



# Battling for consumer memory: Assessing brand exclusiveness and brand dominance from citation-list<sup>☆</sup>

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## ABSTRACT

This article proposes two new indices and a new map to analyze a brand's competitive position in consumer memory. It relies on each consumer's brand citation-list. We view as beneficial mono-citations, when the brand is the only one cited by a consumer. We define "brand exclusiveness" as the share of mono-citations the brand gets among the mono-citations for all brands cited. Another index measures the "dominance" of one brand over another brand in memory. We offer a new map of memory competition that positions pairs of brands according to their association in memory and to the dominance of one brand over the other. We illustrate the possible contribution of these new indices and of this new competitive map, using the example of luxury watches. We analyze the convergent, discriminant and predictive validity of brand exclusiveness. We discuss avenues for future research suggested by these new concepts and associated empirical measures.

## 1. Introduction

Consumer memory is a battling ground, where brands compete for recall. This article proposes a new approach to analyze spontaneous recall. It extends the long stream of research that has shown the theoretical and managerial importance of brand awareness. Three indices have become classical: aided awareness (how many consumers recognize the brand when prompted with its name), unaided awareness (how many consumers spontaneously recall the brand when cued with the category), top-of-mind awareness (how many consumers recall it first). These indices provide brand rankings of increasing stringency. However, because they consider each brand separately, they overlook the rich information provided by the full list of brands recalled spontaneously by each consumer, the consumer's "citation-list."

We propose that each consumer's citation-list should be analyzed as a whole and in the order provided by the consumer. Calculating separately for a brand its spontaneous awareness and top-of-mind awareness takes no account of the number and identity of the other brands that consumers recall spontaneously when recalling that brand.

A brand cited first but concurrently with a long list of other brands faces memory competition. In contrast, a brand cited first *and* alone

faces no memory competition. This situation of "mono-citation" is the most favorable for a brand, and accordingly we place it at the summit of the "citation pyramid" presented in Fig. 1a. Brands cited first (top-of-mind) but not alone are one step lower in the pyramid. Brands cited later (not on Top-of-Mind) are two steps lower, at the bottom of the citation pyramid.

According to Ewing (2015), the number of mono-citations reflects both memory salience, brand identity and mental availability. Moving from the individual level to the product category level, we propose to measure the "Exclusiveness" of a brand by the number of its mono-citations, compared to the total number of mono-citations over all brands in the category. The most exclusive brand on a market is the brand with the highest share of mono-citations in that market.

Brand exclusiveness is critical in the luxury sector (Kapferer & Bastien, 2009, p. 316). In the words of Kapferer and Bastien, "For a luxury brand, ease in recalling the brand name is not enough. Being the first brand cited is not enough. Being the only brand recalled is what counts." This is a very advantageous memory position as it prevents other brands' inclusion in the consideration set (Hoyer & Brown, 1990; Macdonald & Sharp, 2000). Industry expert agrees. Best Global Brands (2020) defines brand distinctiveness as "The existence of uniquely ownable signature

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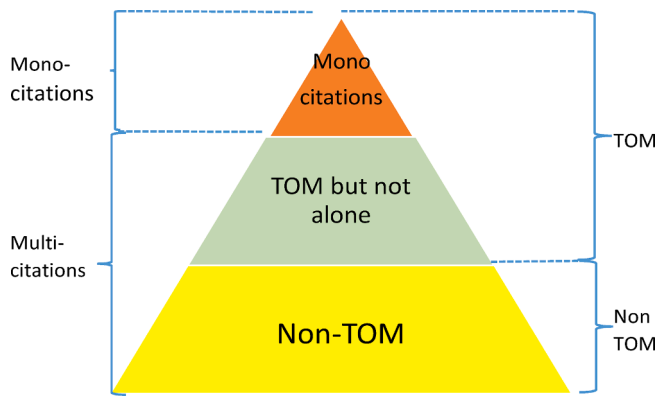


Fig. 1a. Citation pyramid.

assets and experiences that are recognized, remembered by customers, and difficult to replicate. The strongest brands grow by making iconic moves that rise above the noise and create monopoly windows in memory.”

Even when a brand does not enjoy a large share of mono-citations, it is important to assess its relative position against co-cited brands. This can be done on the basis of the citation-list, by focusing on the order in which the brands are cited. Brands co-cited spontaneously in citation-lists constitute a network of brands strongly associated in consumer memory (James, 2004; Romaniuk & Sharp, 2004; James & Fogler, 2007). From cumulated experience with brands, either through advertising, social media, in-store displays, purchases and consumption, brand connections develop in memory (Anderson & Bower, 1980; Keller, 2003; Romaniuk, 2006). Strong memory connections show-up in citation-lists. Citation-lists provide an opportunity to discover the memory network of brands in a product category. An analogy with bibliometric citation analysis (Fetscherin & Heinrich, 2015) is useful. Bibliometric analysis assesses the co-citations between articles about a certain research topic. It analyzes co-citations with other published articles. Similarly, we explore the memory links among brands in a given product category by analyzing brand co-citations based on citation-lists.

However, counting the number of co-citations of two brands is only a first step in measuring their association in memory, because it does not take into account the relative memory strength of the two brands co-cited. If a consumer cites Brand A before brand B, A is in a dominant memory position for the consumer. At the level of the product category, if consumers who recall A rarely recall B while most consumers who recall B also recall A, A is in a dominant memory position over B. This index of pairwise “Brand Dominance” takes into account the asymmetrical character of interbrand links in memory.

Multiple researchers have proposed memory concepts that go beyond awareness and top-of-mind: Brand uniqueness (Aaker 1991, 1996, 2014, Kapferer & Bastien 2009), brand differentiation (Zaichkowsky 2010), brand inhibition (Alba & Chattopadhyay, 1986), brand dominance (Aaker 1996) and brand salience (Alba & Chattopadhyay, 1986; Romaniuk & Sharp, 2004; Veceli & Shaw, 2010). However, none of these authors proposed a memory-based measure that encompasses these five forms of memory exclusiveness. It is to fill this gap that we propose the two new empirical indices described above, both based on the analysis of citation-lists: “Exclusiveness” and pairwise “Brand Dominance.”

Thus, to investigate a brand’s market competitive position and its links with consumer characteristics, this research relies on spontaneous recall surveys rather than on consideration sets. These memory-based indices differ from consumers’ judgment of a brand’s exclusivity, a brand attribute studied by Hudders et al. (2013) and Porto (2018)

among others. These authors define exclusivity as a joint perception of the scarcity and inaccessibility of the brand. Using a large-scale survey on luxury watches, we illustrate how these new indices offer a deeper understanding of memory competition based on the “citation pyramid” (Fig. 1a), above the traditional approach of ranking brands based only on awareness and top-of mind.

Section 2 of this paper reviews the literature on the classical indices of brand awareness, top-of-mind and salience, before developing the concepts of citation pyramid, brand exclusiveness and pairwise dominance and positions them relative to traditional awareness indices. Sections 3 and 4 present the case of luxury watches in twelve countries, which we use to illustrate the new insights provided by the indices of exclusiveness and dominance, and our methodology. Section 5 presents results. We assess the convergent, discriminant and predictive validity of brand exclusiveness. We show that ranking brands by exclusiveness differs from ranking by awareness or top-of-mind across gender, age, income and country and discriminates better among brands. Finally, we measure pairwise brand dominance and we illustrate the memory diagnostic obtained by crossing brand dominance with brand association. Section 6 summarizes our contribution, discusses limitations and managerial implications and offers suggestions for future research.

## 2. Conceptual framework

In this section, we briefly review past research on brand awareness; we describe in more detail the new concept of brand exclusiveness; we discuss further the “citation pyramid” of Fig. 1a; we briefly review the literature on brand associations in memory; and we present the new concept of pairwise brand dominance.

### 2.1. Brand awareness

The marketing literature has stressed the theoretical and practical importance of the concept of brand awareness. Brand awareness refers to the likelihood that a consumer will recall or recognize the brand (Keller, 2008; Huang & Sarigöllü, 2012). Brand awareness affects consumers’ decision-making process, as brands with higher awareness are more likely to be included in consumers’ consideration sets (Silk & Urban, 1978; Aaker, 1996; Baker, 2003; Macdonald & Sharp, 2000; Huang & Sarigöllü, 2012). Subjects choosing from a set of brands with marked differences in awareness show an overwhelming preference for the highest awareness brand (Macdonald & Sharp, 2000). Higher levels of brand awareness make the brand more central, which in turn improves the likelihood of keeping the brand in mind in a purchase situation (Erdem, Swait, & Valenzuela, 2006; Yasin et al., 2019). Thus, brand awareness is an essential first step in building consumer-based brand equity (Aaker 1991; Keller & Davey 2001; Rossiter & Percy 2017) and is one of the most important brand attributes (Aaker, 1991; De Chernatony & McDonald, 2003; Feldwick, 1996; Keller, 1993).

From an information processing perspective, brand awareness increases information accessibility and, since information familiarity is essential for judgment formation, this results in a more favorable assessment of the brand (Buchanan, Simmons & Bickart 1999; Simonin & Ruth, 1998). Consumers with brand awareness make initial decisions more quickly (Macdonald & Sharp, 2000). Empirical evidence confirms that brand awareness positively influences brand choice and market share (Lee, Hsieh, & Hsu, 2011) and increases customer acquisition, retention rates and profit margins (Sthal, Heitmann, Lehmann, & Neslin, 2012).

Three measures of brand awareness have become classical (Keller, 1993; Agarwal & Rao, 1996; Romaniuk et al. 2004; Sthal et al., 2012). When a consumer is cued with a product category, a brand has top-of-mind awareness (TOM) if the consumer cites it first; it has unaided

awareness if the consumer cites it spontaneously; it has aided awareness (recognition) if the consumer has to be prompted by the brand name or a logo or picture to recognize it. When cued by a product category, most consumers can cite spontaneously only a relatively small set of brands, typically around one or two according to Greenland, Ries and Trout (1972), but up to nine according to Lambert-Pandraud, Laurent, Mullet, and Yoon (2017). Aided awareness scores are higher than unaided awareness scores (Singh & Rothschild, 1983, Singh et al., 1988), but they may suffer from false positives and they indicate a weaker memory link (Laurent et al., 1995; Lambert-Pandraud et al., 2017) with the product category.

Unaided brand awareness is a well-established benchmark of brand memory strength, be it in the traditional hierarchy-of-effects model of advertising effectiveness (Palda 1966; Barry & Howard 1990) or in the low involvement hierarchy proposed by Ray, Sawyer, Rothschild, Roger and Reed (1973). However, unaided brand awareness is not a comprehensive index of a brand memory position, as it does not take into account the rank position of the other brands in the citation-list nor the length of the list, which indicates the number of co-cited brands.

Top-of-mind brand awareness (TOM) has captured researchers' attention due to the assumption that the first brand cited must occupy a favorable and presumably unique position in consumers' memories (Pelsmacker & Geuens, 1999). "Top-of-mind recall is considered to be the most important driver of brand equity in the awareness index" (Prasad & Dev, 2000, p. 27). The first brand cited might affect whether other brands are cited or not cited (Alba & Chattopadhyay, 1986). However, top-of mind awareness does not take into account the number of other brands co-cited in the citation-list.

According to Vigneron and Johnson, (2004) and Shukla (2012), the purchase of luxury brands implies considerable involvement due to their symbolic meaning and high self-engagement. Additionally, people make frequent initial searches on the Internet and this process generally begins with brands recalled spontaneously (Edelman 2010). Considering the high involvement and strong brand loyalty characteristics of luxury brands, as well as their growing online purchases, TOM and unaided awareness are better adapted than aided awareness. Following earlier research by Laurent, Kapferer, and Roussel (1995), our study uses TOM and unaided awareness, called for brevity "awareness" in the rest of the article. The first part of Table 1 offers a summary overview of the classical indices of brand awareness, TOM and brand salience.

### 2.2. Brand exclusiveness

We propose an indicator of a brand's memory position that is more discriminant than top-of-mind awareness. It relies on the concept of mono-citation. Being in the top-of-mind position is very beneficial for a brand, as stressed by the research stream reviewed above. However, the benefit is even higher if the brand is the only one recalled ("mono-citation"). To denote this situation, we develop the concept of brand exclusiveness, which builds on five closely related concepts, uniqueness, differentiation, inhibition, dominance, and salience as developed in the literature. Brand uniqueness (Aaker 1991, 1996, 2014; Kapferer & Bastien 2009, p. 316) refers to the absence of comparison. Brand differentiation (Zaichkowsky 2010) refers to the implicit association with the product category. Brand inhibition (Alba & Chattopadhyay 1986) occurs when an increase in salience of one brand inhibits the recall of other brands. Brand dominance (Aaker 1996) occurs when most consumers can name only one brand in a given category. Brand salience refers to high level of prominence in memory that makes the brand stand out from competitive brands in buying situation (Guido, 1998; Romaniuk & Sharp, 2004; Alba & Chattopadhyay, 1986, p. 363; Miniard, Unnava, & Bhatla, 1989).

Accordingly, most researchers implicitly tie the concept of brand salience to being the first mentioned brand or 'top-of-mind' brand (TOM). However, according to Romaniuk and Sharp (2004), brand salience reflects the quantity and quality of the network of memory

**Table 1**

Top panel: classical indicators of brand awareness. Bottom panel: new concepts of brand exclusiveness and brand dominance.

Concepts	Definition	Operationalization	Authors
<b>Review of concepts from the literature</b>			
<i>Aided awareness</i> confirms prior exposure to the brand.	Whether consumers recognize the brand as belonging to the category, when cued with the brand name or logo.	% of respondents recognizing the brand	Keller (1993)
<i>Unaided awareness</i> refers to the lowest salience of a brand in memory.	When consumers spontaneously recall the brand name as a member of the product category.	% of respondents citing spontaneously the brand in whatever rank.	Alba and Chattopadhyay (1986, p. 363) Laurent, Kapferer, and Roussel (1995)
<i>Top-of-mind Awareness</i> measures accessibility of the brand in memory.	Whether buyers recall the brand first, before any other brands in the same category, the product category being the only retrieval cue."	% of respondents citing the brand first, before any other brand(s) in the same category	Romaniuk and Sharp (2004, p. 328).
<i>Brand uniqueness</i> refers to one single brand recalled, implying no possible comparison	Only one brand is recalled, being unique is what counts, not any comparison with a competitor.	None	Aaker (1996) Kapferer and Bastien (2009, p. 316).
<i>Brand differentiation</i> refers to implicit association with the product category.	The brand becomes implicitly associated with the product category and spontaneously comes to mind alone.		Zaichkowsky (2010)
<i>Brand inhibition</i> one brand citation inhibits citation of other brands.	An increase in the salience of one brand inhibits the recall of other brands.		Alba and Chattopadhyay (1986, p. 363)
<i>Brand salience</i> refers to high prominence in memory	Whether a brand is more accessible in memory to the point of excluding competing brands		Alba and Chattopadhyay (1986); Romaniuk and Sharp (2004)
<i>Brand exclusivity</i> refers to providing a personal image that cannot be duplicated	Whether a brand satisfy consumers need for uniqueness in a way no other brands can achieve	Exclusivity items in the BLI scale and the CNFA scale.	Vigneron and Johnson (2004); Kapferer and Valette-Florence (2016); Ruvio et al. (2008); Shukla (2012); Shukla et al. (2022)
<i>Pairwise brand association</i> occurs when 2 brands are cited together	Proximity of brands in memory comes from congruence in content and meaning of the brands	% of co-citations	Keller (1993, 2003); Anderson and Bower (1980); Romaniuk (2006)

(continued on next page)

Table 1 (continued)

Concepts	Definition	Operationalization	Authors
<i>Corrected brand association</i> adjusts pairwise co-citations by each brand's awareness.	Co-citations are bounded by each brand's awareness and thus need adjustment	Ochiai index of association adjusts co-citation dividing them by the geometric mean of the two brand citation	Borrowed from plant ethology, Ochiai (1957); Tan, Kumar, and Srivasta (2002)
<b>Proposition of new concepts</b>			
<i>Brand memory exclusiveness</i> relates brand mono-citation to other brands' mono-citation	Share of mono-citations at the product category level	Percentage of a brand mono-citations over total number of mono-citation in the product category	Authors
<i>Brand pairwise dominance</i> informs co-citations with their asymmetrical dependent probability of co-citation.	Brand A dominates brand B when the conditional probability of citing brand A given the citation of B is higher than the reverse.	Brand A dominates brand B if $P(A/B) > P(B/A)$	

associations buyers hold about the brand. Brands that are more accessible tend to increase choice (Hauser & Wernerfelt, 1990) or reduce the probability of consumer defection (Romaniuk & Sharp, 2004). The salient brand has a higher chance of recall at the exclusion of competing brands (Alba & Chattopadhyay, 1986).

Brand exclusiveness in memory could relate to brand exclusivity, a psychosocial attribute of a brand seen as scarce and inaccessible (Catry, 2003; Cui, Mrad, & Hogg, 2018; Hudders, Pandelaere & Vyncke, 2013; Porto, 2018). It could also be envisioned as a memory-oriented consequence of a brand uniqueness value (Vigneron & Johnson, 2004; Kapferer & Laurent, 2016; Ruvio, Shoham, & Makovec Brenčić, 2008; Shukla, 2012; Shukla et al., 2022), derived from consumers' need for uniqueness.

Table 1 summarizes these five closely related definitions of brand exclusiveness, adding for completeness the closely related concept of brand exclusivity and need for uniqueness. We propose a measure of “brand exclusiveness” that taps simultaneously brand uniqueness, brand differentiation, brand inhibition, salience, and memory dominance. Brand exclusiveness is the percentage of mono-citations a brand receives among the mono-citations of all brands cited in the product category.

When a brand is cited first (TOM), this can either inhibit or prompt the citation of other brands. The case of inhibition (“mono-citation”) is very advantageous as it prevents the inclusion of other brands in the consideration set. In contrast, if the first citation prompts the citation of other brands, the TOM position is less favorable as one or more of those secondarily cited brands might integrate the consideration set. One could refer to the first case as brand isolation in memory and to the second case as brand complementarity in memory.

From a strategic viewpoint, the key feature of the concept of mono-citation is that it assesses a brand's position in consumer memory based on the other brand(s) in the citation-list. Consider a simple example, contrasting two cases in which, out of 1,000 consumers, brand A and brand B have 100 TOM citations each. In the first case, 80% of consumers who cite brand A in TOM also cite brand B, and 80% of consumers who cite brand B in TOM also cite brand A. Thus, the two brands will appear together in a large number of citation-lists. In the second case, all 100 TOM citations of brand A are mono-citations, and all 100 TOM citations of brand B are mono-citations. Thus, each of the two brands will benefit from being the single brand cited in a large number of citation-lists.

A brand having mostly mono-citations probably benefits from loyal customers. However, if those loyal customers are very few, the

small number of mono-citations suggests a niche positioning, but probably no clear brand success. Thus, the raw number of mono-citations a brand receives must be related to the number of mono-citations of other brands. We propose to measure exclusiveness by the share of mono-citations a brand gets among the mono-citations for all brands cited in a product category.

Table 1 lists these memory concepts in order of increasing stringency. Its top part summarizes the definition and operationalization of the classical indicators of awareness discussed above in the literature review; its bottom part defines the measures of brand exclusiveness and dominance in memory, discussed in the next section.

### 2.3. The citation pyramid

The classical analysis of citations distinguishes between TOM and non-TOM citations. Going one step further, we propose to divide TOM citations into mono-citations and non-mono-citations. This division permits a finer analysis of a brand's memory position. Climbing upwards the memory pyramid, we distinguish between three levels of brand salience, unaided awareness (non-TOM), TOM but not alone, and mono-citation. Consumers might not cite spontaneously a brand they would recognize when prompted. A brand cited spontaneously might not be cited first. A brand cited first might not be cited alone. A brand cited first and alone stands at the top of the memory pyramid. A brand that benefits from a large share of mono-citations is in an exclusive memory position.

Brand exclusiveness adds a stricter benchmark to the classical series of memory indices, by separating the TOM citations of a brand into those in which the brand is cited alone (mono-citation) and those in which the brand is cited first but not alone. It defines the uppermost ladder in the citation pyramid. It provides a “citation-list oriented” vision of a brand's position in consumer memory. Brand exclusiveness pinpoints brands most able to exclude other brands from consumer memory (hence the name exclusiveness) and which thus sit at the top of the citation pyramid as shown in Fig. 1a.

### 2.4. Brand associations in memory

According to Henderson et al. (1998), citing two brands together spontaneously suggests that there is an interrelated network of propositional nodes between them. Two brands that are strongly associated in consumer's memory are more likely to be co-cited. Within a product category, frequent co-citations reveal a network of brand connections linking brands perceived as similar (Romaniuk & Sharp, 2004). According to Keller (1993, 2003), the observed frequency of co-citations among pairs of brands is a logical measure to quantify the strength of their association.

However, on the measurement side, the number of co-citations is constrained between zero and the number of citations of the least cited brand. Thus, it needs adjusting to offset the inequality of the two brands' own citations. Let us compare two cases, each one with 20 co-citations out of 1,000 respondents as in Table 2a below.

In case one, brand A awareness is 12% (120 citations) and brand B awareness is 10% (100 citations) thus co-citations are bounded in the interval [0; 100]. In the second case, brand A awareness is unchanged but brand C awareness is lower, only 4% (40 citations) thus, co-citations are bounded in the interval [0; 40]. The 20 co-citations present in both cases denote a very different level of association. Thus, the number of co-citations alone is not a good index of association. The Ochiai index<sup>1</sup> takes into account the awareness of the two brands (Ochiai, 1957), by

<sup>1</sup> Originally, the Ochiai index distinguishes between plants that grow together from plants that rarely grow together. The analogy considers that some brands share common parcels of memory while some other do not. Other authors call this index “cosine association”. The centered Ochiai index is zero at independence.



**Table 2**  
Citation's crosstabs and pyramid's crosstabs.

Case 1	B cited	B not cited	Total	Case 2	C cited	C not cited	Total
A cited	20 (a)	100 (b)	120	A cited	20 (a)	100 (b)	120
A not cited	80 (c)	800 (d)	880	A not cited	20 (c)	860 (d)	880
Total	100	900	1000	Total	40	960	1000

**a:** Crosstabs with identical co-citations ( $a = 20$ ) but different association in memory (Case 1,  $Ochiai = 0.1828$ ; Case 2,  $Ochiai = 0.2887$ ) because C is less cited than B. In case one, the Delta domination index of A over B is  $1/30$  ( $20/100 - 20/120$ ) In case two, the Delta domination index of A over C increase to  $1/3$  ( $20/40 - 20/120$ )

**Brand D - Brand O cross tabulation**

		Brand O				
		Uncited	non-top	Top not-alone	Mono-citation	Total
Brand D	Uncited	11123	278	124	67	11592
	non-top	1396	11	4	0	1411
	Top not-alone	113	0	0	0	113
	Mono-citation	80	0	0	0	80
	Total	12712	289	128	67	13196

**Panel A** **Rho = - 0.298** Only 15 co-citations (grey area)

**b:** Pyramid's crosstabs with negative polychoric correlation illustrating memory isolation

**Brand D \* Brand F cross tabulation**

		Brand F			
		Uncited	non-top	Mono-citation	Total
Brand D	Uncited	11119	443	30	11592
	non-top	913	498	0	1411
	Top not-alone	88	25	0	113
	Mono-citation	80	0	0	80
	Total	12200	966	30	13196

**Panel B** **Rho = 0.567** 523 co-citations (grey area)

**c:** Pyramid's crosstabs with positive polychoric correlation illustrating memory complementarity

dividing the number of co-citations by the geometric mean of the two brands' citations. Let  $|A|$  and  $|B|$  be the number of citations of brand A and B. Let  $|A \cap B|$  be the number of co-citations, then the Ochiai index of association is  $|A \cap B| / (|A| * |B|)^{1/2}$ . Tan, Kumar & Srivasta, (2002) provide an alternative definition as the geometric mean of each brand

conditional probabilities. In case one of Table 2, the probability of citing A given that B is cited is 20% ( $P(A/B) = 20/100$ ). In case two, the probability of citing A given that C is cited is 50% ( $P(A/C) = 20/40$ ), pointing to a stronger relative memory position of A in case two, caused by a lower awareness of C relative to B.

The citation crosstab of two brands classifies respondents into four situations. (a), respondents co-citing the two brands; (b), respondents citing only the first brand; (c), respondents citing only the second brand and (d), respondent citing neither brands. Referring to these four crosstabs frequency as a, b, c, d, the Ochiai association index is:

$$Ochiai = a / [(a + b) * (a + c)]^{1/2}$$

In the above example of Table 2, Ochiai (A, B) = 0.18 and Ochiai (A, C) = 0.29, correctly increasing when the second brand awareness decrease. The Ochiai index varies from zero in the absence of co-citation to one when  $|A \cap B| = |A| = |B|$ . In this case, all respondents citing brand A also cite brand B and thus all citations are co-citations (e.g.,  $b + c = 0$ ).

Past research concentrated on co-citations crosstabs. Future research could cross brand memory pyramids to obtain a better estimate of the level of association in memory. Tables 2b and 2c show the two extreme cases of isolation in memory and complementarity in memory found in our data.

### 2.5. Pairwise brand dominance

The literature often envisions the association between brand pairs as being symmetric, neglecting the memory “dominance” of one brand over the other. Memory dominance among pairs of brands differs from the concept of category dominance (Herr, Farquhar & Fazio, 1996), which reflects the extent to which “a product category (athletic shoe) evokes the subordinate brand (Nike).” Farquhar et al. (1990) showed that strong category dominance results in the brand being named earlier, recalled more frequently, classified faster and recognized sooner. The concept of category dominance deals with the relation between a product category and a brand’s salience in memory. However, it does not focus on the relative dominance among pairs of brands in memory resulting from the length and composition of citation-lists, which is the basis of our definition of pairwise brand dominance. Brand A dominates brand B in memory when citing brand B leads many respondents to cite brand A, while citing brand A leads few respondents to cite brand B.

We formally define brand A as dominating brand B if the proportion of respondents citing A among those citing B, i.e., the conditional probability  $P(A/B)$ , is larger than the proportion of respondents citing B among those citing A, i.e., the conditional probability  $P(B/A)$ . In other words, if a respondent cites B then the probability of citing also A is higher than the reverse. We quantify the strength of the dominance of A over B by:

$$\Delta = P(A/B) - P(B/A)$$

### 3. Application to luxury watch brands

To illustrate the insights gained by our new indicators, this article analyzes data relative to luxury brands. How to define luxury has been heavily debated in the literature (Han, Nunes, & Drèze, 2010; Gurzki & Woisetschlager, 2017; Roux, Tafani, & Vigneron, 2017). Cristini, Kauppinen-Räsänen, Barthod-Prothade, and Woodside (2017) note that the perception of luxury fluctuates due to the changing aspects of economic markets. One can contrast two perspectives on how to define luxury, one objective and one subjective.

The first perspective defines a luxury brand by an enumeration of characteristics. For example, several authors (Roux et al., 2017; Vigneron & Johnson, 2004; Wiedmann, Hennigs, & Siebels, 2009) distinguish between non-personal appeals (conspicuousness, uniqueness, and quality) and personal appeals (hedonism and extended-self). Similarly, Amatulli, Guido and Natarajan (2015) combine the status facets of luxury (ostentation, materialism, and superfluosity) with the style facets (individual lifestyle, hedonism, and culture). Wiedmann et al. (2009) distinguish between individual, social, functional, and financial values, whereas Roux et al. (2017) proposes refinement, heritage, exclusivity and elitism. Gurzki and Woisetschlager (2017) note

that authenticity (e.g., heritage, history) and exclusivity (e.g., rarity, uniqueness) represent the two core facets of luxury branding.

In the second perspective, (Eckhardt, Belk, & Wilson, 2015; Silverstein & Fiske, 2003; Kapferer & Bastien, 2009; Kapferer & Laurent, 2016; Kapferer & Valette-Florence, 2021; Paul, 2015, 2019, 2020), each consumer defines luxury subjectively. The process of luxury democratization has transformed luxury brand consumption into an important medium of self-expression (Chandon, Laurent, & Valette-Florence, 2016). Luxury brands, by virtue of their diverse symbolic value associations, allow consumers to express positive aspects of their self-concepts (Wilcox et al., 2009). Luxury concerns potentially everyone as noted by Dubois and Laurent (1996) who introduced the concept of “luxury excursionist,” the occasional consumers of luxury products. Kapferer (2021) asserts, “Luxury potentially concerns everyone. It is both an assessment of oneself (I am able to afford luxury) and a means of transporting oneself to another world. The old luxury reserved for the ultra-rich is evolving into plural luxuries, potentially accessible to all through rental and second-hand purchase.” New luxury is no longer very exclusive, unreachable, or inaccessible and new forms of luxury business have evolved, e.g. renting luxury or buying second hand luxury items (Kessous & Valette-Florence, 2019). The two perspectives are not exclusive but, in this research, we use the subjective definition of luxury.

### 4. Methodology

We apply our method to luxury watches. We chose luxury watches because they are archetypes of global brands and because they use the same name in every country to gain economy of scale and reach high-income consumers becoming more and more similar in their aspiration to conspicuous consumption. According to Statista (2019), watches account for 12% of the personal luxury sector, reaching estimated sales of 7.2 billion dollars in 2019. The leading importing countries are Hong Kong, China, USA, Switzerland and Japan. The leading exporting countries are Switzerland, Hong Kong, China, France and Germany. A few brand leaders, Rolex, Omega, Cartier, Patek, Longines and Audemars-Piguet reach market shares above 4% and dominate the sector of luxury watches. Luxury watches provide an interesting context to study associative memory networks because they comprise mainly mono-category brands with the notable exceptions of Seiko, Gucci, Casio, Armani, Hermès and Dior.

The 2018–2019 IPSOS luxury watch survey covers five countries in 2018 (Japan, China, Hong Kong, South Korea, and Russia) and seven countries in 2019 (United Kingdom, France, Italy, Spain, Germany, USA and China19) with sample sizes around 1,000 in all countries, except 1,600 in the USA, Japan, China18 and China19, totalizing 13,196 respondents. It is a self-administered online questionnaire answered by the TOP 20 Income in the IPSOS IIS panel. Appendix A displays the sample distribution by country according to gender, age and income, the questionnaire and the distribution of the number of brand cited.

The questionnaire starts with background information (country, gender, age, income, travel abroad and frequency of luxury buying), preceding the unaided brand awareness question “What are the 5 luxury brands of watches that first come to mind?” Beside the 175 true watch brands<sup>2</sup> cited by respondents, the survey registers also non-responses and gather, in the “other” category, names that are not true watch brands.

### 5. Results

We describe successively four groups of results, regarding the measurement of exclusiveness, its validity, classical maps of brand

<sup>2</sup> To compare awareness, top-of-mind and exclusiveness at the five percent risk level, with a power of 80%, we analyze the 22 brands with citation level above 2%.

associations, and our new combined map of brand associations and dominance.

5.1. Exclusiveness: Measurement

Only 259 respondents could not cite any brand. 5,787 respondents cited only one brand. The rate of mono-citations varies among countries going from a maximum of 59% in Japan to a minimum of 34% in China. The average number of brands cited is 2.47, the median is two brands, and the mode is one brand (mono-citation)<sup>3</sup>. Brand lists with non-identical content (in terms of brands cited or order of citation) represent 35.2% of all lists. The first three most cited lists are mono-citation-lists (Brand A 18.2%; Brand B 2 %; Brand C 1.4%). The first list comprising only two brands represents only 0.9% of all citation-lists.

Plotting the memory pyramid for all brands would be cumbersome. Instead, we use a biplot (Greenacre, 2010). Biplot are exploratory graphs that generalize simple scatter plot to many variables. Fig. 1b displays the biplot of the direction of the 22 most cited brands in the memory pyramid space (mono-citation, TOM not alone, and non-TOM)<sup>4</sup>. Brand A leads strongly in exclusiveness, followed far behind by brand B and brand C. The first three columns of appendix A display the citation counts of the 22 most cited luxury watch brands (cited alone, cited first but not alone and not cited first)<sup>5</sup>. Brands are ordered according to the total number of citations in column four. Columns five and six show awareness and top-of-mind in percentage of the total sample. The last column gives the brand exclusiveness index as the percentage of the brand’s mono-citations over the 5,787 mono-citations observed in the sample.

The last line at the bottom of appendix A gives the summary citation distribution according to the three ladders of the memory pyramid and the coefficient of variation of the three memory indices. The exclusiveness index reveals the brands sitting at the top of the memory pyramid.

5.2. Exclusiveness: Validity analyses

As for any new concept, even outside the realm of multi-item scales, the convergent, discriminant and predictive validity of brand exclusiveness need an assessment. Looking first at convergent validity, the mono-citation indicator is a refinement over top-of-mind. Mono-citations distinguish among top-of-mind citations those that are free from concurrent citations. Then, exclusiveness results from norming mono-citations by their interval of variation (namely, dividing a brand’s mono-citations by the total number of mono-citations for all brands). This definition establishes the theoretical connection of exclusiveness with top-of-mind and awareness as defined in Table 1 and exemplified in appendix A. Next, the high and significant correlation of exclusiveness with awareness, (0.956; p < 0.01) and top-of-mind (0.874; p < 0.01) establishes convergent validity. Using exploratory factor analysis, the first latent variable extracts 99.6% of total variance of the three-memory indices (awareness, top-of-mind, and exclusiveness), establishing their unidimensionality. These analyses require linearity. However, the relations between the three indices are far from being linear. Instead, they follow a highly nonlinear format. A brand with high awareness enjoys a disproportionately higher exclusiveness than a brand with low awareness. It is necessary to use a Rasch model with a double logit transformation of both awareness and exclusiveness, following Laurent, Kapferer and Roussel (1995), to achieve linearity in the relation between awareness and exclusiveness. Regressing the logit of exclusiveness on

the logit of awareness one obtains.

Logit (exclusiveness) = -1.256 + 1.282 * Logit (awareness) R <sup>2</sup> = 0.750		
t value	(-2.587)	F = 60.086
	(7.751)	
p value	(0.018)	(0.0001)

As expected, the regression coefficient of the logit transformation of awareness is close to one. This coefficient and the good fit of the regression demonstrate the near proportionality of the logit transformation of exclusiveness to the logit transformation of awareness across brands. Going back to the original scale, this translates into a quickly decreasing exclusiveness as awareness declines<sup>6</sup>.

Looking at discriminant validity, the 5% confidence interval around the correlation between exclusiveness and awareness is [0.901; 0.977] while it is [0.752; 0.939] for the correlation between exclusiveness and top-of-mind. In both cases, the confidence interval does not include a perfect correlation, thus pleading in favor of distinct concepts (Bagozzi et al., 1991; Fornell and Larcker, 1981). After linearization, the correlation between the logit transformation of exclusiveness and the logit transformation of awareness decreases to 0.806 with a confidence interval going from 0.613 to 0.908, a result more in favor of discriminant validity. In line with the HTMT method (Nunally, 1978; Henseler et al. 2015), we explored the correlation of brand exclusiveness with an a priori unrelated variable such as luxury excursionism (I treat myself from time to time or very occasionally). This correlation (-0.03) is very close to zero, thus in favor of discriminant validity.

We assess predictive validity through various market performance indicators. The first one is the number of Google queries using the brand name<sup>7</sup>. To query information about a brand, that brand must be salient in memory, thus the correlation of brand exclusiveness and google query should be high. Other performance indicators are estimates of brand familiarity in the US, Swiss watch values, most valuable Swiss watch, Interbrand ranking<sup>8</sup>, US market share and US sales<sup>9</sup>. These data, retrieved from various websites, are only estimates with some missing values. Brand exclusiveness correlates significantly with Google’s queries (0.892; p < 0.01), US familiarity (0.742; p < 0.01), Swiss watch values (0.826; p < 0.01), most valuable Swiss watch indices (0.851; p < 0.01), Inter brand ranking (-0.534; p < 0.03), market share (0.597; p < 0.02) and US sales (0.953; p < 0.001). These results show evidence for the predictive validity of brand exclusiveness for a variety of brand market-performance indices.

Adding brand exclusiveness to the classical memory indices permits a more complete and better discriminating assessment of a brand’s memory position. In the luxury watch sector, the leader is way above competition in all levels of the memory pyramid. First, it is the most exclusive brands by capturing 43.6% of all mono-citations. Second, mono-citations make up 31.5% of all his citations. The two closest followers catch only 9.8% and 8% of all mono-citations but with different citation pyramids. The second follower gets 71.2% of its citations in the “non-top” lowest level while the third follower gets 60.5% of its citations in the middle “Top but not-alone” level. This example suggests that the third follower’s communication strategy should aim to convert its top-of-mind respondents toward exclusiveness while the second follower should work to move its non-top base toward the top-of-mind level.

Exclusiveness scores discriminate better across brands than TOM scores or awareness scores do. We compute the coefficient of variation of each index (printed in the rightmost part of the last line in appendix A). The coefficient of variation is a classical measure of variations in values, obtained by dividing the standard deviation by the mean. We see that

<sup>3</sup> The distribution of the number of brands cited is in the appendix C.  
<sup>4</sup> Please see detailed numerical results in appendix A.  
<sup>5</sup> Please note that citations in the first four columns are absolute numbers while the last three columns are percentages.

<sup>6</sup> Regression plots are available from the first author  
<sup>7</sup> Using Google trends: <https://trends.google.com/trends/>  
<sup>8</sup> <https://www.forbes.com/the-worlds-most-valuable-brands/>  
<sup>9</sup> <https://journal.hautehorlogerie.org/en/mega-brands-drive-the-watch-making-market/>

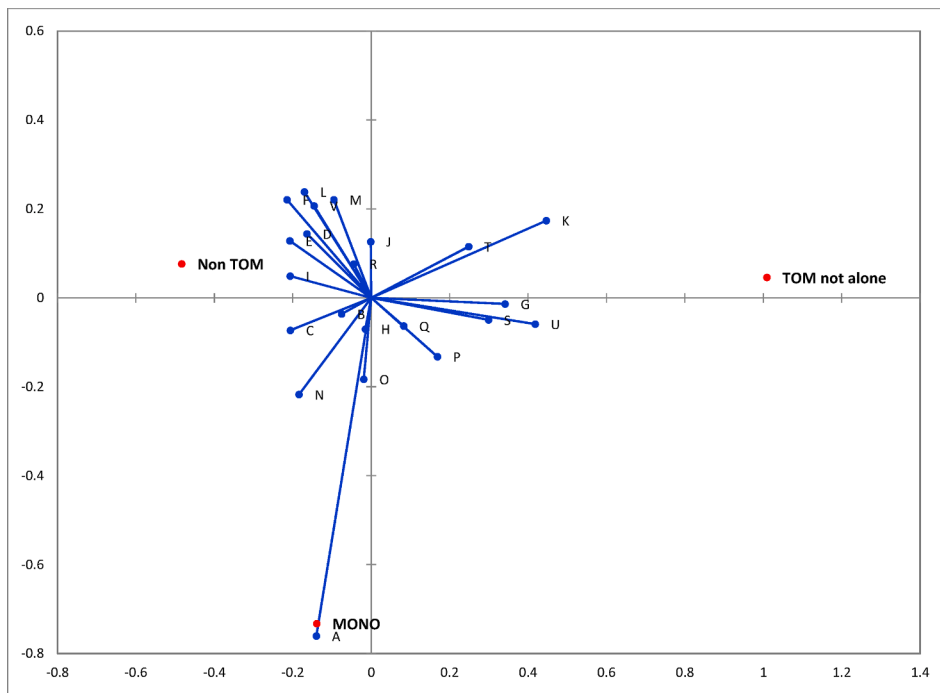


Fig. 1b. Biplot of 22 most cited luxury watch in the memory pyramid space.

there are stronger variations in exclusiveness (3.11) than in TOM (1.51) or awareness (1.45). Thus, exclusiveness distinguishes better between brands with closely related awareness or top-of mind scores. For example, looking at the brands ranked sixth and seventh, they get close awareness of respectively 7.5% and 7% but the first one captures only 0.5% of mono-citations while the second one captures 1.1%. The seventh brand is clearly ahead in exclusiveness while just behind in total citations. Consequently, the seventh brand should orient its communication mix toward increasing awareness while the sixth brand should change the message content to increase exclusiveness. We extended the comparison to the 23 respondent segments defined by gender (two segments), age (six segments), income (three segments) and country (12 segments), as shown in appendix B. In all segments, the coefficient of variation is higher for mono-citations than for top-of-mind citations.

Except for the strong brand leader which dominates the luxury watch market, the ranking of secondary brands based on mono-citations differs from the ranking based on TOM, for all consumer segments. Brands achieving good rankings in mono-citation are not necessarily the same or in the same order as brands achieving the highest TOM citations. Altogether, appendices A and B demonstrate that brand exclusiveness has discriminant validity over awareness and top-of mind.

Previous luxury research demonstrated the effect of gender, age and country on brand equity and brand prestige (Aiello, Donvito, & Pederzoli, 2009; Amatulli, Guido, & Natarajan, 2015; Dubois, Czellar, & Laurent, 2005; Yasin et al., 2019; Pappu, Quester, & Cooksey, 2007; Roth, Diamantopoulos, & Montesinos, 2008). Thus, it is reasonable to expect a significant effect of a respondent’s demographic profile on the memory pyramid. Appendix B shows that gender, age, country and income significantly affect mono-citations and top-of-mind (all Chi square test reject independence at the 1% risk level). Country has the strongest effect (Cramer = 0.202) on mono-citation and top-of-mind, followed by gender (Cramer = 0.129 and 0.181) and age (Cramer = 0.107 and 0.119). The effect of income is surprisingly lower (Cramer = 0.095 and 0.072) but one must keep in mind that respondents in our sample have been selected among the top 20% income bracket in their respective countries. These results demonstrate a significant effect of demographic factors on mono-citations and top-of-mind. This adds another element in

favor of the convergent validity and discriminant validity of mono-citations.

Analyzing data by country offers another test of convergent validity. Godey et al. (2012) found significant effects of the country of origin and the country of manufacture on the purchase of luxury products. Thus, we expect that respondents from the country of origin of the luxury brand will deliver significantly higher awareness, top-of-mind, and mono-citations for their own-country brands than respondents from other countries. There is a positive own-country effect for three brands: brand C, brand V, and brand N that have a long anteriority on their country of origin. In all seven own-country tests, the results for mono-citations are similar to results for awareness and top-of-mind.

### 5.3. Classical maps of brand associations

In a classical approach, one would first compute the Ochiai index of association between all pairs of brands, then create a multidimensional scaling map of brand associations in memory on the basis of these Ochiai indices of association. This could be done, for example, using PROXSCAL.

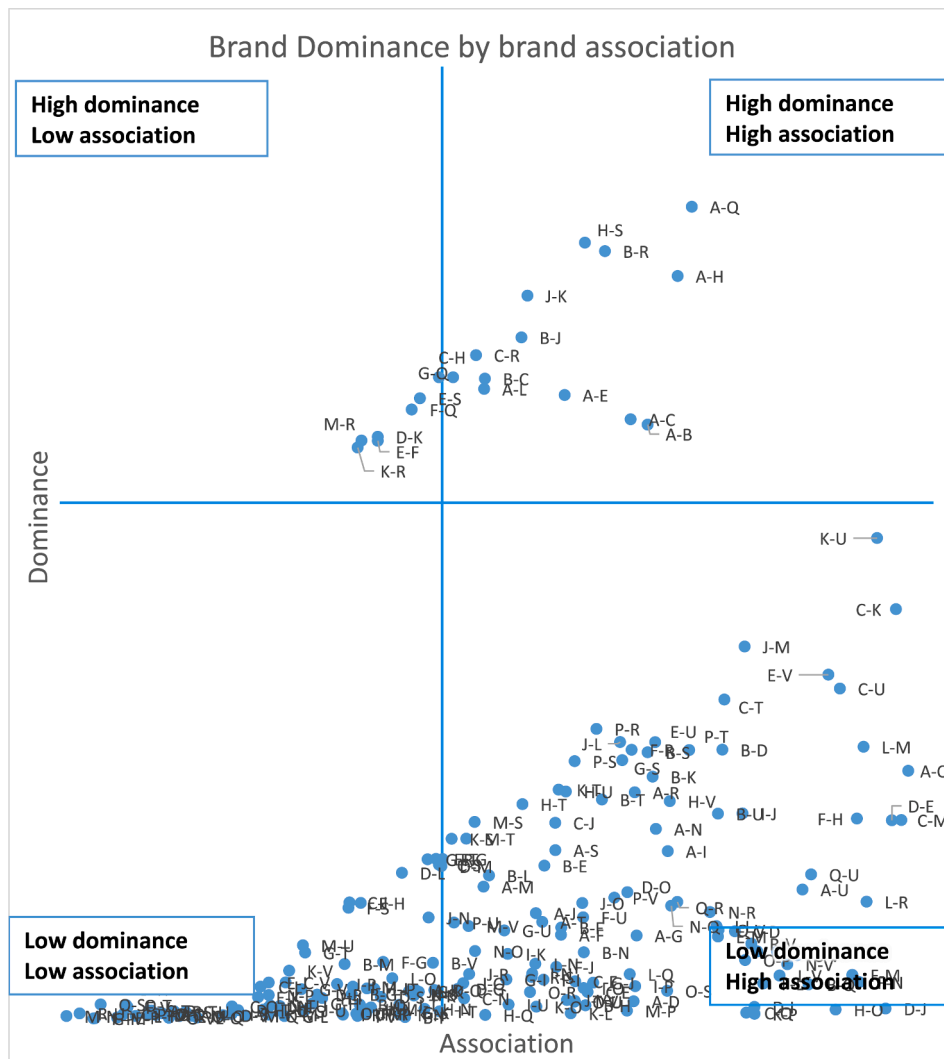
However, such a classical map would have a strong drawback. When two brands are significantly associated in memory, they will appear as close on the map, but this closeness would not inform us whether one brand dominates the other. In the following section, we introduce a new asymmetric map based on pairwise brands domination.

### 5.4. Combined map of brand associations and dominance

Looking at the 231 brand pairs, the first brand being dominant, we classify asymmetric domination using two indices. The first one, delta, measures the strength of dominance. The second one, the Ochiai similarity index, distinguishes pairs of brand with a high association (complementarity) from pair of brand with a low association (isolation).

In Fig. 2, we present a combined map of dominance and association that summarizes the strategic positions of brands in memory. Each point in the map refers to a pair of brands. In the top-left quadrant, there is high dominance and low association, a very rare instance for luxury





Legend: The horizontal blue line separates high from low dominance  
 The vertical blue line separate low association (left) from high association (right)  
 In each pair, the first brand dominates the second brand

Fig. 2. Dominance-association map for luxury watch brands.

watches. This is a situation of “Distant supremacy.” The first brand in the pair enjoys a high dominance but the two brands appear rarely in the same memory list. In the top-right quadrant, we have a situation of “Clear supremacy” characterized by a high dominance of the first brand and a high association with the second brand. The brand leader falls in this quadrant six times. The six dominated brands (B, C, E, H, L, Q) endure a situation of high complementary and high leader dominance in memory. Four secondary brands (B, C, H, J) enjoy in turn dominance over weaker brands. In the bottom-right quadrant, we see many brands in a situation of “Balanced competition.” These pairs of brand are highly associated in consumer memory but none of these brands dominates strongly the other. In the bottom-left quadrant, there is a situation of “Distant ignorance.” These pairs of brands do not compete in the same arena. There is low dominance associated with low association.

Traditional maps based only on the degree of association between brands fail to integrate memory dominance. The new map offers a more encompassing picture of the strategic situation of the brands. For managers, it is not sufficient to diagnose which competitive brands are closely associated with their own brand. They need to know whether their brand dominates the other brands, or is dominated by them, or whether the competition is balanced. Similar maps by country, gender

or age groups procure clear local views of the battle for memory dominance in consumer mind.

### 6. Discussion

As Walter Landor once said, “Products are produced in the factory, but brands are produced in the minds of the consumer” (cited by Zaichkowsky 2010, p. 549). The present study offers two main conceptual and methodological innovations to evaluate a brand position in consumer memory. We extend the research tradition initiated by Laurent et al. (1995) and developed by Romaniuk et al. (2004); Romaniuk and Sharp (2004); Romaniuk (2006); Romaniuk, Wight, & Faulkner (2017) by developing the memory pyramid concept and its corollary, the index of brand memory exclusiveness.

A brand cited alone more than another brand exhibits higher memory exclusiveness. Brands that benefit from a high share of monocations achieve desirable brand uniqueness as underlined by Aaker (1996) and Kapferer & Bastien (2009). They obtain high differentiation according to Zaichkowsky (2010). They enjoy insulation from other brands as developed by Alba and Chattopadhyay (1986). They gain a better accessibility in memory as underlined by Romaniuk and Sharp

(2004). Brand exclusiveness in memory provides an indicator of the brand's ability to be cited more exclusively than its competitors. Exclusiveness is the most stringent indicator of a brand's position in consumer memory.

Achieving more mono-citations than one's competitors is not the same as having the highest awareness or the best top-of-mind. We illustrate how the ranking of brands in terms of exclusiveness differs from brand rankings in terms of top-of-mind, both globally and across genders, age groups, income and countries. We observe higher exclusiveness scores for some brands in the country where they originated. These results extend to the memory pyramid results showing that country of origin significantly influences brand equity (Yasin et al., 2019; Pappu, Quester, & Cooksey, 2007; Roth et al., 2008) and contributes to prestige (Kumar & Paul, 2018).

### 6.1. Managerial implications

Brand equity is the added value consumers attach to a brand they know over unknown brands (Aaker, 1991, 1996, 1996; Keller, 1993). Brand awareness is the essential first step in building customer-based brand equity (Keller & Lehmann, 2003a, 2003b). Thus, brand managers regularly monitor brand recognition, unaided brand awareness and top-of-mind. Unaided awareness and top-of-mind are necessary first steps. But, in the luxury sector, consumers look for exclusive symbolic values to express their self-worth (Hudders et al., 2013; Kapferer & Bastien, 2009; Kapferer & Valette-Florence, 2018; Gurzki & Woisetschlager, 2017), thus "being the only brand recalled is what counts." To benchmark this goal, we offer three complementary memory assessments, brand exclusiveness, a better brand association index and brand dominance over co-cited brand. These measures provide an extended diagnostic of the brand position in the memory pyramid as exemplified in Fig. 1a, 1b and 2 for the luxury watch market.

Brand exclusiveness is the best memory position for a luxury brand because it provides uniqueness, differentiation and insulation from competition. A successful luxury brand is something extremely rare, something special, something completely different, and something that stands apart from other brands. A consumer develops an intimate, personal, emotional relation to a luxury brand. Whether one speaks of brand uniqueness (Kapferer & Bastien, 2009), or brand differentiation (Zaichkowsky, 2010) or brand inhibition (Alba & Chattopadhyay, 1986), the common feature is a brand that stands alone in the consumer mind. It is not the first one, it is the only one. In that sense, the index of exclusiveness is in line with the essence of luxury. A brand that benefits from exclusiveness is apart from all others, whereas a top-of-mind brand that is not mono-cited is in memory competition with co-cited brands, even if cited first.

Dominance is also consistent with consumers' relationship to luxury. If brand A dominates brand B, most associations of B with luxury lead consumers to also associate A with luxury. In contrast, associations of A with luxury will seldom lead consumers to also associate B with luxury. In other terms, the indicator of dominance assesses the relative status of A and B as luxury brands. Managers study brand image in terms of association with user profiles, purchase and usage situations, personality, values, history and heritage, but the simple list of co-cited brand brings in precious information on all these aspects without asking. The somewhat overlooked richness of citation-lists need reassessment.

Combining indices of dominance with indices of association between brand pairs, we develop a competitive memory map. This map reveals the opposition of high versus low association and high versus low dominance. For each brand pair, the map indicates if the focus brand is associated or not with other brands in consumer's memory, and whether one brand dominates the other. This research provides managers a blueprint to develop multi-country investigations of luxury brand awareness, focusing the attention on citation-lists to investigate the

inner composition of awareness scores and the resulting memory pyramid.

### 6.2. Limits and avenues for further research

Some important questions need more research. What are the psychological and behavioral characteristics of mono-citers? To what extent do brand mono-citers attribute more exclusivity (in the sense of, e.g., Hudders et al. 2013) to that brand than to other brands? To what extent do brand mono-citers hold a more favorable attitude toward that brand? Are mono-citers more loyal to that brand and more inclined to recommend it? Answering these questions have important consequences for brand management and justify further investigations.

The analysis of chains of brands linked by a path of significant dominance relationships needs further studies to uncover the effect of anteriority on the market or the role of brand values. Applying the indices of exclusiveness and dominance to other luxury product categories and to other countries is necessary to enhance generalizability. Including diverse luxury product categories would help benchmarking product-specific levels of exclusiveness and dominance. In addition, further segmentation analyses could use consumer values to consolidate the managerial relevance of exclusiveness and dominance. Further studies could analyze multiple product categories simultaneously to explore the link between the exclusiveness and dominance indices with the concepts of brand typicality, brand love, brand preference, and brand financial performances. Following Paul (2015), Kumar and Paul (2018) and Paul (2019), brand exclusiveness and brand dominance could help compare memory performance of luxury brands following a "Masstige" strategy against luxury brands following a classical prestige and rarity strategy.

The indices of brand exclusiveness and dominance are new tools offered to managers of luxury brands to monitor their brand memory position across luxury segments and countries. They provide new, more stringent benchmarks, to assess their brand competitive position in consumer memory. Further research shall consolidate the link between brand exclusiveness and brand equity and market performance. Brand benefiting from higher exclusiveness and higher dominance should enjoy a better reception of the brand story, a more focused identity, a better penetration of the consideration set, less cannibalism from offspring brands, more resilience to competitive move and a better ability to penetrate other product categories. We need more case studies, as in Cavender and Kincade (2014), to assess a potential path to leadership as the brand develops through time. A path moving from low awareness, low exclusiveness and low association to the product category, to better association with the product and leader brands, to finally achieve success with highest exclusiveness, highest dominance and maximum association.

Following Mostafa & Arnaout (2020) and Jack (2009), there seems to be no limit to the price buyers are willing to pay when they feel that the brand is highly exclusive and dominates other luxury brands.

### CRedit authorship contribution statement

**Jean-Louis Chandon:** Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Methodology. **Gilles Laurent:** Review and editing. **Raphaëlle Lambert-Pandraud:** Review and editing.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Brands	Memory pyramid			Citation	Unaided Awareness* (%)	TOM* (%)	Exclusiveness (%)**
	Mono-citations	TOM but Not Alone	Non TOM				
A	2526	358	5132	8016	60.70%	21.90%	43.60%
B	232	449	1684	2365	17.90%	5.20%	4.00%
C	179	1357	708	2244	17.00%	11.60%	3.10%
D	80	113	1411	1604	12.20%	1.50%	1.40%
E	75	6	1236	1317	10.00%	0.60%	1.30%
F	30	0	966	996	7.50%	0.20%	0.50%
G	63	751	111	925	7.00%	6.20%	1.10%
H	90	239	531	860	6.50%	2.50%	1.60%
I	62	0	710	772	5.90%	0.50%	1.10%
J	30	203	419	652	4.90%	1.80%	0.50%
K	4	566	7	577	4.40%	4.30%	0.10%
L	12	36	487	535	4.10%	0.40%	0.20%
M	12	91	409	512	3.90%	0.80%	0.20%
N	80	8	420	508	3.80%	0.70%	1.40%
O	67	128	290	485	3.70%	1.50%	1.20%
P	54	262	163	479	3.60%	2.40%	0.90%
Q	44	192	217	453	3.40%	1.80%	0.80%
R	26	100	285	411	3.10%	1.00%	0.40%
S	32	295	68	395	3.00%	2.50%	0.60%
T	12	232	96	340	2.60%	1.80%	0.20%
U	23	275	0	298	2.30%	2.30%	0.40%
V	8	27	229	264	2.00%	0.30%	0.10%
Summary	Citation pyramid			25,008	Variation coefficient		
22 first brands	3741	5688	15,861		1.45	1.51	3.11

Detailed values of seven indicators for each of the 22 top brands of luxury watches.

\*Percentages computed over the weighted sample of 13,196 respondents.

\*\*Percentages computed over the total number of mono-citations 5,787.

Appendix B

Socio-demo	Mono-citation*					Top-of-mind citations*				
	1st	2nd	3rd	4th	CV	1st	2nd	3rd	4th	CV
<b>Gender association with Mono-citation (<math>X^2 = 62.1</math>; Cramer = 0.129) and Top-of-mind (<math>X^2 = 308.2</math>; Cramer = 0.181)</b>										
Male	A	B	C	N	3.18	A	C	G	B	1.53
Female	A	C	B	H	3.03	A	C	B	G	1.53
<b>Age association with Mono-citations (<math>X^2 = 213.3</math>; Cramer = 0.107) and Top-of-mind (<math>X^2 = 672.8</math>; Cramer = 0.119)</b>										
18–24	A	P	O	B	3.12	A	C	K	P	1.47
25–34	A	B	C	D	3.09	A	C	K	B	1.48
35–44	A	B	C	E	2.94	A	C	B	G	1.43
45–54	A	B	C	E	3.24	A	C	G	B	1.59
55–59	A	C	B	N	3.20	A	C	G	B	1.74
60+	A	G	N	C	3.28	A	G	C	B	1.57
<b>Income association with Mono-citation (<math>X^2 = 67.57</math>; Cramer = 0.095) and Top-of-mind (<math>X^2 = 97.34</math>; Cramer = 0.072)</b>										
High income	A	B	C	H	3.03	A	C	G	B	1.49
Very High	A	B	C	D	3.17	A	C	G	B	1.55
HNWI	A	B	C	E	3.16	A	C	G	B	1.48
<b>Country association with Mono-citations (<math>X^2 = 1687.8</math>; Cramer = 0.202) and Top-of-mind (<math>X^2 = 4321.4</math>; Cramer = 0.202)</b>										
UK	A	E	B	C	3.60	A	G	C	B	1.77
Russia	A	D	B	I	2.63	A	C	T	B	1.27
Japan	A	B	N	C	2.22	A	B	S	C	1.42
China18	A	M	B	C	2.10	C	A	H	K	1.23
China19	A	B	H	F	2.18	C	A	K	H	1.20
Hong Kong	A	C	B	N	3.86	A	C	K	J	1.96
South Korea	A	B	O	C	2.79	A	C	B	U	1.37
US	A	B	O	E	4.00	A	C	G	B	2.55
France	A	C	G	I	3.17	A	C	G	K	1.78
Italy	A	C	D	O	3.78	A	C	G	K	1.78
Spain	A	C	B	I	3.11	A	C	B	G	1.68
Germany	A	G	C	E	3.36	A	G	C	B	2.24

Mono-citation ranking versus Top-of-mind ranking across 23 Segments.

\* First four brands displayed for brevity.

$X^2$  = All Chi square tests reject independence (1% risk level) between socio demo and citations.

**Cramer** measures associations between brands and respondent sociodemographic.  
**CV** = Coefficient of variation measures discrimination among the 22 brands.

**Appendix C**

Sample size composition

Country	Male	Female	18-24	25-34	35-44	45-54	55-59	60+	High Income	Very High Income	Uppermost Income
UK	54.7%	45.3%	1.5%	28.7%	23.8%	19.8%	19.4%	6.9%	33.5%	33.0%	33.6%
Russia	50.0%	50.0%	6.7%	37.1%	26.2%	23.7%	5.7%	0.6%	40.0%	27.5%	32.5%
Japan	50.0%	50.0%	7.9%	12.1%	20.2%	25.0%	22.4%	12.4%	40.0%	30.0%	30.0%
China18	50.0%	50.0%	9.5%	43.5%	34.0%	11.2%	1.7%	0.1%	50.0%	30.0%	20.0%
China19	50.0%	50.0%	9.5%	43.5%	34.0%	11.2%	1.5%	0.3%	50.0%	30.0%	20.0%
Hong Kong	50.0%	50.0%	7.9%	36.3%	32.9%	16.1%	6.2%	0.5%	0.0%	60.0%	40.0%
South Korea	50.0%	50.0%	9.1%	34.5%	31.4%	18.5%	5.8%	0.7%	20.0%	40.0%	40.0%
US	51.2%	48.8%	10.1%	15.6%	19.2%	23.1%	26.6%	5.4%	40.3%	33.3%	26.5%
France	61.8%	38.2%	12.2%	15.4%	20.7%	25.3%	17.8%	8.7%	42.6%	47.4%	10.0%
Italy	53.6%	46.4%	7.4%	10.8%	17.5%	17.7%	38.9%	7.8%	35.7%	28.3%	36.0%
Spain	58.3%	41.7%	6.2%	14.3%	19.4%	19.2%	35.1%	5.9%	38.6%	25.2%	36.2%
Germany	63.8%	36.2%	8.9%	14.0%	19.0%	23.4%	28.4%	6.3%	46.1%	23.2%	30.7%
Total	53.3%	46.7%	8.2%	25.8%	25.0%	19.3%	17.2%	4.5%	37.2%	33.8%	29.0%
N	7040	6156	1086	3411	3301	2548	2264	591	4907	4457	3883

Questionnaire

Question	Categories
In what country do you live?	UK, Russia, Japan, China18, China19, Hong Kong, South Korea, France, Italy, Spain, Germany
Are you...	A man, a woman
What is your date of birth?	Year
What is your annual income before taxes?	The three upper income level depending on the country
Have you ever traveled abroad?	Yes (past 12 month, between 12 month and 2 years, not within past 2 years), No (but I intend to), (No, I don't intend to)
For you, luxury products are	(Part of my day life, treat myself from time to time, very occasional, can't afford them, do not interest me)
What are the 5 luxury brands of watches that first come to mind?	Open ended format, record the citation-list in the order of citation

Citation distribution

# Brand cited	Frequency	Percent
0	259	2.0%
1	5787	43.9%
2	1744	13.2%
3	1258	9.5%
4	1255	9.5%
5	2893	21.9%
Total	13,196	100.0%

Mean	2.47
Median	2
Mode	1
Skweness	0.491
Kurtosis	-1.37

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