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Assessing Brand Image through Communalitites and Asymmetries in Brand-to-Attribute and Attribute-to-Brand Associations.

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Abstract

Brand image is a key component of customer-based brand equity, and refers to the associations a consumer holds in memory. Such associations are often directional; one should distinguish between brand-to-attribute and attribute-to-brand associations. Information on these associations arise from two ways of collecting data respectively: brand-by-brand evaluations of all attributes and attribute-by-attribute evaluations of all brands. In this paper, the authors present a methodological approach, namely correspondence analysis of matched matrices, to assess the communalitites as well as asymmetries between brand-to-attribute and attribute-to-brand associations. The methodology results in perceptual maps visualizing brand image. The approach is illustrated in an empirical market research project in which two samples of consumers evaluated ten brands of deodorants and eleven attributes.

Keywords: Brand image, brand-to-attribute and attribute-to-brand associations, perceptual mapping, correspondence analysis.

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Introduction

The value of a brand lies in what consumers have experienced and learned about the brand. The resulting brand associations held in a consumer's memory constitute the brand image, and a®ect their behavior. Brand associations are thereby important building blocks of customer-based brand equity (Keller 1993 and 2003; Krishnan 1996), and marketers should aim to optimize the attributes and bene¯ts that the brand is associated with by the consumers, satisfying their core needs and wants (Keller 2003; Park, Jaworski and MacInnis 1986). Such strongly held, favorably evaluated associations that are unique to the brand and imply superiority over other brands will be critical for a brand success (Broniarczyk and Alba 1994). Hence, brand associations will have implications for many marketing mix actions, such as (re-)positioning and (re-)design of a brand (Kaul and Rao 1995), as well as extending a brand to other product categories (Czellar 2003). Associations between brands and attributes are often directional (Anderson 1983; Holden and Lutz 1992; Farquhar and Herr 1992; Krishnan 1996): the association is from the brand to the attribute and/or the other way around. For example, the brand equity of BMW is a®ected by the extent to which positive features like safetiness and sportiness are evoked by that car brand. In addition, whether or not certain cues or attributes enhance brand recall in a purchase or consumption setting contributes to the equity of the brand. Insights in the communalities and asymmetries of these bi-directional associations can direct towards recommendations for brand managers. Holden and Lutz (1992) stated that when measuring advertising e®ectiveness, one has to assess e®ects on attributes evoked by the brand as well as on attributes that are likely to evoke the brand. Farquhar and Herr (1992) showed that the dual nature of brand association is an essential part of determining the limits of a brand's stretch. Hence, when assessing brand image, one should consider both brand-to-attribute and attribute-to-brand associations.

Previous conceptual and empirical studies related to the description and assessment of brand image largely ignored the bi-directional nature of brand associations. Exceptions are Farquhar and Herr (1992), Holden and Lutz (1992)

and Krishnan (1996), which provided conceptual foundations for studying such associations. However, extant literature does not present methodological tools adapted to the bi-directional nature of the association data.

A variety of methodologies have been proposed to assess and visualize brand images spatially on the basis of brand ratings or associations regarding a set of attributes, so-called perceptual mapping methods (see for example Dillon, Frederick and Tangpanichdee 1985 or Shocker and Srinivasan 1979). In this stream of literature, several studies (Ja®e and Nebenzahl 1984; Olsen and Olsson 2002; Teas and Wong 1992; Wong and Teas 2001) have demonstrated important di®erences for multi-attribute ratings collected through brand-by-brand judgment of all attributes versus attribute-by-attribute judgment of all brands. However, this stream of literature is speci¯cally dealing with multi-attribute rating judgments, instead of binary associations. Furthermore, again no methodological tools are presented that account for the directional nature of the data.

Here, we aim to contribute to this stream of publications by providing a perceptual mapping procedure to assess brand image based on bi-directional associations. In particular, we present a methodological approach, correspondence analysis of matched matrices (Greenacre 2003; Greenacre and Clavel 2002), which provides insightful spatial representations of the communalities and asymmetries between the brand-to-attribute and attribute-to-brand associations.

In this paper, we ¯rst discuss the background on brand associations within the customer-based brand equity model. Next, we discuss the potential communalities and asymmetries between attribute-to-brand and brand-to-attribute associations. We present a methodology for assessing the communalities and asymmetries and apply it in a study of brand image for deodorants. The application illustrates the insights obtained from the methodology and implications that can be derived. Finally, we dicuss general implications for research on brand image and provide directions for future research.

Customer-based brand equity

Customer-based brand equity occurs when consumers are familiar with the brand and hold favorable, strong, and unique brand associations in memory (Keller 1993,

2003). Memory for a concept consists of a network of nodes and linkages among these nodes (Anderson 1983). The nodes represent concepts and linkages represent the relationship between the concepts. The strength of the association linking two nodes re°ects the likelihood that activation of one node will activate the other (Higgins and King 1981). A brand node can have a variety of associations linked to that node, like attributes or bene¯ts. Customer-based brand equity implies a certain amount of brand knowledge causing di®erential consumer responses to marketing of the brand. Brand knowledge has two components (Keller 1993, 2003): Brand awareness and brand image.

Brand awareness is related to the strength of the brand as re°ected by consumers' ability to identify the brand under di®erent conditions (Alba and Chattopadhyay 1985). Brand awareness is often measured by means of brand recall, which refers to the number of consumers that retrieve the brand when no cue at all or a cue like the product category or an attribute is given. Mature brands often score higher on brand recall compared to new brands (Kent and Allen 1994), which can be attributed to longer history of media support, purchases, and consumption occasions.

Brand image can be de¯ned as consumer perceptions about a brand as re°ected by brand associations held in memory. Brand associations are informational nodes linked to the brand node in memory and contain the meaning of the brand for consumers. The favorable, strength, and uniqueness of brand associations are the dimensions of brand knowledge that play an important role in determining the di®erential response that makes up brand equity (Keller 1993). The links in memory are often conceptualized as directional (Anderson 1983), and may start or end at the brand node. Farquhar and Herr (1992) further elaborated on the dual nature of brand association and show that failure to account for the directionality and possible asymmetries can lead to incorrect conclusions.

One of the dimensions of brand image within the customer-based brand equity model is the strength of the associations between a brand and other concepts, such as attributes. The strength of an association is labelled as connectivity by Nelson, Bennett, Gee, Schreiber and MacKinner (1993). As our research deals with bi-directional associations, we adopt terminology by among others Ashcraft (1978),

Farquhar and Herr (1992), and Loftus (1973), who used the term dominance, which combines direction and strength of an association. In particular, we use \attribute dominance" to refer to the strength of the directional association from a brand to an attribute, and \brand dominance" as the strength of the directional association from an attribute to a brand. Attribute dominance is operationalized by the number of people who give the attribute in response to the brand and, in a similar way, brand dominance by the number of people who give the brand in response to the attribute, with appropriate adjustments for total frequencies in order to normalize the measures. Traditionally, dominance has been discretized into high and low dominance using somewhat arbitrary thresholds, e.g. at 50 percent by Ashcraft (1978).

Empirical data

To explain and illustrate the methodology for studying bi-directional associations, we present an actual marketing research project on brand images in the deodorant product category. Interviews were conducted in London, in the year 2000. Within this project, brand association data has been collected from two samples of 198 and 203 subjects, respectively. Respondents, in both samples, were asked a series of questions about the deodorant brands, such as \most often used brand", \a brand one would switch to", \a brand one would not use again", and \brands used nowadays". Any mentioning of a brand would include that brand amongst a respondent's personal list of evoked brands (Howard and Sheth 1969). This so-called \free-choice" questioning results in di®erent evoked brands across subjects. It is considered a better option compared to \forced-choice", where respondents have to evaluate all brands (Barnard and Ehrenberg 1990; Shocker and Srinivasan 1979). For respondents unfamiliar with a brand, the \forced-choice" procedure may give rise to response strategies such as guessing or yea-saying (Greenleaf 1992). This more re¯ned structure allows consumers with higher product experience to exercise greater discernment when recalling and/or evaluating brand-to-attribute associations (Mason, Jensen, and Roach 2001). The negative counterpart is that this type of data includes the usage e®ect, which implies that brands with larger market shares score higher on most attributes

(Barnard and Ehrenberg 1990). Finally, limiting the task to evoked brands matches with the observation that customer-based brand equity occurs when a consumer is familiar with the brand and holds brand associations in memory (Keller 1993). Information on the directional associations were collected in two ways, namely: brand-by-brand evaluations of all attributes and attribute-by-attributes evaluations of all brands. The ¯rst sample of 198 subjects provided brand-to-attribute associations. For each one of the evoked brands, the subjects had to indicate which of the listed attributes are strongly associated with it. The question made during the interview was: \Which of these attributes particularly apply to this brand?". The second sample of 203 subjects provided attribute-to-brand associations. For each attribute, they stated whether it applied to each of the brands they had evoked. The question asked during the interview was: \To which of these brands does this particularly apply?". Two di®erent samples were used to avoid learning e®ects. The ¯nal format of the tables is the same for both samples: frequencies representing the number of people who made a positive association between a brand and an attribute. The rows are ten brands of deodorants and the columns eleven attributes (Table 1).

[Insert Table 1 about here]

The set of attributes is obtained from a previous study in which consumers were asked about the most important attributes for this particular product category, which is a valid and common applied methodology to elicit relevant product attributes (Alpert 1971; Breivik and Supphellen 2003). In line with Keller (1993, 2003), we distinguish between category-speci¯c attributes and non-speci¯c, more general attributes (A9 to A11).

Preliminary description of dominance, communalities, and asymmetries

To describe dominance relations, Loftus (1973), Ashcraft (1978) and Farquhar and Herr (1992) measured the strength of association simply by the frequency with

which the item was mentioned, with normalizations that do not include information related to the number of evoked brands. For example, following Ashcraft (1978), in the study on Deodorants, for the attribute A3 from the attribute-to-brand association table, the raw frequencies are:

[59; 33; 40; 28; 32; 43; 79; 31; 29; 10]:

Since the highest value corresponds to B7: Vaseline Intensive Care, we take this brand as reference point and transform the data as percentages relative to it:

[74:7; 41:8; 50:7; 35:4; 40:5; 54:4; 100; 39:2; 36:7; 12:7]:

Now, brands with values higher than 50% possess the high dominant property Ashcraft (1978). Thus for attribute A3 we observe the high dominant property for brands B1: Dove, B3: Natrel Plus, B6: Sure, and B7: Vaseline Intensive Care. The previous de¯nition of dominance does not take into account that more well known brands tend to receive higher values and so will establish more dominant relations. We improve the de¯nition of dominance by analyzing percentages calculated from the frequencies relative to the number of times each brand is evoked. This results in tables that measure brand dominance independently from brand familiarity, which allows comparison of dominance and other evaluations across brands.

[Insert Tables 2 and 3 about here]

Table 2 shows the obtained brand-to-attribute association data: frequency of associations relative to the number of brand evocations. For example, the cell (B4, A1) tells us that 44:7% of the subjects who evoked Right Guard, associated it with attribute \prevents body odour all day". The attribute-to-brand association table (Table 3), similarly expresses frequencies of attribute-to-brand associations relative to evoked brands. For example, the cell (B4, A1) tells us that 44:4% of the subjects who evoked Right Guard named it in response to \prevents body odour all day". Now, for attribute A3 (does not irritate my skin) there exists brand dominance in the cases for the following brands: B1: Dove, B7: Vaseline Intensive Care, B8: Secret and B9: Impulse (again using 50% as cut-o® point). Notice that brand

dominance changes when the brand familiarity e®ect is eliminated. Brands like B3: Natrel Plus and B6: Sure are highly evoked brands and have high dominance only when associations are not expressed relative to the number of evoked brands. On the other hand, B8: Secret, and B9: Impulse are not highly evoked brands but have high dominance when associations are expressed relative to the number of evoked brands.

We follow our exposition with the introduction of the idea of communalities and asymmetries in dominance relationships. For the cell (B1, A3) in the attribute-to-brand association table (Table 3), we ¯nd a value of 60:2%; indicating that a high brand dominance relation between Dove and \does not irritate my skin" exists. For the same pair (B1, A3) in the brand-to-attribute analysis (Table 2) the percentage is very similar (60:4%), so in this case associations in both directions share a common high dominance and asymmetry does not appear. The brand displays a strong brand image with respect to this attribute independent of the direction in which the associations are measured. But if we take another pair such as (A1, B10), in the brand-to-attribute case, the proportion of people who made the association is equal to 55:0%, which means that a high attribute dominance relationship exist between Body Shop and \prevents body odor all day" is given. However, the attribute-to-brand association takes a value of 22:7%, concluding that high brand dominance is not present. These percentages are quite di®erent indicating that asymmetry between the directional associations exist.

Correspondence analysis of matched matrices

The application of correspondence analysis has been proposed for visualizing brand images in a perceptual map (e.g. Greenacre 1984; Ho®man and Franke 1986). This yields independent factors, which de¯ne orthogonal dimensions of a perceptual map, where brand and attributes are points projected on the map. The center of the map, or centroid, can be interpreted as an \average brand" characterized as having an average degree of association with each attribute. Then, dominance relationships between a brand and an attribute will be established relative to that average brand. This sets us free from ¯xing a percentage threshold for high dominance (e.g. 50%). As a consequence, we can describe high dominance

relationships also for attributes with low averages, while with the previous de¯nitions, these might not be recognized as having any high dominance relations. Furthermore, it makes brands directly comparable in terms of the attributes, and so, the results describe the degree of uniqueness in associations between a brand and an attribute in a particular sample.

As the numbers of brands and/or attributes that de¯ne brand image increase, the total number of associations become very large. At some point, it becomes di±cult to inspect the (communalities and assymetries of the) bi-directional associations. Seperate correspondence analyses of the brand-to-attribute and attribute-to-brand associations will display each of these sets of associations separately in a perceptual map. In empirical studies, these two maps will only be the same to some degree. However, determining the di®erences and communalities will be hard, if not impossible, by simply inspecting the two maps. Therefore, we introduce correspondence analysis of matched matrices (Greenacre 2003; Greenacre and Clavel 2002) to the customer-based brand equity ¯eld to capture communalities and asymmetries in brand image due to the directionality of the associations. In particular, the communality will capture those associations which are independent of the direction of making evaluations (brand-to-attribute or attribute-to-brand), and the asymmetry will capture those associations which change due to the direction of making evaluations as well as the source of asymmetry (attributes or brands). Applying correspondence analysis of matched matrices to the tables of frequencies with respect to the evoked brands yields a visualization of the communalities and assymetries between the two sets of associations.

The methodology we present consists of applying correspondence analysis to the two matrices, attribute-to-brand and brand-to-attribute associations, combined in a particular block format. This leads to an analysis of the centered sum and the uncentered di®erence components, which are desirable properties. Recovering the centered sum still enables describing strength of the associations relative to a \mean brand". The displayed asymmetries are uncentered, which allows interpretation of locations in the map as positive or negative di®erences.

If B and A are two n £ m matrices, where B represents the brand-to-attribute association table measuring attribute dominance and A the attribute-to-brand

association table measuring brand dominance, the data matrix to apply correspondence analysis takes the form:

$$\begin{bmatrix} B & A \\ A & B \end{bmatrix} \tag{3}$$

The sum component $B + A$ will capture communalities: associations which are high dominant relations (compared to a \mean brand") in both tables, that means independently of the direction of making evaluations. The di®erence component $B - A$ will capture asymmetries between the two association matrices. Let the singular value decomposition of $B + A$ and $B - A$ be respectively:

$$B + A = UD_{\oplus}V^T \qquad B - A = XD_{-}Y^T \tag{4}$$

where U, V, X and Y are singular vectors of the sum and di®erences, respectively, and $D_{\oplus}$ and D_{-} are diagonal matrices with the singular values of the communalitites and asymmetries, respectively, in their main diagonal. Then the singular value decomposition of the $2n \times 2m$ block matrix is (Greenacre 2003):

$$\begin{bmatrix} B & A \\ A & B \end{bmatrix} = \frac{1}{\sqrt{2}} \begin{bmatrix} U & X \\ U & -X \end{bmatrix} \begin{bmatrix} D_{\oplus} & 0 \\ 0 & D_{-} \end{bmatrix} \frac{1}{\sqrt{2}} \begin{bmatrix} V & Y \\ V & -Y \end{bmatrix}^T \tag{5}$$

where

$$\frac{1}{\sqrt{2}} \begin{bmatrix} U \\ U \end{bmatrix}^T \frac{1}{\sqrt{2}} \begin{bmatrix} U \\ U \end{bmatrix} = \frac{1}{2}U^TU + \frac{1}{2}U^TU = I$$

Thus the solutions corresponding to the di®erence component appear as repeated vectors with a change in sign in the singular vectors. The di®erences with respect to just apply a singular value decomposition to the data matrix previously exposed, are the fact that the points have di®erent weights in correspondence analysis and that there is a standardization in the form of the chi-square metric. If A and B are two tables coming from di®erent subsamples, the total or marginal frequencies may di®er, like in our case, where we have di®erent \total evoked" for each brand. The asymmetry analysis would re°ect di®erences due to di®erent totals between both samples and not due to the directionality. However, by analysing observed percentages relative to the number of evoked brands, this issue is solved in the approach presented here.

The results of correspondence analysis can be visualized in a map, based on the decomposition of the inertia or variance, from the data matrix (Greenacre 1984; Blasius and Greenacre 1994). In our case, some dimensions represent the communality and others collect information related with the asymmetries. The inertia of each one of these dimensions can be decomposed into components in the following way

$$\begin{bmatrix} D_{\lambda 1} & 0 \\ 0 & D_{\lambda 2} \end{bmatrix} = F^T D_r F = G^T D_c G$$

where F is the matrix collecting principal coordinates for rows (brands), G is the matrix collecting principal coordinates for columns (attributes), $D_{\lambda 1}$ and $D_{\lambda 2}$ are the diagonal matrices with the principal inertias of sum and di®erence components respectively in their main diagonal. Greenacre (1984) shows that singular values are the square roots of the principal inertias ($D_{®} = D_{\lambda 1}^{1=2}$ and $D_{-} = D_{\lambda 2}^{1=2}$). Finally, D_r and D_c are diagonal matrices with the row masses r_i (row sums divided by the grand total) and column masses c_j (column sums divided by the grand total) in their main diagonal respectively.

The contribution of inertia shows to what extent the geometric interpretation of an axis is determined by the variable categories (Blasius and Greenacre 1994). In our particular application this can be used to assess which attributes have contributed most to the principal axis and thereby to give meaning to the obtained dimensions. The contribution of the columns (attributes) to the principal inertia are de¯ned as the inertia components relative to their total. For the communality analysis, this is for each particular attribute $c_j g_{jk}^2 = \lambda_{1k}$ and for the asymmetry analysis, it becomes $c_j g_{jk}^2 = \lambda_{2k}$. Finally, we will examine correlation values for rows (brands) and columns (attributes) to complement the interpretation of dimensions as well as to see which brands are well represented by them. The squared correlations of the rows/columns with the principal axes are the inertia components $r_i f_{ik}^2 (c_j g_{jk}^2)$ expressed relative to the row (brand)/column (attribute) inertia, which is $\sum_k r_i f_{ik}^2$ ($\sum_k c_j g_{jk}^2$).

Empirical results

The total inertia of this correspondence analysis of matched matrices is equal to 0:0456. Part of it corresponds to the communality between both tables, while the rest is due to the asymmetries between the brand images described in the studies. The principal axes with relatively high inertia corresponding to the communality are the ¯rst one (with inertia of 0:0163) and the second one (with inertia of 0:0088) which represent 47:6% and 25:9% respectively of the inertia of communality. Hence, together these two dimensions explain 73:5% of the communality variance. The principal axes with highest inertia corresponding to the di®erences between both analyses are the third one (with inertia of 0:0060) and the ¯fth one (with inertia of 0:0031). The ¯rst value represents 52:5% of the total inertia of asymmetries and the second one 27:5%. Then, both together represent 80:0% of the variance of the asymmetries. From the relative values of the inertia, we can see that the asymmetries are less important than the communalities in this particular application, but some di®erences between bi-dircetional associations of some brands can still be captured and interpreted.
First of all, we describe the communality between both types of associations, followed by the asymmetries.

Communalities

For interpretation of the maps, we display the coordinates and correlation values (CORR) for brands with respect to the ¯rst and the second principal axes (Table 4). The meaning of principal axes displaying communalities is determined by the contribution and correlation values of the attributes with respect to these axes. This information is collected in Table 5.

[Insert Tables 4 and 5 about here]

Since the inertia for the sum and the di®erence are not very high, we display symmetric maps (Greenacre 1984), in other words, a map with principal coordinates for attributes and another map with principal coordinates for brands. Since points are in di®erent spaces, only relative positions can be interpreted and

not distances between points of di®erent category variables. The symmetric maps are represented in Figures 1 and 2.

[Insert Figures 1 and 2 about here]

The attributes which have contributed most to the ¯rst principal axis are A4: has a long lasting fragrance, A5: has a pleasant fragrance, and A8: can use all over the body. The ones which have contributed most to the second principal axis are A1: prevents body odour all day, A2: keeps me dry all day, and A6: leaves me feeling con¯dent. Hence, the ¯rst principal axis is related to fragrance while the second principal axis is more related to durability and con¯dence. All of these are attributes speci¯c for the deodorants category product.
As an example of the interpretation, consider Brand B2: Mum. It is positioned on the left handside of Figure 2 and displays a strong association with A8: can be used all over the body, A4: has a long lasting fragrance, and A5: has a pleasant fragrance. So, Mum is related with the dimension of \fragrance" consistently for both directions of associations. The map also informs about a strong association between the brands B1: Dove and B7: Vaseline Intensive Care and the attributes A1: prevents body odour all day, A2: keeps me dry all day and A6: leaves me feeling con¯dent. Considering both directions of associations, these brands display a brand image related to \durability".

Asymmetries

For the assymetry componet, the coordinates and the correlation values for brands appear in Table 6, and the contribution and correlation values for attributes appear in Table 7. The symmetric maps are presented in Figures 3 and 4.

[Insert Tables 6 and 7 about here]

[Insert Figures 3 and 4 about here]

From the location of the attributes in Figure 3, we can conclude that all attributes re°ect positive di®erences between the brand-to-attribute association table and the attribute-to-brand association table. A close relative position between a brand and an attribute means that the association was stronger in the brand-to-attribute

association table (attribute dominance) than in the attribute-to-brand association table (brand dominance). A counterpart position along the dimensions means that the association was stronger in the attribute-to-brand association table (brand dominance) than in the brand-to-attribute association table (attribute dominance). The main explanatory attributes in the map of asymmetries are not category-speci¯c attributes. A9: to be portable, A10: quick to apply, and A11: costs little less than other brands have important correlations with the ¯rst principal axis of di®erences. A1: prevents body odor all day, a category-speci¯c attribute, displays a high correlation with respect to the second principal axis. The maps (Figures 3 and 4) reveal that brands and attributes are displayed along two dimensions. One of them is a ¯ctitious line that goes from B1 to B3. A perpendicular dimension with respect to the previous one is the ¯ctitious line connecting B8 and B7. All brands are situated on the right hand side of the centroid and above the ¯rst principal axis, with the exception of B1, B2 and B10. Brands situated further from the centroid (0,0) are the ones displaying higher di®erences between both analysis. In our case, this holds in particular for B8 (with respect to the ¯rst principal axis of di®erence) and B10 (with respect to second principal axis of di®erence), which are the brands lowest in familiarity. The attributes situated on the right hand side of the centroid are characterized by higher percentages of brand-to-attribute association and the attributes located in its left hand side of the centroid are characterized by higher percentages of attribute-to-brand associations.

The deodorant brand B8: Secret is situated just opposite to A9 along the second ¯ctitious dimension, previously described. It means that Secret is strongly associated with the attribute of \being a portable deodorant" when we ask attribute-to-brand but not when we ask brand-to-attribute. We can check this result going to the tables 2 and 3: the value in the attribute-to-brand table is indeed much higher than in the brand-to-attribute table. In managerial terms we can conclude that Secret is not positioned as a portable brand, but it nevertheless has a stronger association with respect to this attribute compared to other brands of the sample. Actually, almost all brands, with the exception of B10: Body Shop, are situated in the opposite position with respect to A9: to be portable. This

means that these brands receive a higher percentage of association with respect to that attribute in the attribute-to-brand analysis compared to the brand-to-attribute one.

The other brand displaying higher asymmetries in the map is B10: Body Shop. Its close relative position with respect to A1: prevents body odor all day, indicates that Body Shop is positioned (brand-to-attribute associations) with an image of durability, a bene¯t which is not perceived as a competitive advantage (attribute-to-brand associations) of this brand in the set of the analyzed brands. However, this brand is more associated with the attributes A10: is quick to apply in the attribute-to-brand compared to the brand-to-attribute associations, as B10 is situated opposite to A10. Then, apparently Body Shop is not positioned as a brand characterized for being quick to apply, though, in comparative terms, it does owns this bene¯t compared with the other brands in the sample.

From the application we can conclude that the researcher should consider both attribute-to-brand and brand-to-attribute associations to describe brand images. Consumers can consider the set of evoked brands and establish their perceptions and purchase behavior based on the uniqueness and strength of brand-to-attribute associations. In other cases, consumers may have in mind some attribute or bene¯t and the set of competing brands is established depending on the strength of the links that start in that particular attribute. Non product-speci¯c attributes turn out to be important sources of asymmetries and they do not appear in the analysis of communalities, where more well-known brands are specially represented. If the asymmetries are not involved in dominant relationships, the source of asymmetry can be due to the higher number of answers in the attribute-to-brand association tasks for the non-speci¯c attributes. An explanation could be that these are secondary attributes in the positioning of the brands.

Discussion, conclusions and future research

We have addressed the problem of communalities and asymmetries in brand-to-attribute and attribute-to-brand associations. This topic has been addressed before, but basically focused on category-brand associations and tended to be conceptual (e.g. Farquhar and Herr 1992). We show the relevance of taking

into consideration bi-directional associations when assessing and visualizing brand image. We introduced a particular way of correspondence analysis, named correspondence analysis of matched matrices (Greenacre 2003; Greenacre and Clavel 2002), as a tool for measuring communalities and potential asymmetries between brand-to-attribute and attribute-to-brand association tables. It identi¯es the brands and attributes which are critical sources of asymmetries.

We can corroborate that when the association between brands and attributes is measured asking brand-to-attribute associations, which is a non-comparative format, the stronger links from the brands to the attributes dominate the associations. On the other hand, if a researcher measures brand image asking attribute-to-brand associations (a comparative format), stronger links from the attributes to the brands will determine the perceptions of the consumers. Non product-related attributes, which are less core attributes related with the product category, have received more associations in the attribute-to-brand (brand dominance) tables. Thus, we suggest that both directions of associations should be considered when brand image is assessed to make managerial recommendations.

It is largely unclear to what extent certain types of products, brands, and/or attributes will display large communalities or asymmetries between the two directions of associations. One might argue that brands which are positioned (captured by the brand-to-attribute associations table) with respect to attributes that di®er from their competitive advantage (captured by the attribute-to-brand association table) should display substantial asymmetries. In addition, leading brands or more mature brands (more associated with unique attributes or, if shared ones with the category product, related to present stronger associations with respect to other brands) may display the same brand associations in both directions, while secondary brands in a particular market may display large asymmetries. Finally, the nature of the attributes may a®ecte the degree of asymmetry between both tables. While category-speci¯c attributes could show high communality, non category-speci¯c attributes could show high asymmetry. In our empirical study, the more general attributes \portable", \quick to apply", and \price" indeed show relatively large asymmetries. These attributes are apparently not the ¯rst ones people consider to describe a brand image. However, they do

display high attribute-to-brand associations for many brands, and may therefore be important in speci¯c purchase situations such as for traveling or for going to the gym. Further research is required to examine the drivers and consequences of communalities and asymmetries between brand-to-attribute and attribute-to-brand associations.

It could also be interesting to study the time dynamics of the communalities and asymmetries of the associations. If asymmetries are not desired (i.e. signal of secondary brands or due to divergences between competitive advantage and positioning), the analysis of matched matrices applied to di®erent periods could describe the change of such asymmetries due to managerial decisions. This would require the data to be combined as follows (Greenacre and Clavel 2002):

$$\begin{bmatrix} & A_1 & B_1 & A_2 & B_2 \\ B_1 & A_1 & B_2 & A_2 & \\ A_2 & B_2 & A_1 & B_1 & \\ B_2 & A_2 & B_1 & A_1 & \end{bmatrix} \tag{8}$$

where A_1 and B_1 represent the attribute-to-brand and the brand-to-attribute association tables at period 1 and the A_2 and B_2 collects the same tables at period 2. Once we apply correspondence analysis to the previous expression, we are able to recover asymmetries as well as communalities, and to visualize the changes over time.

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Table 1

Attributes and brands included the empirical study.

Attributes	Brands
A1: prevents body odour all day	B1: Dove
A2: keeps me dry all day	B2: Mum
A3: does not irritate my skin	B3: Natrel Plus
A4: has a long lasting fragrance	B4: Right Guard
A5: has a pleasant fragrance	B5: Soft & Gentle
A6: leaves me feeling con¯dent	B6: Sure
A7: leaves no marks on my clothes	B7: Vaseline Intensive Care
A8: can be used all over the body	B8: Secret
A9: is portable/ can carry around	B9: Impulse
A10: is quick to apply	B10: Body Shop
A11: costs a little less than most others	

Table 2

Brand-to-attribute associations: Percentages relative to the number of evoked brands.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	Total evoked
B1	52.5	48.5	60.4	39.6	48.5	37.6	46.5	26.7	35.6	40.6	10.9	(101)
B2	34.6	19.2	32.7	58.7	69.2	34.6	39.4	59.6	47.1	45.2	12.5	(104)
B3	36.3	28.3	38.1	17.7	40.1	21.2	26.5	10.6	38.9	49.6	26.5	(113)
B4	44.7	38.2	43.4	22.4	40.8	23.7	23.7	19.7	17.1	47.4	9.2	(76)
B5	46.2	43.0	37.6	24.7	30.1	39.8	31.2	15.1	19.4	48.4	19.4	(93)
B6	44.8	34.5	48.3	33.6	54.3	39.7	34.5	24.1	26.7	46.6	18.1	(116)
B7	61.9	61.9	52.3	37.4	52.3	48.4	37.4	23.2	32.9	51.6	16.8	(155)
B8	38.2	45.5	47.3	18.2	43.6	27.3	29.1	21.8	23.6	43.6	5.5	(55)
B9	43.3	63.3	51.6	37.7	53.3	35.0	35.0	13.3	40.0	53.3	15.0	(60)
B10	55.0	25.0	70.0	35.0	55.0	25.0	35.0	25.0	50.0	30.0	5.0	(20)

Table 3

Attribute-to-brand associations: Percentages relative to the number of evoked brands.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	Total evoked
B1	52.0	44.9	60.2	36.7	55.1	41.8	36.7	37.8	59.2	62.3	14.3	(98)
B2	28.6	25.3	36.2	54.9	57.1	34.1	36.3	69.2	59.3	62.6	18.7	(91)
B3	31.1	26.4	37.7	22.6	38.7	28.3	31.1	21.7	56.6	46.2	22.6	(106)
B4	44.4	36.5	44.4	30.2	38.1	34.9	30.2	23.8	38.1	57.1	7.9	(63)
B5	42.3	37.6	37.6	22.4	25.9	34.1	24.7	21.2	37.6	58.8	8.2	(85)
B6	29.8	27.7	45.7	30.9	37.2	27.7	27.7	27.7	43.6	57.4	23.4	(94)
B7	54.6	50.0	52.0	33.6	44.7	48.7	31.6	26.3	46.1	63.2	19.1	(152)
B8	41.0	42.6	50.8	31.1	32.8	37.7	27.9	31.1	57.4	57.4	21.3	(61)
B9	37.5	35.7	51.8	26.8	42.9	35.7	39.3	14.3	60.7	50.0	7.1	(56)
B10	22.7	22.7	45.5	18.2	36.4	18.2	31.8	22.7	45.5	45.5	18.2	(22)

Table 4

Commulaties: coordinates and correlation values for the brands.

	k=1	CORR	k=2	CORR
B1	-52	72	-133	469
B2	-356	915	34	8
B3	61	90	148	538
B4	79	251	27	30
B5	127	433	23	14
B6	-5	1	40	91
B7	31	23	-177	754
B8	52	98	3	0
B9	59	101	-63	117
B10	6	1	97	171

Table 5

Commulaties: coordinates, correlations, and contribution values for the attributes.

	k=1	CORR	CTR	k=2	CORR	CTR
A1	60	68	4	-156	454	53
A2	132	171	18	-248	608	120
A3	40	44	2	-88	210	19
A4	-292	726	76	-108	100	19
A5	-171	547	36	-58	62	8
A6	-15	4	0	-193	641	65
A7	-80	237	6	-79	232	11
A8	-489	871	179	-15	1	0
A9	-118	144	16	1	0	0
A10	-12	5	0	-57	129	9
A11	-31	6	0	87	44	6

Table 6

Assymetries: Coordinates and correlations for the brands.

	k=3	CORR	k=5	CORR
B1	90	215	27	20
B2	74	40	-15	2
B3	44	48	42	43
B4	62	158	47	91
B5	64	110	16	7
B6	91	468	-39	86
B7	69	114	-6	1
B8	115	472	56	115
B9	68	135	15	6
B10	73	98	-145	380

Table 7

Asymmetries: coordinates, correlations, and contribution values for the attributes.

	k=3	CORR	CTR	k=5	CORR	CTR
A1	81	122	21	-108	219	72
A2	71	50	15	8	1	0
A3	16	7	1	-72	139	35
A4	20	3	1	-105	93	51
A5	90	151	27	-56	58	20
A6	-13	3	0	-78	106	30
A7	39	57	4	-24	21	3
A8	-104	39	22	-52	10	10
A9	-211	461	141	-96	96	57
A10	-108	464	45	23	21	4
A11	-108	67	13	105	64	24

Figure 1

Correspondence analysis of matched matrices: Communalities of brands in principal coordinates.

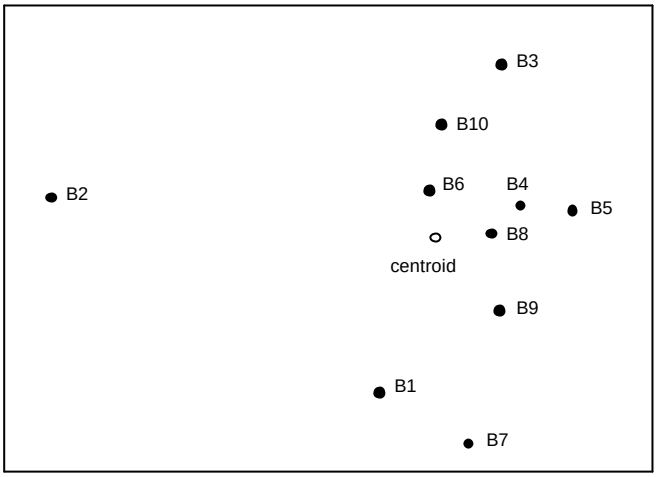

Figure 2

Correspondence analysis of matched matrices: Communalities of attributes in principal coordinates.

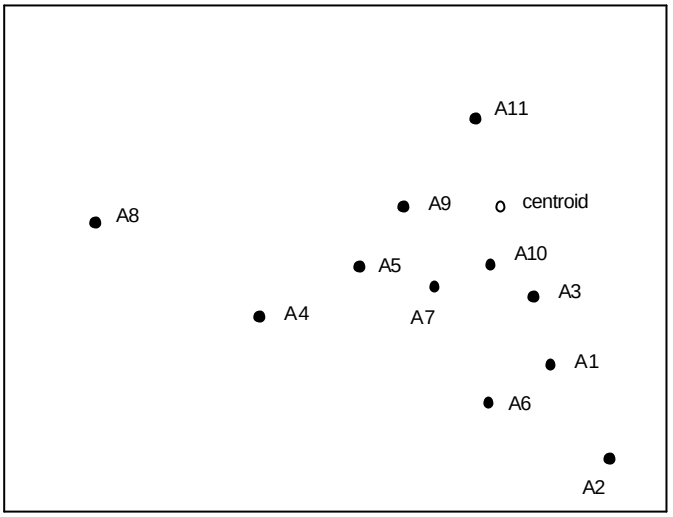

Figure 3

Correspondence analysis of matched matrices: Asymmetries of attributes in principal coordinates.

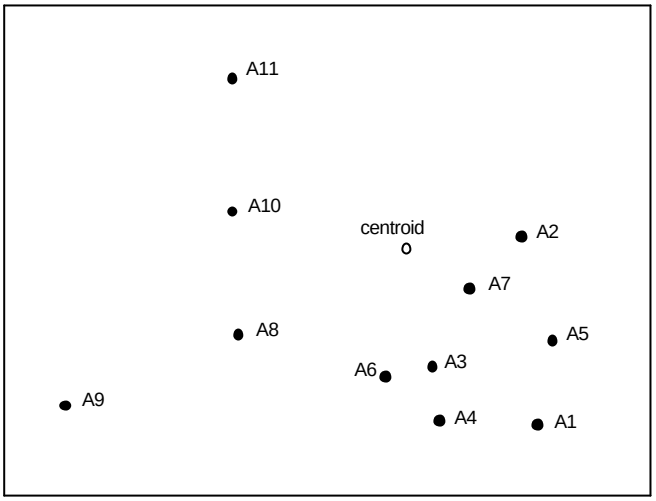

Figure 4

Correspondence analysis of matched matrices: Asymmetries of brands in principal coordinates.