How Sensory Evaluation Can Provide Development Direction: An Approach

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ABSTRACT: *The authors explain how linking product sensory attribute documentation, through descriptive analysis panels, with consumer exploration through one-on-one interviews, provides clear direction to product development. In addition it permits the product development team to track progress of the prototypes.*

Product development often relies on sensory evaluation and consumer research guidance to direct the product development process - by identifying products that consumers want and need. With cosmetics and toiletries, the relationships that link the sensory properties of products to both consumer acceptance and consumer perceived benefits are thought to be more difficult to "get at" than in the product development of foods and home care products. This is because personal care products are marketed with glamour language that promises "beauty" and "youth" and consumers do not have very concrete language to describe the products or the effects of the products. Many of the attributes are integrated, combining both consumer language with descriptive language, for example "youthful" or "glow." Sensory evaluation techniques can help tease apart the terminology and provide a deeper understanding of the sensory experience.

Early Stage Research

Often the developer doesn't know where to begin; the process of understanding seems to be mysterious. Yet it doesn't have to be a mystery – in fact it is just a matter of putting information together, as the following problem illustrates.

One of our global clients wants to understand the key drivers for a hand lotion product including key benefits for the consumer (moisturizing, protection, non-greasy, therapeutic, etc.) This early stage research is intended to extract information and insights for R&D to move forward to develop some viable prototypes.

The traditional approach is for sensory scientists and marketing research professionals to depend on some large-scale quantitative research, conducted in a central location or in home environment. The quantitative data are thought to be critical for making business decisions since many companies require hard numbers to move the development process forward. This approach at this stage of development is expensive and limiting. The prototypes are often a shot in the dark (best guess) and sometimes not different enough from existing products to provide any real information. The luxury of working at the early stages of product development permits the sensory scientist and product developer to "explore" both the consumer and product landscapes in search of buried treasure.

An approach that provides a map to the treasure combines descriptive analysis via a trained panel (to document the sensory properties of the product without indication of preference or acceptance, much like an analytical instrument) with qualitative interviews.

Large-scale consumer research is generally linked statistically to the documentation of the descriptive data to benchmark the product category. However, at early stages in the development process before the prototypes are developed at the bench, the sensory and development scientists can collect some preliminary information and direction.

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Collecting Preliminary Information

The first step is to document a large array (15-30) of hand lotion products in the marketplace from which a diverse subset of (4-8) are selected for discussion with consumers. In this case, a trained panel used our descriptive analysis method[a] to evaluate and rate the perceived sensory attributes (see Table 1) on an intensity scale of 100 points thus defining precisely

[a]*Spectrum Descriptive Analysis Method is a trademark of Sensory Spectrum, Inc.*

Table 1. Sensory characteristics measured by descriptive analysis

Phase	Attribute	Scale
Rubout (about the product)	Wetness	Dry → Wet
	Spreadability	Easy to Spread → Difficult to Spread
	Thickness	Thin → Thick
	Oily	None → Much
	Waxy	None → Much
	Greasy	None → Much
	Absorbency	# rubs to absorb
Pick Up (about the product)	Firmness	Soft → Firm
	Stickiness	Not Sticky → Very Sticky/Tacky
	Cohesiveness	Ruptures/Peaks → Cohesive/Strings
	Peaking	No Peaks → Sharp Peaks
Afterfeel (about the skin)	Gloss	Dull → Glossy/Shine
	Tautness	None → Much
	Stickiness	Not Sticky → Very Sticky/Tacky
	Moistness	Dry → Moist
	Slipperiness	Drag → Slippery
	Occlusion	None → Much
	Suppleness	None → Much
	Dry/Roughness	None → Much
	Amount of Residue	None → Much
	Type of Residue	Total = 100%
	- Oily	0 – 100%
	- Waxy	0 – 100%
	- Greasy	0 – 100%
	- Silicone	0 – 100%
	Skin Texture Visibility	None → Much

what the products feel like as they are dispensed in the hand and on the skin. The 10-15 panelists were trained for more than 100 hours to describe in great detail the appearance, fragrance and/or feel of products in terms of the words to describe the attributes and the numerical scale to describe the intensity or strength of each attribute.

Table 2 gives a descriptive profile of two lotions and Figure 1 shows the attribute range graph of the rub-out characteristics.

Note that the descriptive intensity range covers a large space – not all samples are similar. The descriptive panel results are analyzed using multivariate statistical techniques, such as Principal Component Analysis (PCA). Principal Component Analysis is a technique which analyzes multivariate (multivariable) data in order to express their variation in a minimum number of primary components or linear combination of the original variables (see sidebar). It allows the researcher to determine the relationship within combinations of variables (in this case attributes) and between samples and variables. Maps of the data permit the researchers to look into/onto the range of attributes that encompass the sample hand lotions. Figure 2 shows a PCA map of descriptive analysis rub-out characteristics.

To explore the "landscape" of key consumer attributes, four sets of interviews are conducted; each set of six to eight consumers are interviewed one at a time to explore one of the key attributes of interest identified in marketing research studies; moisturizing, non-greasy, protecting and therapeutic. Each consumer spends an

PRINCIPAL COMPONENT ANALYSIS

Principal Component Analysis (PCA) is widely used in signal processing, statistics and neural computing. In some application areas, this is also called the (discrete) Karhunen-Loève transform, or the Hotelling transform. PCA is used to find the components $s_1,s_2,...,s_n$ so that they explain the maximum amount of variance possible by linearly transformed components. The basic goal in PCA is to reduce the dimension of the data. Such a reduction in dimension has important benefits. First, the computational overhead of the subsequent processing stages is reduced. Second, noise may be reduced, as the data not contained in the first components may be mostly due to noise. Third, a projection into a sub-space of a very low dimension is useful for visualizing the data.

Source: Helsinki University of Technology Web site. Available at: http://www.cis.hut.fi/~aapo/papers/NCS99web/node5.html. Accessed Feb. 21, 2005.

Table 2. Spectrum descriptive profile for competitor vs. current lotion

Attribute	A	B
Rubout		
cool	45.7	48.1
wetness	52.2	42.2
spreadability	58.8	47.6
thickness	33.3	35.6
oil	26.7	22.8
wax	8.3	9.4
grease	38.7	40.8
absorbency	37.1	39.1
Afterfeel Immediate		
gloss	16.1	14.7
tautness	27.8	30.3
stickiness	10.3	13.4
moistness	11.9	12.8
slipperiness	72.1	67.6
occlusion	9.8	12.2
suppleness	51.7	45.2
dryness/roughness	42.2	41.7
amount of residue	13.7	17.1
oil %	7.2	6.7
wax %	49.4	45.6
grease %	25.6	41.7
silicone %	16.7	6.1
skin texture visibility	41.7	45.0
Pick-Up		
firmness	34.7	37.1
stickiness	23.9	27.4
cohesiveness	9.3	11.2
peaking	37.3	41.2

hour with a trained facilitator/moderator who presents different hand lotion products to provoke language from the consumer to describe his or her sensory experience, the perceived benefits and the emotional responses.

By considering the known range of sensory intensities from the original array, the product developers can now develop a guideline for intensity - in other words provide a development direction.

The verbatim responses are recorded on paper and video during the sessions. Later the consumer responses are explored to identify the language, properties and benefits that are linked to specific products. The consumer language fell into five groupings of words: moist, glow, disappears quickly, no greasy residue and natural. Table 3 shows a partial list of attributes collected during consumer interviews.

Studying the Descriptive Data

At this point we had some confidence in the structure of the consumer understanding of the hand lotion product category. The sensory scientists then began to study the products' "space" (the descriptive data) in the light of the consumer language for their needs and wants.

The nature of the descriptive analysis results permits the sensory scientist and the product developer to see how each of the samples sits in the space of hand lotions. It also permits the team to understand the relationship of this class of products to the larger set of lotions (therapeutic, youthful, etc.) if those data are available.

In this example, the map (Figure 2) of the immediate afterfeel attributes reveal that one of the products produced by competitor A was considered to have a "supple" afterfeel. In the interviews, consumers describe this sample as having a "soft, flexible, cushion and hydrated" feeling. Notice that neither of our client's current products fit within the space of hydrated or smooth look and feel. By considering the known range of sensory intensities from the original array, the product developers can now develop a guideline for intensity - in other words provide a development direction. This is illustrated in Figure 3.

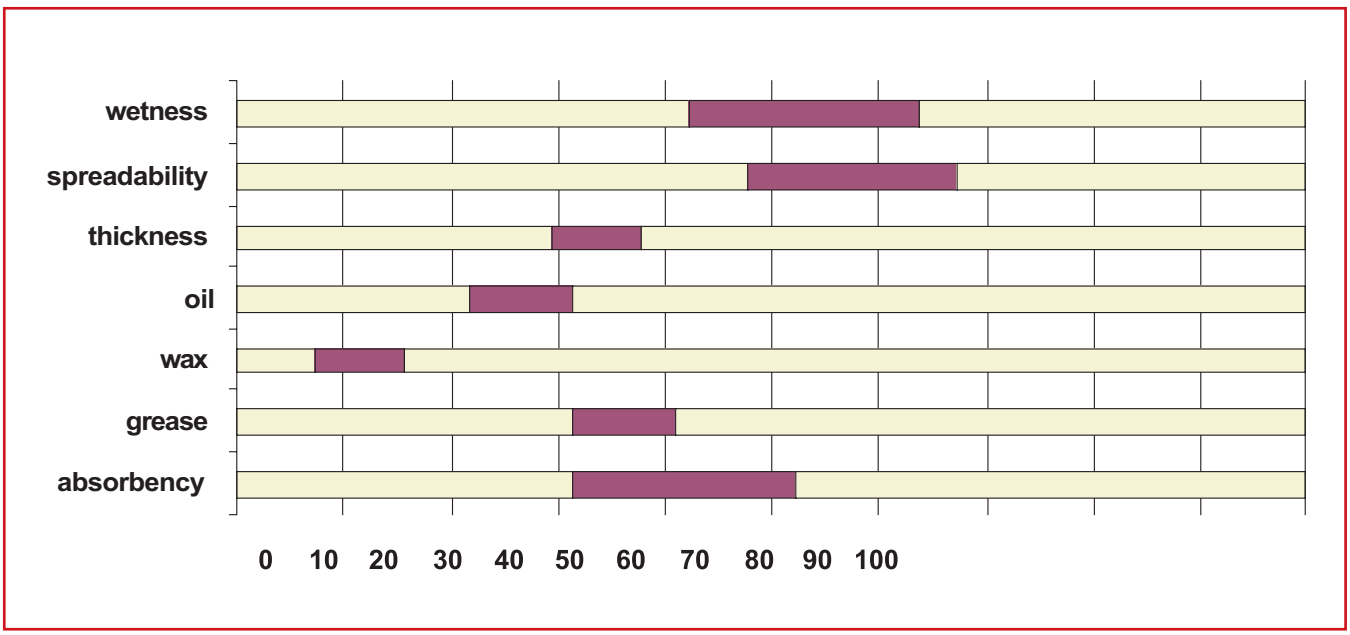

Figure 1. Data range graph for descriptive analysis rub-out characteristics

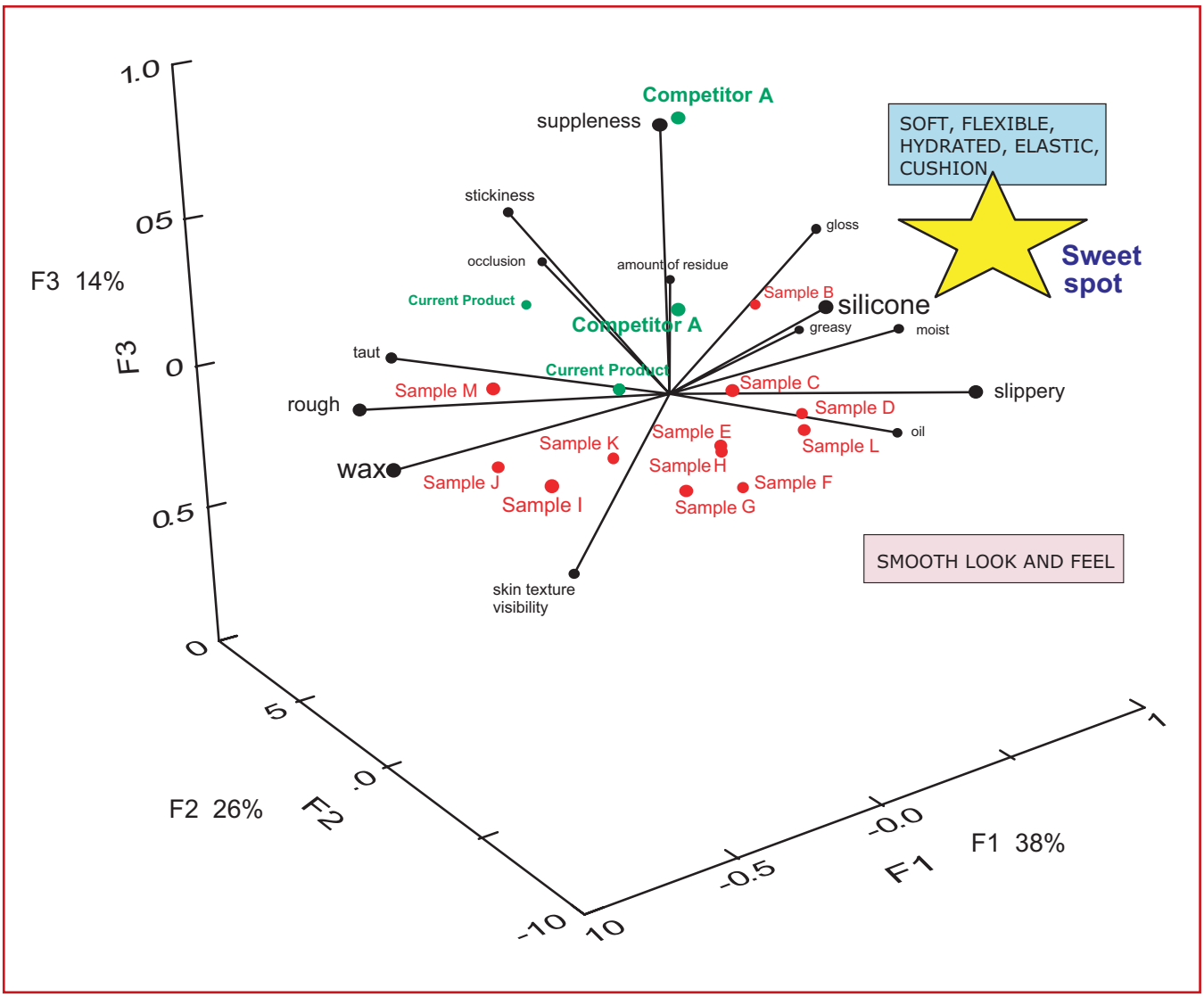

Figure 2. PCA map of descriptive immediate afterfeel characteristics

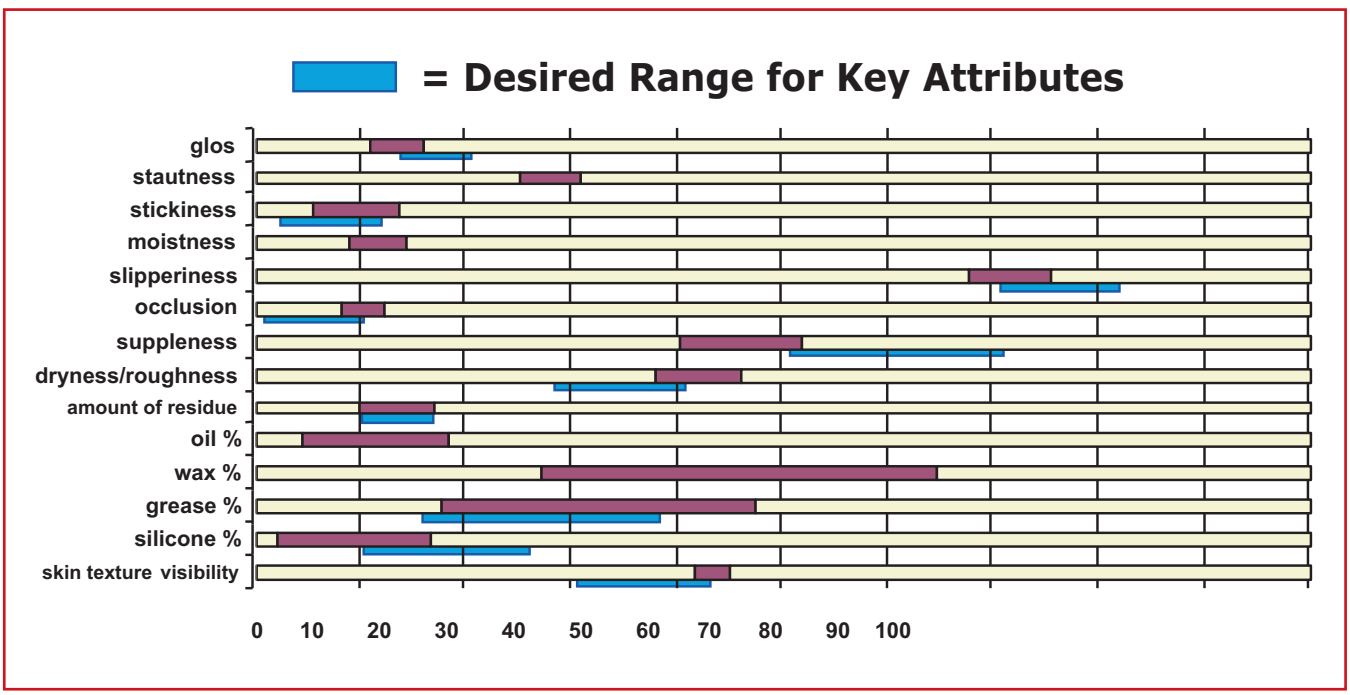

Figure 3. Suggested direction for afterfeel characteristics

Table 3. Partial list of consumer attributes (collected during consumer interviews)

Consumer Terms
Moisturized/Hydrated
Polished Look
Glow/radiant/luminescence
Absorption
Smoothness
Even skin tone
Skin elasticity – look/feel firmer
No greasy afterfeel
Feels light
No oily residue after rub in

The ultimate test of this research approach is in relating these analytical descriptive panel results to the consumer language and insights. Sensory properties are important to define the tactile, appearance and fragrance characteristics of a product but it is only in linking the attributes to consumer acceptance, preference or perception of efficacy or benefits that the research team has direction for development of a successful product.

Consumers understand what characteristics they want in hand lotions but are unable to articulate them in terms that product developers can use to create products that deliver consumer needs. Linking product sensory attribute documentation, through descriptive analysis panels, with consumer exploration through one-on-one interviews, provides clear direction to product development. In addition it permits the product development team to track progress of the prototypes by using the descriptive panel to test prototypes along the way and place them in the product maps to see is they are approaching the "sweet spot" in the map that satisfies consumer needs.

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References

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BLIND PRODUCT ANALYSIS

Analysis of blind product testing allows us to evaluate product performance without the possible effect of branding and its associated imagery. This is obviously important if interest centers on improving product performance through product design features that matter to consumers. However, since consumers are influenced by variables other than sensory performance, such as perceived health, imagery, what their friends are choosing and what will help them to fit in, there must be an associated sensory penalty paid for the consumption of those products that the consumer would not choose on a blind basis.

Source: The Institute for Perception Web site. Available at: http://www.ifpress.com/pdfs/Spring%202005.pdf. Accessed: Mar. 10.