Managers of less popular brands should focus more concretely on monitoring improvements in relation to associations with CEPs, especially relatively to competitors and among consumers who can effectively retrieve the brand (as a

starting point). Hence, they may find particularly relevant to monitor category association rate along with mental market share on a regular basis, because a decline in category association rate would by default indicate an improvement in the associations with CEPs.

Linking these implications more specifically to some of the product and service categories considered in this study, it is also possible to suggest that managers of brands in repertoire markets might need to pay extra attention to the Natural Monopoly in brand image associations, because it is somewhat stronger than in subscription markets (e.g., services such as banking). This is most likely due to the multitude of consumers' encounters with brands, which cause consumers' brains to 'rewire' associations with CEPs on a frequent basis. In contrast, this effect seems somewhat mitigated in 'new' types of offerings such as apps, whereby the pace of consumption and the level of switching between offerings occur seamlessly. However, in such contexts, most associations with CEPs may be essentially 'clustered' around one extraordinarily popular offering, and differences between the other less popular offerings could become minimal. This poses extra challenges for managers to either 'keep up with the flock' or become the most popular offering of all.

More generally, this study reinforces the importance of striking a balance between: i) building and strengthening the information that consumers retain in memory about the brand – e.g., through the consistent use of a palette of highly distinctive branded elements (see Sharp, 2010; and Romaniuk and Sharp, 2016); and ii) anchoring the brand to CEPs (see Romaniuk and Sharp, 2016).

7. Conclusions and limitations

This research has revisited the Natural Monopoly, a marketing law explaining why light users of a certain offering (e.g., a product or service category, or a specific type of consumer behaviour) will be drawn to the most popular brands in that product class, and has showed that the same law can also explain an underlying 'trade-off' in brand image associations. Specifically, through the analysis of multiple data sets, this study showed that consumers with limited knowledge of brands within a certain category tend to retrieve the most popular brands, because they somewhat 'monopolise' CEPs. Hence, brands that are already highly mentally available need to resort to reaching out to those consumers for growth. This exemplifies how the tradition of empirical marketing law continues to offer venues to advance understanding of many aspects of consumption, including in relation to the cognitive mechanisms that characterise how consumers process brands in memory.

Nonetheless, as with any research, this work is not exempt from limitations. For instance, it covers a range of potential confounding factors (e.g., variation over time, variation across contexts differing in the inherent level of brand loyalty etc.), but omits to consider others. Above all, future works could consider high involvement contexts and/or industrial markets, whereby the number of brands available to consumers is somewhat more limited. Future research could also test whether popular brands with higher relative levels of mental availability do indeed grow faster than similarly popular brands with slightly lower levels of mental availability. Finally, in line with the existence of different consideration sets (see Romaniuk and Sharp, 2016), further replications of this work should deploy an experimental design to examine in more detail different sub-sets of CEPs, looking for more benchmarks with managerial relevance.

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