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SENSORY EVALUATION TECHNIQUES

Volume II

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Sensory Evaluation Techniques

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To Manon, Frank and Cathy

PREFACE

How does one plan, execute, complete, analyze, interpret, and report sensory tests? Hopefully, the practices and recommendations in these two volumes, cover all of those phases of sensory evaluation. The test is meant to provide enough information for a food technologist, a research and development scientist, a cereal chemist, a perfumer, or a similar professional working in industry, academics, or government to conduct good sensory evaluation. The books should also supply useful background to market research, advertising, and legal professionals who need to understand the results of sensory evaluation. They could also give a sophisticated general reader the same understanding.

As a "how to" for professionals, the text aims at a clear and concise presentation of practical solutions, accepted methods, and standard practices. The authors at first intended not to devote text and readers' time to resolving controversial issues. Unfortunately, we encountered quite a few which had to be tackled. This is the first book to give an adequate solution to the subject of similarity testing, see Chapter 6, Section II.G and Statistical Tables T11, T12, and T13 at the end of Volume II. Fully half of all sensory tests are done for purposes of similarity testing, for example when an ingredient must be substituted for another which has become unavailable or too expensive, or when a change in processing is caused by replacement of an old or inefficient piece of equipment. Another first is the unified statistical treatment of all ranking tests with the Friedman statistic, in preference to Kramer's tables. We have taken a fresh look at all statistical methods used for sensory tests and hope that you like our straightforward approach.

Also new is a system called Spectrum®, developed by one of us (GVC) for designing procedures of descriptive analysis (Chapter 8). The philosophy behind Spectrum is twofold; (1) to tailor the test to suit the objective of the study (and not to suit a prescribed format) and (2) that the choice of terminology and reference standards are factors too important to be left to the panelists, however well trained. These items should be chosen by the sensory analyst who needs all the accumulated experience of his or her profession for the task.

The authors wish the book to be cohesive and readable; we have tried to substantiate our directions and organize each section so as to be meaningful. We do not want the book to be a turgid set of tables, lists, and figures. We hope to have provided structure to the methods, reason to the procedures, and coherence to the outcomes. We want this to be a reference text that can be read for understanding as well as a handbook that can serve to summarize sensory evaluation practices.

The organization of the chapters and sections is also straightforward. Chapter 1 lists the steps involved in a sensory evaluation project and Chapter 2 briefly reviews the workings of our senses. In Chapter 3, we list what's required of the equipment, the tasters, and the samples, while in Chapter 4, we have collected a list of those psychological pitfalls which invalidate many otherwise good studies. Chapter 5 discusses how sensory responses can be measured in quantitative terms. Chapter 6 lists all the common sensory tests for difference, the triangle, duo-trio, etc., as well as the various attribute tests in use, such as ranking and numerical intensity scaling. Thresholds and just-noticeable differences are briefly discussed in Chapter 7, followed by what we consider the main chapters, Chapter 8 on descriptive testing, Chapter 9 on affective tests (consumer tests), and Chapter 10 on selection and training of tasters.

The body of text on statistical procedures is found in Chapters 11 and 12 but in addition, each method (triangle, duo-trio, etc.) is followed by a number of examples showing how statistics are used in the interpretation of each. Basic statistical concepts such as null and alternative hypotheses, Type I and Type II errors and their relation to alpha, beta, and the sample size "n", one-sided vs. two-sided tests, etc. are presented in Chapter 11. We refrain from detailed discussion of statistical theory, preferring instead to give examples. Included

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in Chapter 12 are discussions of some commonly used experimental designs, such as the randomized block, split plot, and balanced incomplete block. Chapter 12 also includes a discussion of multiway treatment structures, such as factorial experiments and the ever more frequently used statistical technique of Response Surface Methodology (RSM) in which predictive equations are developed that relate a set of sensory responses to the levels of a set of processing parameters or, alternatively to the proportions of a set of ingredients. Also in Chapter 12 the use of multivariate techniques is briefly discussed. This is a subject still in its infancy and future editions of this book probably will contain expanded treatment of this topic.

At the end of Volume II, the reader will find guidelines for the choice of techniques and for reporting results, plus the usual glossaries, indexes, and statistical tables.

With regard to terminology, the terms "subject", "panelist", "judge", "respondent", and "assesor" are used interchangeably, as are "he", "she", and "(s)he" for the sensory analyst (the sensory professional, the panel leader), and for individual panel members.

Morton Meilgaard
Gail Vance Civille
B. Thomas Carr

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Dr. Meilgaard's professional interest is the biochemical and physiological basis of flavor, and more specifically the flavor compounds of hops and beer and the methods by which they can be identified, namely chemical analysis coupled with sensory evaluation techniques. He has published over 50 papers and received the Schwarz Award for studies of compounds that affect beer flavor. He is founder and past president of the Hop Research Council of the U.S.A., also chairman of the Scientific Advisory Committee of the U.S. Brewers Association, and for 14 years he has been the chairman of the Subcommittee on Sensory Analysis of the American Society of Brewing Chemists.

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As a Course Director for the Center for Professional Advancement, she has conducted several workshops and courses in basic sensory evaluation methods as well as advanced methods and theory. In addition, she has been invited to speak to several professional organizations on different facets of sensory evaluation.

Ms. Civille has published several articles on general sensory methods, as well as sophisiticated descriptive flavor and texture techniques. After graduating from the College of Mount Saint Vincent, New York with a B.S. degree in Chemistry, Ms. Civille began her career as a product evaluation analyst with the General Foods Corporation.

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Mr. Carr received his B.A. degree in Mathematics from the University of Dayton, and his Master's degree in Statistics from Colorado State University.

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