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Analyzing Consumer Perceptions

Introduction

An important input to marketing decision making is often an understanding of how consumers "see" the firm, brand, or product relative to competitors. In setting an objective of a particular "product positioning" in the mind of the consumer, we want to check whether or not the desired positioning has in fact been achieved. This helps us assess whether the current strategy is on target, or if some "repositioning" is necessary.

For example, in "Black and Decker: Power Tools" case,[1] management commissioned surveys to

- Obtain tradesmen perceptions of the "overall quality" of 11 brands of tools
- Compare perceptions of the Black and Decker brand vs. those of key competitors Makita and Milwaukee on six dimensions:
    - Is "one of best"
    - High-quality tool
    - Durable tool
    - Proud to own
    - Stands behind product
    - Easy-to-get service

These perceptual data were critical in diagnosing Black and Decker's problem and suggesting the most beneficial type of strategy change.

Similarly, in "L'Oréal of Paris: Bringing 'Class to Mass' with Plenitude,"[2] management collected data to understand consumers' perceptions of Plenitude and of key competitors' products, including Ponds, Oil of Olay, and Estee Lauder, on 15 dimensions, such as "technologically advanced," "good value for the money," "relieves dryness" and "available in stores where you shop." In the L'Oréal case, the consumer perception data were statistically analyzed to produce a two-dimensional visual representation of the competing brands' position on the attributes.

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[1] "The Black and Decker Corporation (A): Power Tools Division," HBS No. 595-057.

[2] HBS No. 598-056.

Professor Robert J. Dolan prepared this note as the basis for class discussion.

Section I of this note first describes the collection of perception data and the reporting of those data in a "profile analysis." This is a very simple procedure, often quite appropriate to the problem at hand.

Section II discusses the more advanced procedure of creating a "perceptual map" as done by L'Oreal. There are two types of data from which these maps can be created. We provide some intuition for how each works and present the advantages and disadvantages of each.

Section III discusses sample applications and uses in marketing decision making. While we do not discuss the details of the statistical procedures, we provide insight into what is happening in the data analysis phase.

Section I: Data Collection and Profile Analysis

There is a variety of ways in which to collect perception data. L'Oréal used a 1-10 scale and asked respondents to provide a rating to indicate the extent to which they agreed with statements of the following sort:

Plenitude is "technologically advanced"

Where 1 = completely disagree

10 = completely agree

Henkel, a Germany-based competitor of L'Oréal mentioned in the case, in addition to selling skin care products has a diverse set of other products, including adhesives. It used the same approach in assessing the image of its adhesive brands, Pritt and Pattex.[3]

A commonly used variant of the rating scale is the semantic differential scale having five or seven points with polar adjectives at either end of the spectrum. For example, to assess its position vs. Sony, Barco management could commission a survey in which respondents are asked to give their perceptions of the brand by marking the following:

Barco Projectors are:

Unreliable	_____	_____	_____	_____	_____	Reliable
Hard-to-Use	_____	_____	_____	_____	_____	Easy-to-Use
Low Priced	_____	_____	_____	_____	_____	High Priced
Poor Value	_____	_____	_____	_____	_____	Good Value
Fuzzy Output	_____	_____	_____	_____	_____	Sharp Output

When analyzing *perception* data (what people see) as opposed to *preference* data (what people like), we usually are more willing to live with an assumption of homogeneity in responses across consumers. For example, you and I are both likely to perceive Volvo as a "safe" car. But, it is dangerous to assume that you and I are similar in our desire for a safe car.

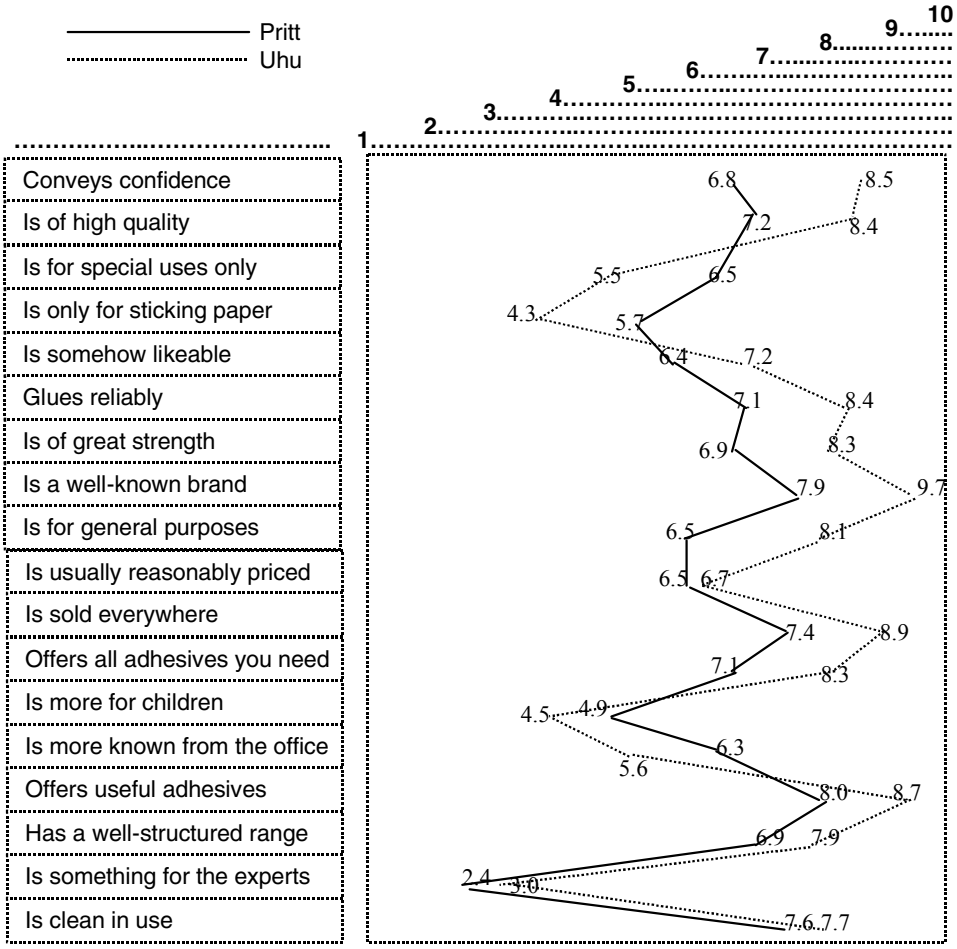
[3] "Henkel Group: Umbrella Branding and Globalization Decisions," HBS No. 585-185.

We can check on how similar are perceptions across respondents (e.g., just compute the variance of the ratings on an attribute across consumers). If one suspects that perceptions vary across groups (e.g., West Coast vs. East Coast, Inexperienced Users vs. Experienced Users, Young vs. Old), you can break out the data and look at specific groups. If we are willing to assume perceptions are pretty much the same across respondents, we can then easily summarize the data by averaging it across all survey respondents. Henkel in analyzing its Pritt adhesive brand had 100 respondents and found an average rating of 6.8 (on the 1-10 "strongly disagree" to "strongly agree" scale) for the statement "Pritt Conveys Confidence." After averaging across respondents, a useful visual representation is Profile Analysis, known more commonly and colloquially as a "snake plot." This simply plots the ratings of brands by attribute. Henkel developed this comparison for its light-duty Pritt brand vs. leading competitor Uhu on 18 attributes using the same 1-10 scale. The raw data were:

	Score on 1-10 Scale 1 = Completely Disagree 10 = Completely Agree	
	Pritt	**Uhu**
Conveys confidence	6.8	8.5
Is of high quality	7.2	8.4
Is for special uses only	6.5	5.5
Is only for sticking paper	5.7	4.3
Is somehow likeable	6.4	7.2
Glues reliably	7.1	8.4
Is of great strength	6.9	8.3
Is a well-known brand	7.9	9.7
Is for general purposes	6.5	8.1
Is usually reasonably priced	6.5	6.7
Is sold everywhere	7.4	8.9
Offers all adhesives you need	7.1	8.3
Is more for children	4.9	4.5
Is more known from the office	6.3	5.6
Offers useful adhesives	8.0	8.7
Has a well-structured range	6.9	7.9
Is something for experts	2.4	3.0
Is clean in use	7.6	7.7

(Numbers in table represent average rating score across 100 respondents.)

The corresponding Profile Analysis looks like this:



The plot pretty quickly gives insight into Pritt's relative position—Uhu being seen as the stronger, general-purpose brand and Pritt's strength being confined to special light-duty purpose like sticking paper for children.

The utility of "snake plots" depends a lot on how many brands have to be considered in the analysis. Given the market situation, Henkel appropriately considered just Uhu. So, the "snake plot" was a powerful enough approach. However, as the number of brands to be considered increases (as it did for L'Oreal with eight brands to consider), snake plots can become an uninterpretable mess, and more powerful techniques are typically needed to yield the desired insights. This is why perceptual mapping techniques have been developed and are widely used.

Section II: Perceptual Mapping Techniques

When consumers' perceptions of multiple competitors on multiple dimensions are of interest, more powerful analysis techniques help to make the data more meaningful. Perceptual mapping techniques derive their name from the fact that the output is a map of brands depicted in attribute

space. There are two types of mapping procedures, depending on the type of data collected from consumers: (i) ratings of items on prespecified attributes and (ii) judgments on overall similarity of pairs of brands. The second method is particularly useful when articulating the attributes of interest in a category is difficult. For example, it may be difficult to state in a meaningful way the attributes consumers use to differentiate types of fruit, perfumes, and styles of office chairs. We now discuss each method in turn.

Attribute Rating Method As mentioned above, L'Oreal used the attribute rating method for eight brands on 15 attributes. In an industrial content, Dow's Specialty Chemical Group[4] used this approach to assess consumers' perception of Dow vs. Competitors on 8 attributes:

1. Meets scheduled delivery dates
2. Practices innovation and development
3. Has fair pricing
4. Has consistent products
5. Provides support in solving processing problems
6. Has custom color capability
7. Provides adequate technical literature
8. Withstands high heat distortion temperatures

The value of perceptual mapping is that it gives us a pictorial representation to summarize the data. The Dow situation had a small "data matrix," consisting of 32 cell entries.

DOW								
Competitor #1								
Competitor #2								
Competitor #3								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

Rating on Attribute #

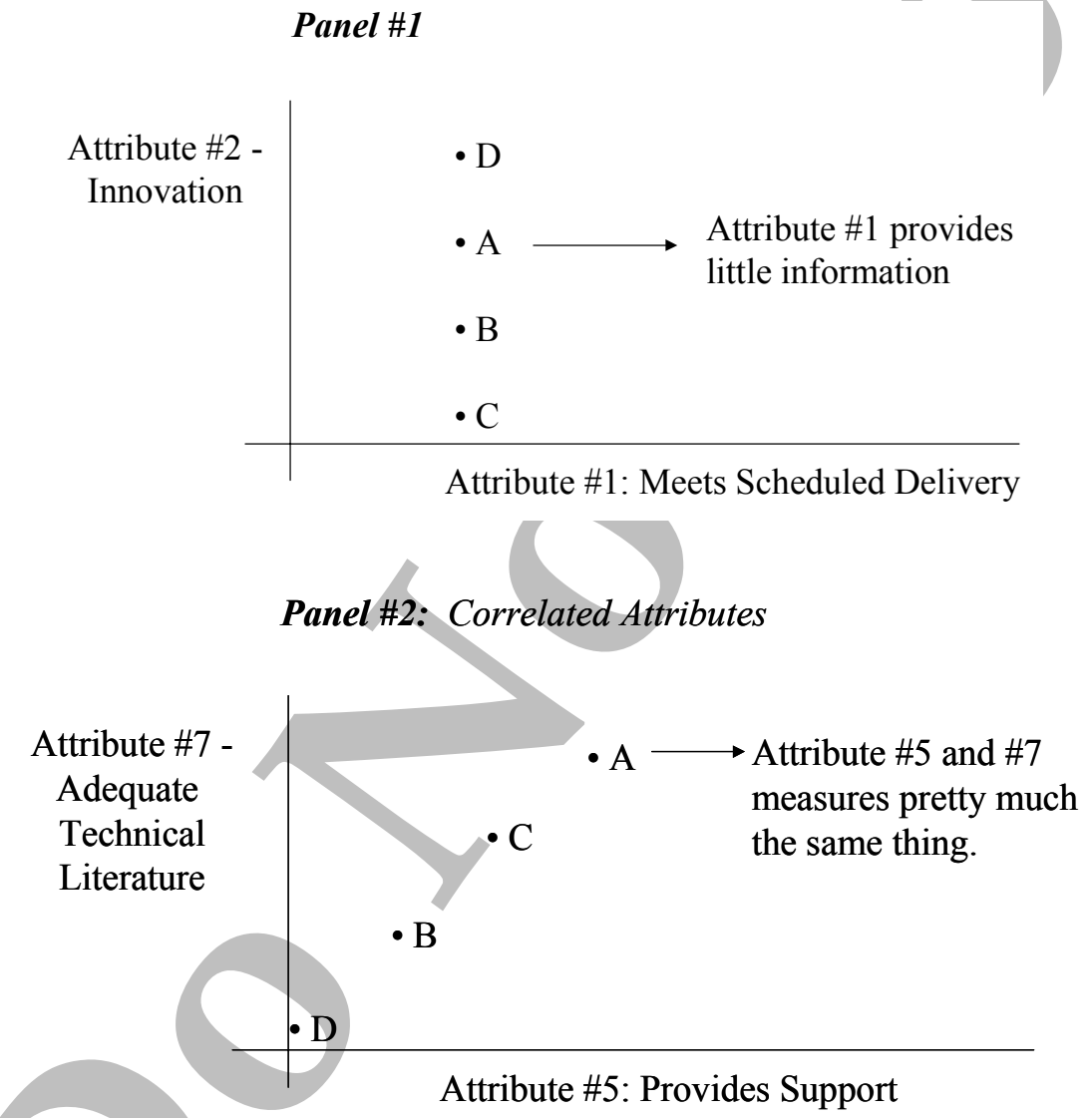
A cell entry in the data matrix is the average rating of the competitor represented by the row on the attribute represented by the column. Even the relatively small data matrix of Dow would be hard to summarize without recourse to statistical procedures.

The statistical procedure underlying this type of perceptual mapping is typically either factor analysis or discriminant analysis. Intuitively, what the procedures do is "look" at situations such as shown in **Figure A**. In panel #1 of **Figure A**, imagine that we have to plot four vendors on two attributes. We see all vendors are rated identically for attribute #1—Meets Delivery Dates—so that is not a very interesting product feature in terms of differentiating products from one another. Once the statistical analysis reveals this, it does not give the attribute "Delivery Dates" much importance in

[4] R.H. Siemer, "Using Perceptual Mapping for Market Entry Decisions," 1989 Sawtooth Software Conference Proceedings, pp. 107-114.

portraying the situation. Attribute #2—"Innovation"—on the other hand, varies across products and would have a place in the final map. Panel #2 of **Figure A** is a situation in which attributes #5 "Provides Support" and #7 "Provides Adequate Technical Literature" are mapped. The result shown here is that these attributes are highly correlated (i.e., the vendors rated high on #5 are also rated high on #7). The statistical analysis would thus treat attributes #5 and #7 as measurements of the same underlying construct.

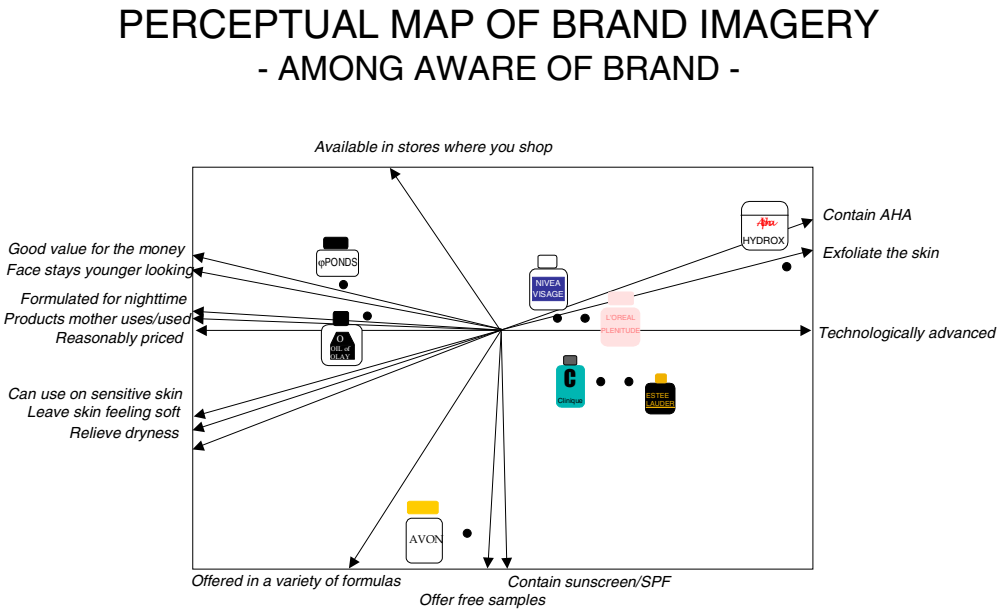
Figure A Intuition Behind Perceptual Mapping



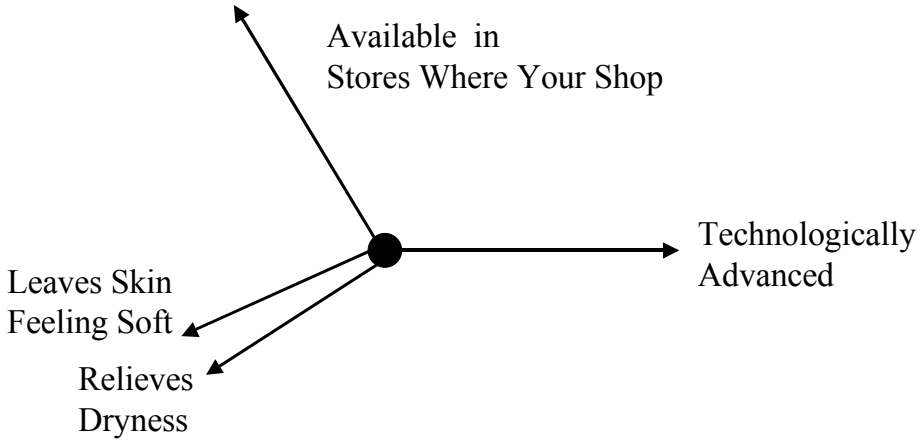
The analysis for Dow collapses the original set of 8 attributes to a two-dimensional map with the four vendors positioned on the axes. Since the original data are in eight dimensions (attributes) and the perceptual map is reduced down to two, the map cannot capture all the variation among the vendors given in the data matrix. However, essentially it does the best it can (i.e., retains the most important information from the full data matrix and reports it in two dimensions to provide visual impact).

The precise output or form of the map depends on the particular mapping software used. Generally, multiple attributes are shown in a two-dimensional space by varying the angle with which the vector comes out of the origin. For example, the L'Oreal map (case **Exhibit 9**) is reproduced here in **Figure B**.

Figure B L'Oreal Map



Let's pull out four of the vectors and focus on interpreting them.

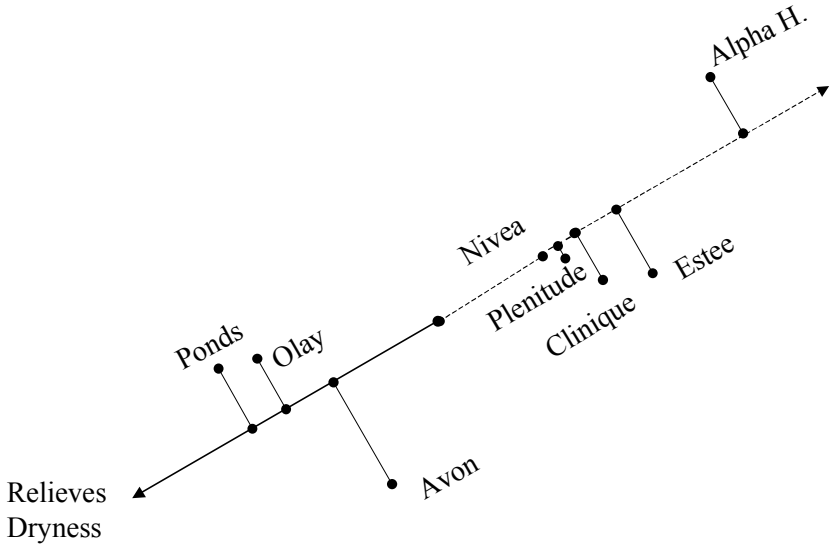


We see two of the vectors go in the same general direction. What this shows us is that brands which rated "high" on "relieves dryness" were also rated "high" on "leaves skin feeling soft." In other words, there really is only one underlying idea here—it's like attributes 5 and 7 in **Figure A—**Panel #2. In contrast, "Available in Stores Where You Shop" forms an almost 90° angle with the softness/dryness vectors, indicating it is unrelated to the softness/dryness skin dimension (i.e., a brand's position on softness/dry skin does not tell you much about its position on "available"). The

"Technologically Advanced" vector points almost in the other direction from softness/dry—capturing the fact that the brands on the market are currently perceived as trading off technologically advanced vs. softness/dryness (i.e., if you are "high" on one you are "low" on the other).

In L'Oreal's case shown in **Figure B**, all vectors were shown with the same length. However, sometimes the vector length is also varied across attributes to indicate how well the provided map is capturing the actual variance in scores across brands for that attribute. The software in Lilien and Rangaswamy's *New Product and Brand Management: Marketing Engineering Applications*[5] Positioning Analysis (p. 50) uses this convention.

In order to see the location of the brand on an attribute, you always "drop a perpendicular" from the brand to the vector. For example, to see where the eight brands in L'Oreal are positioned on dryness, we extend the "relieves dryness" vector back through the origin (shown by the dotted line)



and move along a line to the vector, such that the line forms a 90° angle with the vector.

Overall Similarity Method The Attribute Rate Method has a key limitation for some product types (i.e., it requires the researcher to articulate and the respondent to think in terms of specific product attributes). Imagine trying to execute the approach in the soft drink or perfume market. In categories with competition driven by tastes, odors, or aesthetics—(i.e., things we do not verbalize very well)—the attribute method breaks down. For such situations, an alternative is to ask the respondent to make judgments about the overall similarity of pairs of items. Specifically, for *n* items, we require the respondent to rank the [(n)(n-1)]÷2 possible pairs of items from *most similar* to *least similar*. For example, mapping the theme park attractions in Southern Florida market we might consider 6 items: Disney's Magic Kingdom, Disney's Epcot Center, Universal Studios, MGM Studios, Sea World, and Busch Gardens. (Note: we limit this to 6 for simplicity in showing how the procedure works. Ordinarily, one would want to consider all relevant competition.) With 6 items, there are 15 pairs. A convenient way to represent the required input is in matrix form with a 1 = most similar pair and a 15 = least similar pair. Suppose one respondent gave the judgments shown in **Table A**:

[5] G. Lilien and A. Rangaswamy, *New Product and Brand Management: Marketing Engineering Applications* (Reading, Mass: Addison Wesley, 1999)

Table A Respondent Ranking of Similarity of Six Theme Park Attractions

	Universal	MGM	Sea World	Magic Kingdom	Epcot
Busch Gardens	11	12	10	6	13
Universal	--	1	14	2	5
MGM		--	15	3	6
Sea World			--	8	9
Magic Kingdom				--	4
Epcot					--

"Eyeballing" the data, we might notice a couple of things. First, Magic Kingdom is seen as pretty similar to all the others—it is pretty mainstream. Also, the Sea World-Epcot pair is rated ninth—less similar than the average pair. This might seem odd as they are two of the more educational offerings in the set. In order to sort these things out, we submit the data to a statistical procedure, to develop a map to permit us to "see" the data and get the information from it.

The statistical procedure is called multidimensional scaling, often referred to as MDS. It attempts to find a map such that the distance between the attractions as shown on the map match up (i.e., be in the same order) as the rank numbers in the input data matrix of **Table A**. The map in **Figure C** fits this bill. The output of multidimensional scaling is a plot like **Figure C** and a statistic which tells how closely the distances on the map match up with the original input data. Note that we do not know what the axes are—but our knowledge of the category can help us to name them. On the vertical axis, it's Busch Gardens, MGM Studios, and Universal Studios on one end vs. Epcot and Sea World on the other. This suggests a thrill ride/entertainment vs. educational dimension. The horizontal axis may represent value for the money as two attractions with frequent price promotions (Busch Gardens and Sea World) are set against those with perceived higher prices. The map helps explain what might seem odd to us from "eyeballing" the data. While Sea World and Epcot are seen as similar in their educational aspect, this respondent differentiates them on the basis of their value/price.

Figure C Perceptual Map of Theme Park Attractions

The overall similarity method thus allows us not only to map products but also infer the attributes used by the respondent in making distinctions. Note, however, that these inferences were somewhat subjective (e.g., one might say the horizontal axis is expected wait time at attractions).

Examples of use are in mapping retail stores, desserts, food products, and ethical drugs. Kotler[6] reports actual application to California amusement attractions using overall similarities.

Table B summarizes the major differences between methods.

Table B Comparison of Methods

Attribute Rating	Overall Similarity
Input Data	
• brand ratings on attributes • attributes prespecified by analyst	• overall similarity ranking • definition of similarity left to respondent
Statistical Technique	
• factor analysis or multiple discriminant analysis (software generally available)	• multidimensional scaling (special-purpose software required; however, efficient packages available at low cost)
Output	
• product positions on axes	• relative product positions; axes must be interpreted by analyst
Best Suited For	
• applications with "hard" attributes which can be verbalized	• categories dominated by not easily articulated attributes

Section III: Applying the Maps in New Product Development

There are three major ways in which perceptual maps are used in marketing:

i. to obtain a better understanding of current positioning and market structure
ii. to test where a new product being considered for introduction would be perceived
iii. to provide direction to R&D efforts to satisfy the wants of consumers better.

In many studies, perceptual maps are used for all three of these purposes simultaneously. The third is somewhat different from the others in that it requires representation of consumers' preferred positions (we usually refer to this as "ideal points") as well as competitors' positions on the map. We will now cover each of the three purposes in turn.

Purpose #1: Understanding Market Structure As noted at the outset, one often would like to check rigorously that the desired product positioning has been attained. Understanding where we

[6] P. Kotler, *Marketing Management*, 9th ed. (N.J.: Prentice-Hall, Inc., 1997).

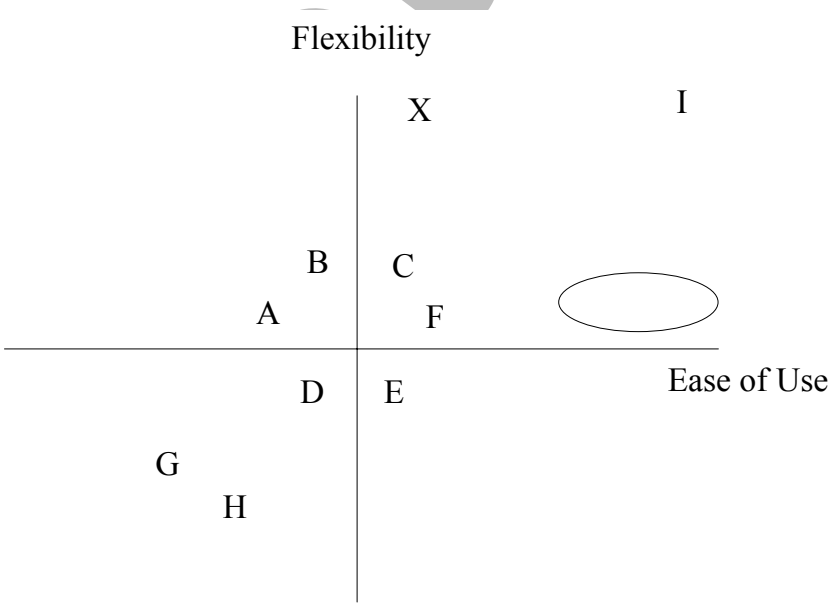
are seen relative to the competition facilitates this. Also, at the idea-generation stage of the new product development process, perceptual maps can be a useful stimulus to opportunity identification. "Holes" in the product space might be exploited as they may represent niches of the market which current competitors have overlooked and could be developed. Second, the maps indicate the vulnerability of competitors by showing how consumers perceive them. For example, there are cases where a dominant share brand seems impossible to attack. However, a deeper understanding of customers' attitudes and perceptions can show the means of attacking this seemingly impregnable incumbent.

Purpose #2: Perceptions of a Product Concept Once a general opportunity has been identified (either with or without perceptual maps), the process usually moves forward to concept development and testing. Perceptual maps can be used to test if the concept or product would be perceived by consumers as the firm intended.

For this use, respondents must be informed about the new concept or product, either through a concept statement or, if possible, product use. Once they are able to form their own image and judgments about the brand, the method proceeds as usual.

For example, suppose a firm in the computer business already participates in the market and the key attributes are ease of use, flexibility, and price. A Perceptual Map of the market on flexibility and ease of use is shown in **Figure D.**

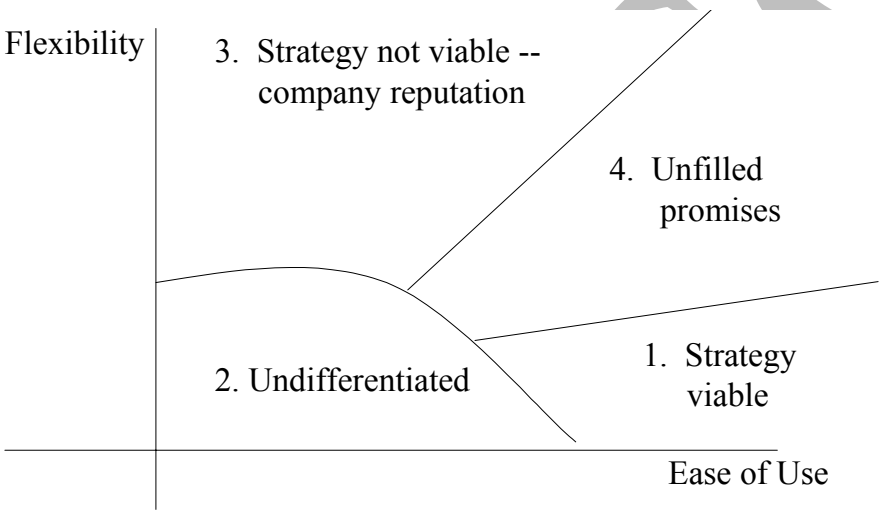
Figure D Perceptual Map of Personal Computer Market



The map shows a group of competitors in the middle of the map; firms G and H in the southwest corner offer less flexibility and convenience (presumably at lower prices). Our Firm X has been able to differentiate itself from the group via innovation on flexibility, taking point X on the map. Although not depicted on the map, this is at a slight price premium over the offerings of A, B, C, D, E, and F. Firm I has been able to differentiate itself by offering both greater flexibility and greater ease of use, but its offering is at a significant price premium.

Our firm is considering expanding its product line to bring out a machine which is very easy to use, but with average flexibility (i.e., a product to be located in the area of the circle drawn on the map). Such a product would sell at the same price level as X, but would (it was hoped) not cannibalize X but rather appeal to a market segment now buying F or I. The question is whether the product could take on this position in customers' eyes even if, in a technical performance sense, it provided average flexibility but was quite easy to use. Perceptual mapping can provide an answer to the advisability of the strategy. Once consumers understand the proposed product, a mapping study could be done to see where the new product falls. **Figure E** shows the four zones.

Figure E



If the new product takes on a position in consumers' eyes in Zone 1, the basic positioning is viable. The product is positioned strongly on the ease-of-use dimension, and the tradeoff of ease of use with flexibility is communicated. All other zones are problematic. Zone 2 puts the firm "in the bunch" with firms A, B, C, D, E, and F—not differentiated enough to make a product line extension worthwhile. Zone 3 is a basic failure to capture the desired position. The firm's reputation for flexibility overwhelms the new product features and the new product is seen to have the same basic strengths and weaknesses as the firm's current offering. Finally, Zone 4 may initially look like a good place to be—offering both improved ease-of-use and flexibility over the "bunch"—but the product cannot deliver against those expectations and hence in the long term this would be problematic.

Similarly, a map can be used after a product introduction to track the positioning. For example, suppose the study at this stage showed the new product to be on the border between Zones 1 and 4. One might then argue that the respondents had limited communication about the new product and that an actual introduction would be accompanied by extensive company-managed communication and trade press reviews which would be sufficient to place the product squarely in Zone 1—the "strategy viable" zone. Perceptual maps could be constructed after the introduction to test this hypothesis and aid in the determination of whether remedial action was necessary.

Purpose #3: Direction to R&D Efforts to Satisfy Customers Better This purpose is similar to Purpose #2, except here we require formal representation of the "ideal point" of a customer (i.e., what point on the map represents the ideal combination of attributes for different customer groups). Our example in Purpose #2 was chosen to sidestep this issue by choosing two attributes which almost

everybody would like as much of as could be obtained for a given price. Consequently, we could think of the "ideal" being as far to the northeast as possible.

When we have attributes for which more is not necessarily better, we will want to represent explicitly these ideals. There are two methods for doing this, both of which are applicable in either the attribute rating or overall similarity procedure. For the attribute approach, we alter the input data collection phase to include the respondents' "ideal" in the set of things to be rated on each attribute. In the overall similarity approach, we include the "ideal" as one of the objects in forming all possible pairs for similarity ranking.

The examples in the literature point out the value of doing this because the ideal points of individuals, while usually clustered, are spread out across the map of brands. For example, Johnson's[7] work on presidential candidates identified eight clusters with significantly varied ideals on the two key dimensions of candidate differentiation:

- liberal versus conservative
- reduce government involvement versus increase government involvement.

Often the intent is to use perceptual maps to serve each of these three purposes. The potential for managerial utility is hopefully clear from the description of the technique; however, added testimony comes from the number of firms regularly using the method and the reaction of some of those users. For example, in discussing Dow Chemical's application in the specialty plastics market, Siemer[8] notes the following contributions of the perceptual mapping study:

> Some of the facts we learned from this study shocked us…. We had focused on physical product benefits as a basis for competitive advantage. Instead, we found a market more interested in service issues. [The study provided] greater understanding of the market structure … an understanding of the unique needs of industry segments [and] ... competitors' vulnerabilities from the point of view of our customers.

The impact of this improved understanding was a change in Dow's basic approach to the market and spending plans, that is to say, "we were able to develop a strategic positioning for Dow that focused and prioritized our resources where they would have the greatest competitive advantage, and then were able to abandon issues and priorities that had low potential return because of customer indifference."

* * * * *

Perceptual mapping has proven an extremely useful addition to the marketing analysis toolkit. It does have a number of limitations, however, which should be noted. First, it presents a static view (i.e., it is a snapshot of consumers' current perceptions). If a series of studies of the same market is done over time, some trends can be monitored. Second, while it may help a firm determine what it would like to do vis-à-vis the market, it provides no indication of the cost or likelihood of being able to achieve the desired positioning.

In short, it in no way substitutes for management judgment but often provides valuable input and serves as a very useful focal point in strategic planning discussions.

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[7] R.M. Johnson, "Adaptive Perceptual Mapping," Sawtooth Software Conference on Perceptual Mapping, Conjoint Analysis, and Computer Interviewing, 1987, pp. 143-158.

[8] R.H. Siemer, "Using Perceptual Mapping for Market-Entry Decisions," 1989 Sawtooth Software Conference Proceedings, pp. 107-114.