

## THE VALUE OF SPORTS: MEASURING BRAND EQUITY THROUGH AESTHETIC IMAGES

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### Context

Brand equity has been one of the hottest topics in the 90s marketing management (Aaker, 1991). Questions such as how much does brand equity really worth, how can it be measured and how can it be exploited only partly received convincing answers. From a research perspective, some elements of brand equity, such as perceived quality, brand association or brand aesthetics (Schmitt & Simonson, 1997) are difficult to measure and even more difficult to quantify, whereas others (loyalty, awareness) lend more easily to quantitative research. In linking brand image to positive images in people's life, such as favourite sport, vacation spots, past time activities, the particular market segment is of huge practical importance. Statistical techniques used for analysis are descriptive and inferential statistics (testing differences and relationships), multidimensional scaling (e.g., in Hsieh, 2002; Keon, 1983) and non-metric scaling of similarities (e.g., in Fry & Claxton, 1971). These techniques assume that we may manipulate the objects and their attributes as if they were plain numbers, which is not always so. Instead of quantifying attributes and their relations, relying on the precise mathematical notion of *entropy*, and *entropic measures* the *information content* of a dataset can be measured. Such an approach has been successfully used in cognitive psychology and linguistics (prominently by Osgood et al., 1957). When using entropy, we make no assumptions about the numerical properties of variables, nor the nature of their relationships. We are free to apply it to nominal or ordinal variables, and we do not have to worry about meaningfulness of averages, covariance and the like.

Here we use the term "entropy" in a sense it was used in Shannon's information theory (Shannon, 1948a, 1948b), where entropy measures the information content of a given variable. The entropy of a variable  $X$  is defined as  $H(X) = -\sum p(x) \log p(x)$ , where  $p(x)$  is the probability that  $X$  is in the state, or has the value  $x$ .

### Methods

Data was collected via a questionnaire using free association and brand personality approach, which was posted on a website discussion board, and also mailed to people who volunteered to complete the survey. Respondents had to meet only the criteria of age (18+) and Hungarian as first language. Respondents were asked to select a sport of their choice, rate their interest on a 10-point scale and associate freely in 8 categories (general description of the sport, clothing designer, cosmetics, newspaper, drink, car, music and animals) naming the first three descriptors that came to their minds in connection with the chosen sport. Seven of 39 sports were retained on the basis of a minimum of 10 questionnaires each. An information index (H-index) was calculated for each descriptor, using the following formula (modified from Pléh & Czigler, 1979):

$$H(i) = -(n_i / N) \log_2 (n_i / N) + \sum_j (n_{ij} / N) \log_2 (n_{ij} / N)$$

where  $n_i$  is the number of occurrences of a particular attribute,  $n_{ij}$  is the number of people naming

attribute  $i$ ,  $N = \sum_{i,j=1}^{m,n} n_{ij}$  gives the number of all the observations, and  $n_{ij} / N$  gives an estimate of the

probability of observing an event labelled with tags  $i$  and  $j$ . The advantage of using the H-index is that it properly weights the descriptors.

Mutual information was calculated between the seven sports and their descriptors (attributes). MI of a sport gives the statistical measure of their dependence, and is defined as  $MI(1,2) = S_1 + S_2 - S_{12}$ , where  $S_1$  and  $S_2$  are the corresponding entropies, given as:

$$S_1 = -\sum_i (n_i / N) \log_2 (n_i / N), S_2 = -\sum_j (n_j / N) \log_2 (n_j / N) \text{ and } S_{12} = -\sum_{ij} (n_{ij} / N) \log_2 (n_{ij} / N).$$

Mutual Information defined this way is an absolute quantity, we may normalise it using the joint entropy  $S_{12}$ , thus  $MI_{rel} = MI/S_{12}$ .

## Results

Of the 187 completed questionnaires, 148 were made by women and 39 by men. All respondents spoke Hungarian as their mother tongue, although 13.4% lived abroad. The 7 sports were: ice skating (21 responses), swimming (19), martial arts (15), football (12), handball (11), auto sport (10) and tennis (10). Male respondents showed slightly higher levels of interest ( $M = 5.15$ ,  $SD = 2.64$ ) than their female counterparts ( $M = 4.53$ ,  $SD = 2.49$ ). Interestingly, 43.2% of female respondent chose 'masculine' sports, whereas no male respondent named 'feminine' sports. Gender-neutral sports were roughly equally selected by males (28.2%) and females (31.7%). Results of the entropic measures will be presented as H-indices of the important descriptors for each selected sport; and as MIs and Venn diagrams between sports and their corresponding strong descriptors. Examples will be given for applying entropy to categorical data (e.g., free recall of images and descriptors).

## Implications

Marketers want to create strong relations between product and a brand, and so determining the strength of this elusive relationship is crucial for planning and developing successful marketing strategies for reinforcing brand image through carefully chosen advertisements, endorsers and/or sponsorships. Information about brand equity can be effectively used in developing or evaluating sport sponsorship proposals. The method can also be used to test how much a particular advertising campaign or sponsorship is associated with a sponsor's brand and competing brands. In other words, sport images with the largest overlap (largest MIs) with the sponsor's image are thought to be the most effective way to promote its products/services. The method's major limitation is its data requirement. The present sample was sufficient as an illustration, but to draw meaningful conclusions, the minimum sample size must be at least a magnitude bigger than the number of categories we wish to use. Variability in data can be greatly reduced by fixing one variable (either the sport or the brand), and so a desirable sample size can be achieved.

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