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Descriptive analysis - state of the art and recent developments

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4. Summary and outlook

Numerous descriptive analysis methods have been presented – along with their respective advantages and disadvantages. Which method is best suited for measuring human perception in the concrete case at hand will depend upon the type of product, the objective of the study and the available time and financial resources.

Despite of their high value, descriptive methods are only gradually making inroads in sensory product research in the individual companies. High costs as well as the need for tedious training and data tabulation are one reason. In addition, many users are simply disappointed by the results. Frequently, interface problems between Marketing and Market Research, on the one hand, and Research and Development, on the other, negate the advantages of descriptive analysis (see Wilton 1993; Carter & Riskey 1990; van Trijp & Schifferstein 1995; Wilton & Greenhoff 1988). While both areas seek to provide products with optimal beneficial properties, collaboration between them is often anything but smooth. Organizational procedural problems or differing attitudes on the part of the individuals involved are a typical phenomena of a discord that Souder believes to be based upon four shortcomings: Shortcomings in communication, interaction, mutual respect and mutual trust (see Souder 1981; Souder 1988)

The importance of descriptive methods has been the subject of controversy for some time now (see Moskowitz 1993; van Trijp & Schifferstein 1995; Wilton & Greenhoff 1988; McBride 1990; Stone & Sidel 1999). McBride, for example, appears in the literature as a determined critic. He divides the development of sensory product research into three phases. The first, he says, was characterized by the total lack of suitable methods for correlating data from Market Research (e.g., target group preferences) with those from Research and Development (e.g., from sensory tests or instrumental analyses). During the second phase, finally, the descriptive methods provide this correlation (see McBride 1990) and are intended to clarify which ingredients in the recipe are responsible for which reactions on the part of the target groups. In this respect, McBride criticizes the ambiguity of the vocabulary employed by descriptive panels. However, this article has shown that sophisticated methods of statistical analysis are capable of solving this problem.

McBride predicts a third phase in which "integrated psychophysics" will eliminate the need for descriptive methods (see McBride 1990). In this case, product characteristics (e.g., sugar content) are systematically varied in order to then observe the reactions of target persons under controlled conditions. The objective is to enable the interrelationship between physical and chemical product characteristics and the human reactions that are triggered by them to be analyzed – even without the employment of descriptive methods.

Stone and Sidel argue in a different way: They view these methods as an indispensable instrument for determining complete sensory profiles of test products, and thus for analyzing which sensory characteristics and which intensities of these characteristics are ultimately responsible for preference or aversion (Sidel & Stone 1993).

Another proponent is Moskowitz. In his view, sensory product research owes its current popularity to the descriptive methods. Their ultimate advantage, he says, is to stress illustrative, easy-to-understand portrayals of sensory product profiles that simplify communication between decision-makers. Yet he also sees a need for improvement and urges continued refinement of the methods (Moskowitz 1993).

Hardware and software innovations could synergistically complement these research efforts. A suitable point of departure for doing so is offered by powerful, flexible programs for conducting and analyzing descriptive analyses, such as "PSA for Windows" from OP&Partner, "FIZZ Sensory Analysis Management Software" from Bio Systems and "Compusense 5 for Windows".

Scharf and Schubert emphasize the importance of descriptive methods for product innovations. It is with good reason that the Consumer Dialog System (CDS) they developed utilizes descriptive data in order to explain target group preferences or aversions (Scharf & Schubert 1996; Scharf

2000). The CDS can be characterized as an instrument that explicitly involves quantitative and/or qualitative methods to gather consumer-oriented information for management decisions at all stages of the innovation process. Following this concept, it is critical for product development purposes to gain insights into the sensory perception of own and/or competitive products – thus, descriptive methods become important (see Figure 11).

Panel recruitment, too, has to be further improved. Subjecting potential panellists to multiple selection tests, as proposed within the context of Spectrum Descriptive Analysis, seems to be the correct approach. However, to be able to identify people with the desired capabilities early on, it will also be necessary to evolve the screening methods. Moreover, findings from the field of motivational research could also be a help in avoiding the need for costly retraining.

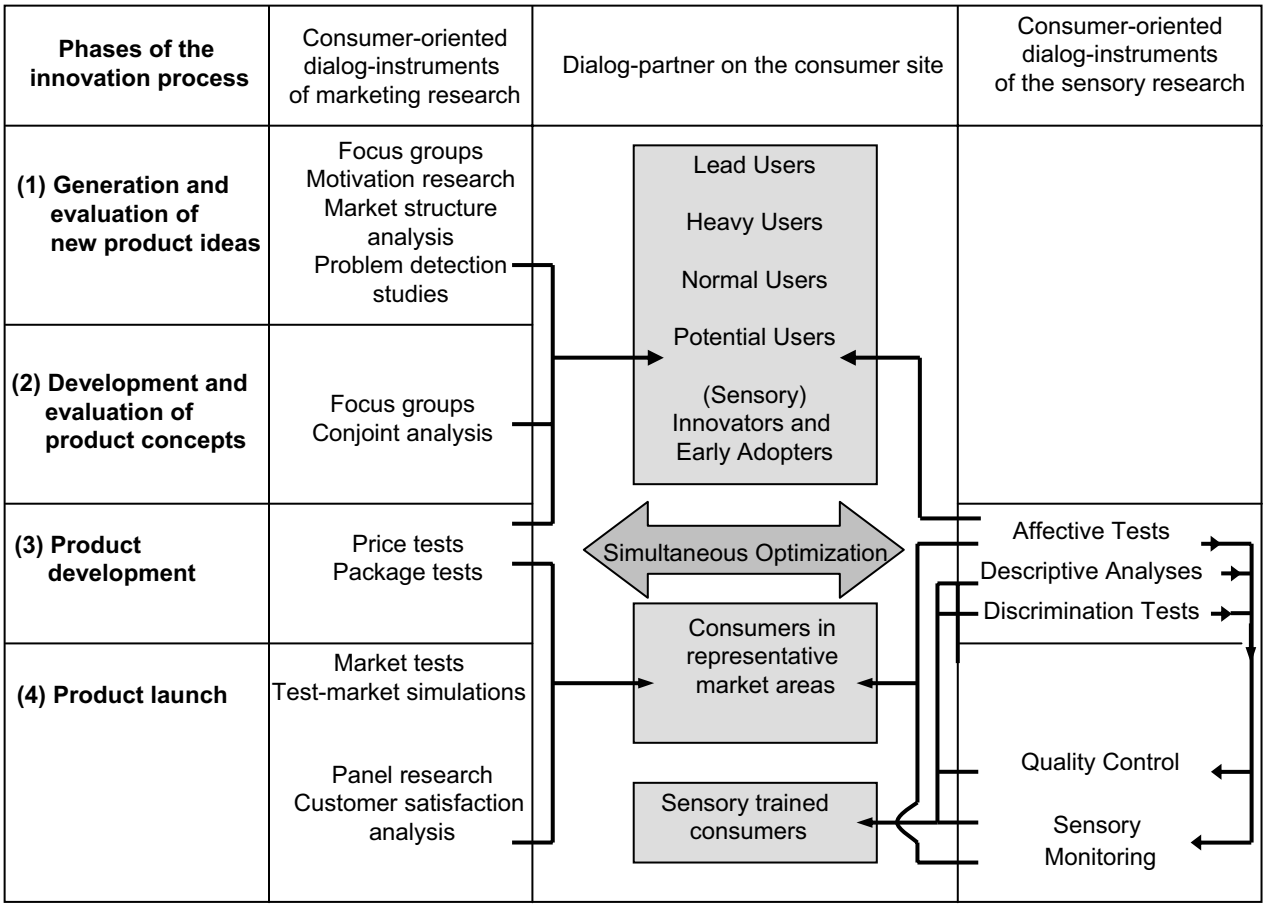

Figure 11: Overview about the Consumer Dialog System (source: Scharf 2000)

Appendix

	Flavor Profile Method CAIRNCROSS/ SJÖSTRÖM 1950	Quantitative Descriptive Analysis STONE/SIDEL 1974	Texture Profile Method SZCZESNIAK 1963	Free Choice Profiling WILLIAMS/ LANGRON 1984
Panellists	4 - 6 trained consumers/experts	10 - 16 trained consumers	4 - 6 trained consumers/experts	10 - 20 (trained) consumers/experts
Analysis Procedure	Under the guidance of a moderator, the panellists jointly define the nature, quantity and description of the sensory characteristics in a comprehensive discussion Each panellist assesses the intensities of the sensory characteristics that have been generated for each tested product (plus the additional overall impression of "amplitude" in the case of FPM)		With the exception of the fact that the panellists assess only haptic product characteristics and receive a list of precisely defined descriptors to simplify the evaluation, the analysis is performed analogously to the FPM	Each panellist individually stipulates the nature, quantity and description of the sensory characteristics Each panellist assesses the intensities of the individually perceivable sensory characteristics for each test product
Scaling Methods	5-level rating scale	6-inch long lineal scale with verbally anchored poles	5-level reference stimulus-supported rating scale	6-level rating or category scale
Analysis of Results	The individual results are discussed under the guidance of a moderator until a consensus is reached within the group Only one overall assessment for all panellists, no statistical analysis possible	Both the individual results as well as the overall result are statistically analyzed (using variance, factor and regressive analysis, in particular) Individual results that vary significantly from the overall result are eliminated	Same as for FPM	Both the individual results as well as the overall result are statistically analyzed (using Generalized Procrustes Analysis in particular)
Advantages	Elimination of personal assessment differences produces an unambiguous overall assessment High probability that all perceivable sensory characteristics will be taken into consideration	Reproducibility and statistical verifiability of all results High probability that all perceivable sensory characteristics will be taken into consideration	Affords the opportunity of systematically analyzing the haptic perceptions of the products	Panellists are not mutually influenced by discussing and agreeing upon the nature, quantity and description of sensory characteristics, as each panellist employs self-selected descriptors in making his/her assessment
Disadvantages	Individual results are influenced by discussing and agreeing upon the nature, quantity and description of sensory characteristics Extremely costly and time-consuming training of panellists Important individual assessments are lost by agreeing upon a joint final result No reproducibility and statistical verifiability of the final result Employed scale is not sensitive enough		Disregards the fundamental principles of synesthetic effects The predefined list of texture descriptors could give rise to the impression of "correct" descriptors Attempts to employ reference stimuli as scale anchors to minimize the personalized spread of perceptive data	Incomplete sensory assessment of the tested products as a result of the employment of self-selected descriptors Problems in linking the individual results to form a meaningful overall result (e.g. problems to interpret the individual descriptors in the joint visualization) Employed scale is not sensitive enough

Spectrum Descriptive Analysis **MUÑOZ/CIVILLE 1986**	**Time-Intensity Analysis** **NEILSON 1958**	**Dilution Profile Method** **TILGNER 1958/1962**	**Flash Profile** **DELARUE / SIEFFERMANN 2000**
15 carefully selected and trained consumers/experts	12 - 14 trained consumers	5 panellists selected with a view to their sensory skills	10 – 20 sensory evaluation experts – not necessarily product experts
The sensory product profiles are measured with the aid of an analysis list created beforehand within the panel on the basis of reference stimuli Each sample is measured 2-3 times, depending upon product category	The sensory perception of a product is measured from the time it is put into the mouth until some time after it has been swallowed The panellist uses a mouse to successively enter each perceived intensity in the PC	Systematic dilution is employed to provide access to subliminal flavor compounds for the analysis; they are then measured by the panellists	The uniqueness of Flash profile is a comparative procedure of evaluation of the complete product set. Panellists rank all samples attribute per attribute and thus focus on the differences among products. Development and usage of descriptors is identical with the procedure of Free Choice Profiling.
Various scales are employed, depending upon product category (magnitude scaling, 10 cm and 15 cm linear scale)	Intensity scales and projective profiles vary as a function of product category	5-level rating scale	Not exclusively specified; authors used 11-pt. intensity scale ranging from 0 (attribute not perceived) to 10 (very intense)
Various uni-, bi- and multivariate methods (in particular variance analysis) The results are visualized in the form of histograms	The results are graphically visualized in the form of Time-Intensity curves	FPM-like crescent visualization, on which the arithmetic average of the individual results is plotted	Same as for Free Choice Profiling
In addition to evaluating food products, it is also possible to assess paper, cosmetic, chemical and other products Intensive prescreening enables individuals whose perceptive shortcomings make them unsuitable as panellists to be eliminated early on	Takes into consideration the fact that taste is a dynamic, not a static phenomenon Precise information opens up new possibilities for analyzing the data	Enables off-flavor constituents in the tested products to be identified	Flash Profile combines the advantages of Free Choice Profiling with a comparative evaluation of all samples. Panellists are able to better discriminate among samples. By application of Flash Profile, one is able to receive fast and cost efficient insight into the relative sensory positioning of a set of products.
Experts are employed as panellists Lack on sensitivity on the part of “broadband panels,” which are expected to possess competence for multiple product categories	Method necessitates expensive laboratory equipment Broad spread in the perceptions of the panellists	The form in which the products are studied does not represent their “natural” state The form in which the results are visualized can easily result in misinterpretations	Flash Profile cannot substitute conventional profiling. If the most important research goal is to gain in-depth and very accurate descriptive profiles, one should decide to use conventional methodologies. As for Free Choice Profiling, data analysis may be subjectively influenced due to interpretation problems concerning the Mappings of Generalized Procrustes Analysis.