

Index

Page numbers in *italics* refer to figures or tables

- A-not-A procedure, 151
 - one tailed, 184
- Acceptance testing, 35
 - budgetary and timing considerations, 249
 - central location tests (CLTs), 263, 264–7
 - consumer numbers, 273–4
 - cost effectiveness, 251, 277
 - “the curse of *N*”, 273–4
 - employee v. non-employee panels, 260–1
 - hedonic scaling, 3
 - home-use tests, 263, 267–71
 - incomplete designs, 264
 - laboratory testing, 262–4
 - methods, *see* Acceptance testing methods
 - mobile laboratory, 266, 266–7
 - mobile serving cart, 266, 266
 - non-employees as subjects, 261–2, 272
 - panels, 262–3
 - “piggy-back” tests, 265
 - practical v. statistical significance, 274
 - preference questioning, 275–6
 - problems, 272–6
 - procedures and practices, 277
 - product variability and, 274
 - purpose of, 274
 - questions, sequence of, 276
 - responsibility for, 249–50
 - scorecards, 253, 274–5
 - types of, 262–72
- Acceptance testing methods, 251–9
 - face (smiley) scale, 257–8
 - hedonic scale, nine-point, 255–6
 - miscellaneous, 256–9
 - paired comparison, 252–5
 - quality scales, 257
- Advertising claims, 24, 290–4
 - consumer testing, 293
 - legal scrutiny, 293, 294
 - national taste test claims, 293
 - product source, 294
 - test planning and procedures leading to, 292–4
- Affective testing
 - in product development, 307–8, 311
 - replication in, 50, 116–17
 - see also* Acceptance testing
- Analysis of variance (AOV), 86–7, 123–4
 - F* ratio, 124
 - in QDA, 223–7, 230
 - replication and, 123
 - tests after *F* test, 124
- Anchors, for rating scales
 - products as, 214
 - word anchors, 79–81, 221, 221–2
- Anticipation error, 107
- AOV, *see* Analysis of variance
- Apprenticeship, in judging product quality, 288
- Appropriateness of product for testing, 103
 - guidelines, 103
- Avoidance of extremes, minimizing in QDA, 222
- Bipolarity, 256
 - just-about-right (JAR) scale, 93
 - nine-point hedonic scale, 90
 - semantic differential scale, 96
- Bonferroni test, 124, 232
- Booths, 42, 43, 45
 - balanced guillotine door, 44, 45, 46
 - booth time, 40
 - bread-box door, 44–5, 45
 - dimensions, 41–6
 - lighting, 42
 - location of, 38, 46
 - number and arrangement of, 37–8, 40
 - planning, 41–6
 - in quality control testing, 320
 - sample pass-through doors, 44
 - sinks, 41–2
 - subjects’ access to, 46
 - ventilation, 44
- Brand extensions, 13
- Brand management, 25
- Business plan, 26

- Canning bees, 8
- Capabilities, based on available resources, 23
- Carriers, in discrimination testing, 168–70
- Category scaling, 70
- Central location tests (CLTs), 263, 264–7
- Central tendency error, 104–5
- Chemical names, use of, 206
- Children
 - as subjects, 257–8
 - use of scales, 83, 89, 90–2
- Choice behavior, 148–9
- Clinical trials, 291
- Color lighting, 42–4, 101
- Competition, monitoring of, 24
 - descriptive analysis and, 243
- Computers, *see* Software
- Consistency of results, 114
- Constant-stimulus method, 194–5
- Consumer insights, 31
- Consumer testing, 247, 251
 - guidelines, 250, 293
 - risks in, 15, 273
- Consumers
 - in discrimination testing, 147
 - qualified/unqualified, 162
 - unscreened, 162
- Contingency coefficient, 75
- Contingency table, 75
- Contrast errors, 104, 109–10, 306
- Control products, in product development, 305, 307, 309–10
- Convergence errors, 104, 109–10, 306
- Corporate strategy, changing, 29
- Cost effectiveness, 15
 - acceptance testing, 251, 277
- Cost reduction, 2, 24, 25
- Courses, educational, 10, 12, 340
 - online, 340
- Curve fitting, 86
- Cutting bees, 8
- Data analysis
 - in descriptive analysis, 210–11
 - and interpretation in discrimination testing, 174–94
 - just-about-right (JAR) scale, 93–5, 259
 - multiple paired tests, 255
 - in optimization, 327–8, 329–31
 - paired-comparison test, 253–4
 - in QDA, 210, 223–35
 - statements of results, Types 1 and 2 errors, 117–20, 191, 194
 - TURF, 95, 259
- Data processing, 48–9
 - capabilities, 26
 - digitizers, 48, 49
 - direct data entry, 39
 - satellite system, 38, 49, 49
- staff, 34
 - see also* Software
- Database
 - acceptance testing, 260
 - in product development, 305, 306, 307, 309, 312
 - review, 122
- Descriptive analysis, 2, 201–45
 - applications, 242–4
 - data analysis, 210–11
 - definition, 202
 - in the food and beverage industry, 202–3
 - historical perspective, 202–3
 - in optimization, 331–2
 - panel leader's role, 203, 242
 - psychological aspect, 207
 - in quality control monitoring, 322, 324
 - scorecards, 209, 210–11, 242, 321
 - subject pool size, 52–3
 - subject screening, 204–5
 - subject selection, 203–4
 - subject training, 205–10
 - test methods, *see* Descriptive analysis test methods
 - as type of introspection, 207
- Descriptive analysis test methods, 211–42
 - classification, 211, 211
 - diagnostic descriptive analysis, 211, 239–42
 - Flavor Profile, 202–3, 203, 211, 212
 - Free-Choice profiling, 207–8, 211, 238–9
 - miscellaneous, 239–42
 - product experts, 211
 - Profile Attribute Analysis, 240
 - QDA, *see* QDA (Quantitative Descriptive Analysis)
 - qualitative, 211
 - quantitative, 211
 - Quantitative Flavor Profiling, 241
 - Spectrum Descriptive Analysis, 210, 211, 235–8
 - Texture Profile, 211, 213–15
- Descriptive panel, 289
- Descriptive profiles, 316–17, 325
- Descriptive tests, 35, 50
 - replication in, 115, 115–16
- Diagnostic descriptive analysis, 211, 239–42
- Difference-from-reference scale, 298
- Difference-preference test, 273
- Difference testing, 56–7
 - and discrimination testing, 147, 148
 - report form, 65
- Digitizers, 48, 49
- Discrimination v. recognition, 196–7
- Discrimination testing, 35, 50, 57–8, 100, 112, 145–200
 - carriers, 168–70
 - components of, 156–95
 - consumer numbers, 147
 - data analysis and interpretation, 174–94
 - and difference testing, 147, 148

- experimental design, 170–4
 forced-choice, 149, 184
 guidelines, 163–4, 199–200
 innate qualities, 199
 lighting, 167–8, 195
 limitations, 146
 management of, 156–7
 methods, *see* Discrimination testing methods
 miscellaneous, 155
 misuse of, 147
 no-decision responses, 184
 number of subjects per test, 40–1
 objectives, 158–9
 one-tailed, 184
 operational elements, 156–7
 organization, 156–7
 preference testing after, 147, 196–7
 procedures, 10, 159–74
 product coding, 170
 product preparation and serving, 167
 product screening, 159–60
 in quality control monitoring, 321–2, 324
 record keeping, 156, 164–5
 replication in, 115, 185–90
 requests for, 158, 158
 sensitivity, 160–1
 statistical significance tables, 174, 175–83, 184
 subject pool size, 52–3
 subject selection, 162–6
 test selection, 160–2
 two-tailed, 184
 visual difference, 161–2, 167
- Discrimination testing methods, 149–55**
 directional discrimination, 76
 dual-standard method, 155
 duo-trio tests, *see* Duo-trio tests
 just-noticeable-difference (JND), 193, 194–5, 198
n-AFC, 155
 paired-comparison test, 149–51
 same-or-different test, 160, 170, 172, 184
 sequential analysis, 166
 triangle test, *see* Triangle test
- Dissimilarity scale, 70**
Dual standard method, of discrimination testing, 155
Duncan's test, 119, 124, 230, 231, 232, 233, 233
Dunnett's test, 124, 141, 230, 232
Duo-trio tests, 152–3, 171
 balanced, 171, 172
 constant-reference, 152–3, 161, 171, 173, 192
 one tailed, 184
 scorecards, 152, 152
- Education**
 courses, 10, 12
 sensory professionals, 339–43
- Efficacy, *see* Product efficacy**
Electronic noses and tongues, 59–60, 282, 325
Employee acceptance tests, validity of, 260–1
- Employees**
 v. non-employees as subjects for acceptance tests, 260–1
see also Staff
- End-order effects, *see* Avoidance of extremes**
Errors in statements of results, Types 1 and 2 errors, 117–20, 191, 194
Errors in testing, 100–1
 of anticipation, 107
 central tendency error, 104–5
 contrast errors, 104, 109–10, 306
 convergence errors, 104, 109–10, 306
 of expectation, 107
 first-sample effect, 104
 first-sample error, *see* Time-order error
 of habituation, 107
 halo effect, 108
 leniency error, 108
 logical error, 108
 order effect error, *see* Time-order error
 position error, *see* Time-order error
 proximity error, 108–9
 psychological, 100, 104–10
 stimulus error, 107
 time-order error, 105–7
- Ethnographics, 303**
Expectation error, 107
Experimental design, 134–7
 balanced-block designs, 134, 136, 138, 138
 balanced-incomplete-block designs, 139, 142
 discrimination testing, 170–4
 guidelines, 134–6
- Expert panels, 288–90**
Experts, 6, 8, 287–90
 description, 287–8
 expert panels, 288–90
 judging product quality, 288
 v. trained panel, 280–1, 288–9
- External validity, 114**
- F* ratio, 124
F test, tests after, 124
Face (smiley) scales, 90–2, 257–8
 risk of misinterpretation, 257
Face validity, 114
Factor analysis, 210–11
 physical/sensory/chemical data, 284–7
 Fechner, G. T., 17–18
First-sample effect, 104
First-sample error, *see* Time-order error
Fisher's least significant difference (LSD) test, 124
 modified, 232
- Flavor**
 evaluation, 146
 importance of, 3, 7
Flavor Profile method, 10
 collective judgment, 212
 of descriptive analysis, 211, 212, 240–1

- Flavor Profile method (*continued*)
 development of, 202–3
 dilution procedure, 212
 panel leader's role, 212
 subject selection/screening, 203, 212
- Focus groups, 302–3, 304
 information from, 304
- Food action rating scale (FACT), 248
- Food safety, 3, 312, 325
 health and safety regulations, 290
- Forced-choice tests, 149, 184
- Free-Choice profiling, 207–8, 211, 238–9
 use of statistics in, 207
- Front-end research, 304
- Functional measurement, 83
- Future, 343–4
- General linear model (GLM) hypothesis, 123
- Goals and objectives, 26, 27–9
- Graphic rating scale, 83–4, 221
- Habituation error, 107
- Halo effect, 108, 252, 276
- Health and safety regulations, 290
- Hedonic continuum, 248
- Hedonic scale, nine-point, 82, 87–90, 105, 106, 255–6
 bipolarity, 90
 criticisms of, 89–90, 256
v. magnitude estimation, 255–6
- Hedonic scaling, 3
- History, 7–10
- Home-use tests, 263, 267–71
- Imagery, 2
- Implementation stage, 30
- Ingredients
 modification, 150
 replacement, 32
 testing, 323–4
see also Reference products/ingredients
- Institute of Food Technologists, Sensory Evaluation Division, 3, 13
- Instrument–sensory relationships, 281–7
 factor analysis, 284–7
 physical/chemical/sensory measures, 283, 284
- Instruments
 advantages of, 282
 and hedonic response, 282, 283
 humans functioning as, 5
 imitative, definitions, 281
 preference testing and, 282–3
- Interval scales, 83–4
- Introspection, descriptive analysis as, 207
- Jar scale, *see* Just-about-right (JAR) scale
- Judgments, independence/dependence of, 117
- Just-about-right (JAR) scale, 92–3, 259
 bipolarity, 93
 data analysis, 93–5, 259
- Just-noticeable-difference (JND), 17, 18, 193, 194–5, 198
 constant-stimulus method, 194–5
 single-stimulus method, 195
- Kertosis, 120, 121
- Labeled affective magnitude scale (LAMS), 105, 256
- Labeled Magnitude Scale (LMS), 87
- Laboratory testing, 262–4
 mobile laboratory, 266, 266–7
- Language, sensory/descriptive
 development of, 206–7
 including references, 210
v. subjects' own terminology, 206, 207
- Latin-square design, 105
- Law of Comparative Judgment, 19
- Least significant difference (LSD) test, 124
 modified, 232
- Leniency error, 108
- Lighting
 color, 42–4, 101
 for discrimination testing, 167–8, 195
- Likert scale, 96, 97, 258
- Liking
 asking subjects' reasons for, 275
 measurement of, 248, 276
- Line extensions, 302, 308, 309
- Line scales, 83–4
 in QDA, 221–2
- Listening, selective, 304–5
- Logical error, 108
- McNemar test, 93, 94, 95
- Magnitude estimation, 19, 70, 84, 85, 90, 341–2
v. nine-point hedonic scale, 255–6
- Magnitude-of-difference scoring, in quality control monitoring, 322
- Magnitude production, 84
- Magnitude scales, 70
 labeled affective magnitude scale (LAMS), 105, 256
 Labeled Magnitude Scale (LMS), 87
- Managers
 educating, 343
see also Sensory professional-managers
- Market share, growth in, 2
- Marketing research, 15–16
 acceptance testing and, 249
 paired-comparison test in, 254
- Measurement, 69–97
 functional, 83
- Meat product evaluation, 256
- Metathetic continua, 85

- Motivation of subjects, 59–61
guidelines, 60
- Multiple-factor designs and analyses, 125–33
split-plot (mixed) designs, *see* Split-plot (mixed) designs and analysis
treatment-by-treatment-by-subject ($T \times T \times S$), 126, 127
treatments-by-subject ($T \times S$), 125–7
- Multiple paired tests, 141–3, 254–5
data analysis, 255
- Multiple regression/correlation (MR/C) techniques, 326–7, 328, 332
- Multiproduct tests, in product development, 306
- Multivariate analysis, 342–3
in QDA, 228–30
- n*-AFC discrimination testing methods, 155
- N* of 1, *see* Experts
- National Advertising Division (NAD), Better Business Bureau
concerns referred to, 294
guidelines, 293, 294
- National taste test claims, 293
- Neural networks, 328, 342–3
- Newman–Keuls test, 119, 124, 230, 231, 232
- Newspaper articles, 12
- Nine-point hedonic scale, *see* Hedonic scale, nine-point
- Nominal scales, 73–6
- Non-employees, as subjects for acceptance tests, 261–2, 272
v. employees, 260–1
- Non-parametric statistical methods, 112–13
- Noses, electronic, 59–60, 282, 325
- Number biases, 5, 9
- Objectives, *see* Goals and objectives
- Operational strategy, 23
- Operations manual, 27, 65–6
- Optimization, 325–35
cluster analysis, 332–3
complexity of, 332
consumer questionnaires, 334–5
data analysis, 327–8, 329–31
definition, 326
descriptive analysis in, 331–2
design approaches, literature on, 331–2
objective, 327
process stages, 328, 329
in product development, 311
product selection, 331
types of programs, 326
Usage and Attitude (U&A) data, 334
use of optimization information, 326
- Order effect error, *see* Time-order error
- Ordinal scales, 76–83
data analysis, 82
interval properties, 81–2
parametric/non-parametric categories, 82
ranking, 76–9
- Organization, importance of, 21–2
- Organizational plan, 23
- Organoleptic analysis, 9
- Paired-comparison test, 3, 76, 77, 82–3, 149–51, 252–5
A-not-A procedure, 151
data analysis, 253–4
directional, 149, 150, 171
discrimination testing, 170, 171, 171
dislike both equally, 252, 254
in marketing research, 254
no preference option, 252, 253–4
paired eating method, 151
- Paired-eating method, 151
- Paired-preference data *v.* scaled data, 271
- Paired-preference test, 76, 82, 92
scorecard, 253
- Paired same-or-different test, 170, 172
- Panels
acceptance testing, 262–3
compared, 289–90
employee *v.* non-employee, in acceptance testing, 260–1
trained *v.* expert, 280–1, 288–9
- Parametric statistical methods, 112–13
- Partial least squares (PLS), 327
- Perceptions, phantom, 58, 107
- Performance monitoring, of subjects, 26, 59–61
- Personal care products, frequency of application, 292
- Phantom attribute, 107, 210
- Phantom perceptions, 58, 107
- Physical/chemical-sensory relationships, descriptive analysis and, 244
- Physiological perspective, 16–19
neural pathways, 16
sense receptors, 16
- Planning, 24, 27, 30, 66
business plan, 26
organizational plan, 23
- Planning stage, 30
- Position error, *see* Time-order error
- Power law, 85
- Preference measurement, 248
- Preference testing, 247
after discrimination testing, 147, 196–7
paired comparison, 252–5
- Preparation area, 46–8
counter space, 47
heating, lighting, ventilation, 47–8
- Principal components analysis (PCA), 284, 289
- Process/ingredient/analytical/sensory relationships, 24
- Procrustes analysis, 239
- Product attitude survey (PAS), 54, 163, 164–5

- Product development, 24, 301–12
 affective testing, 307–8, 311
 control products, 305, 307, 309–10
 database, 305, 306, 307, 309, 312
 definition, 301
 descriptive analysis and, 244
 failure rate, 301–2
 marketing and sensory testing objectives, 305
 multiproduct tests in, 306
 new ideas, sources and procedures, 302–3
 optimization and, 311
 project team, 311
 publications featuring, 302
 QDA in, 305–6, 309
 sequence of events in, 307–11
- Product differences, 145–6, 227
 description of, 198–9
 giving atypical results, 25
 magnitude of, 197
- Product efficacy
 biological, 290, 291
 perceived, 290–4
- Product stability testing, 295–301
 determining shelf life, 295–7
 difference-from-reference scale, 298
 methods, 299–300
 planned approach to, 301
 product source and, 297
 project termination criteria, 300
 split-plot analysis, *see* Split-plot (mixed) designs
 and analysis
 use of a control/reference, 297–8, 300
- Products
 appropriateness of, for testing, 103
 “bridge products”, 333
 changing concepts, 306–7
 criteria for testing, 102–3
 dating, 295, 301
 development of, *see* Product development
 differences between, *see* Product differences
 efficacy, perceived, 290–4
 evaluation of, 5, 202
 failure, 13
 grading, 314, 315
 “ideal”, 310
 intrinsic sensory properties, 248
 knowledge of, and test strategy, 100–1
 numerical codes for, 73, 170
 preparation and serving, in discrimination testing,
 167
 product line extensions, 302, 308, 309
 quality index, 318–19
 reference products, *see* Reference products/
 ingredients
 reformulation, 24
 scorecards for, *see* Scorecards
 screening, in discrimination testing, 159–60
 sensory specification, 24
 serving order during tests, *see* Serving order
 shelf life, 295–7, 301
 source of, in product stability testing, 297
 stability testing, *see* Product stability testing
 variability in, 187, 274
see also Quality control
- Profile Attribute Analysis, 240
- Profitability, contribution towards, 21–2
- Program strategy, 26, 29–31
- Project team, in product development, 311
- Proprietary situation usage surveys, 334
- Prothetic continua, 85
- Protocepts, 310–11
- Proximity error, 108–9
- Psychological errors in testing, 100, 104–10
- Psychological perspective, 16–19
- Psychology, measurement in, 69–70
- Psychophysical Law, 17–18, 84–5
- Psychophysical Power Law, 18
- Psychophysics, 17–19
- Public relations activities, 50
- Publications, sensory evaluation, 340
- QDA (Quantitative Descriptive Analysis), 211, 215–35
 consensus language development, 219–20
 data analysis, 210, 223–35
 describing sensory properties, 216–17
 development of, 215–16
 discrimination trials in, 204
 evaluation of multiple products, 217
 features of, 216–35
 line scales, 221–2
 minimizing end-order effects (avoidance of
 extremes), 222
 panel leader’s role, 205
 in product development, 305–6
 product difference, 227
 quantification, 220–3
 reference material, 219
 reliability of responses, 222–3
 repeated trials, 222–3
 sensory maps/pictures (“spider webs”), 234–5,
 234, 236–7
 subject response behavior, 225, 225–6
 subjects limited in number, 218–19
 subjects qualified before participation, 218
 terminology, 207, 208–9, 217
 training, 208, 241
- Quality, meaning, 312–13
- Quality assurance, 24, 316
- Quality control, 24, 312–25
 aim, 313
 consumer-based, 314
 descriptive analysis and, 244
 descriptive profiles, 316–17, 325
 monitoring, *see* Quality control monitoring
 sensory programs’ lack of success, 313–14
 variation in products, 312

- Quality control monitoring
 descriptive analysis, 322, 324
 discrimination testing, 321–2, 324
 evaluation frequency, 321
 finished product evaluation, 324
 go/no-go decisions, 321, 322, 323
 guidelines, 320–3
 management commitment to, 324–5
 manufacturing process, stages appropriate for, 323–4
 methods, 321–2
 out-of-date systems, 314
 product acceptance–rejection criteria, 321
 record-keeping and reporting, 323
 reference material, 320, 321–2, 325
 resources, 319–21
 subject performance monitoring, 322
 subject screening, 320
 subject training, 320–1
 testing area, 320
- Quality scales, 257
- Quality standards, 313, 315, 316
- Quantitative Descriptive Analysis, *see* QDA
- Quantitative Flavor Profiling, 241
- Questionnaires for completion by consumers, 334–5
- Questions
 close-ended, 76
 open-ended, 74, 75–6, 252, 274, 275
- R-index*, 155
- Rank-order test, 76
- Ranking tests, 76–9
 data analysis methods, 78–9
 direct, 77
 limitations, 77–8
 multi-product, 77
- Rating scales, 79
 data analysis, 82
 graphic, 83–4, 221
 nine-point, 79
 word anchors, 79–81, 221, 221–2
see also Scales
- Ratio estimation, 84
- Ratio production, 84
- Ratio scales, 84–7
 data analysis, 86–7
 magnitude estimation, 84, 85, 86, 341–2
 use of (ratio scaling), 70, 85–6, 342
- Raw materials
 sampling, 283
 specification, 24
- Recognition *v.* discrimination, 196–7
- Record keeping
 discrimination testing, 156, 164–5
 in quality control monitoring, 323
 test reports, 26, 63–5
see also Performance monitoring; Test requests
- Reference products/ingredients, 141–3, 219
 for quality control tests, 320, 321–2, 325
- Reliability, 113–15
 of responses in QDA, 222–3
 of results, 4, 113–15
- Replication, 115–17, 119
 additional subjects in place of, 116
 in affective testing, 50, 116–17
 AOV and, 123
 in descriptive tests, 115, 115–16
 in discrimination testing, 115, 185–90
 in multiple-factor designs and analyses, 125–6
 statistical approach to, 116
- Request stage, 30, 31
- Research, 27, 66
 front-end research, 304
- Research and development, 25, 26
- Response scales, 71
 bias and, 72
 desirable features, 71–2
 ease of use, 71
 meaningfulness of, to subjects, 71
 pilot test on inauguration of, 73
 sensitivity, 72
 statistical analysis, 72
 validity/relevance, 72
see also Scales
- Response surface methodology (RSM), 326, 327, 328, 332
- Results, reliability and validity, 4, 113–15
- Risk
 in decision-making, Types 1 and 2 errors, 117–20, 191, 194
 statistical, 112
- Salt, perception of, 148
- Same-or-different test, 160, 170, 172
 one-tailed, 184
- Scaled data *v.* paired-preference data, 271
- Scales, 71–87
 avoidance of extremes, 105
 categories, 73
 children using, 83, 89, 90–2
 difference-from-reference scale, 298
 dissimilarity scale, 70
 face (smiley), 90–2, 257–8
 five-point, 79, 291
 food action rating scale (FACT), 248
 hedonic scale, nine-point, *see* Hedonic scale,
 nine-point
 interval, 83–4
 just-about-right (JAR) scale, 92–5, 259
 labeled affective magnitude scale (LAMMS), 105, 256
 Labeled Magnitude Scale (LMS), 87
 Likert, 96, 97, 258
 line scales, 83–4, 221–2
 magnitude scale, 70
 nominal, 73–6

- Scales (*continued*)
 ordinal, 76–83
 quality, 257
 ratio. *see* Ratio scales
 semantic differential, 96, 258
 suitability for stated problem, 96–7
 three-point, 291
see also Rating scales; Response scales
- Scaling, 5
 multidimensional, 76
- Scaling theory, 70
- Scheffé test, 119, 124, 230, 232
- Scorecards, 5, 9, 108, 109
 for acceptance testing, 253, 274–5
 for descriptive analysis, 209, 210–11, 242, 321
 for directional paired-comparison test, 149, 150
 for duo-trio test, 152, 152
 for paired-preference test, 253
 product quality index, 316–19
 simple v. multipage, 274–5
 for triangle test, 154
- Scoring, 3
- Semantic differential scale, 96, 258
 bipolarity, 96
- Sensitivity, of response scales, 72
- Sensory analysts, 33–4, 35
- Sensory evaluation
 activities, 24
 as applied science, 208
 capabilities, 28
 courses in, 340
 defining, 13–16
 development of, 11–13
 different views on, 22–3
 early developments, 10
 early survey, 3
 encompassing all senses, 14, 16–17
 future, 343–4
 goals and objectives, 26, 27–9
 greater awareness of, 1
 historical background, 7–10
 an independent group, 26
 location within company, 25–6
 misuse of, 338
 opportunities for, 12–13
 as part of marketing decisions, 2
 as profitable investment, 344
 publications, 340
 reliance on single methods, 11–12
 a scientific discipline, 2–3, 4, 11, 13, 208, 339–41
 web sites, 340
 workshops, 340, 343
- Sensory evaluation program
 elements of, 26–7
 organization of, 24–66
- Sensory fatigue, 82, 141, 185, 186, 214
- Sensory forgetting curve, 163
- Sensory information, understanding of, 4–5
- Sensory professional-managers, responsibilities, 32
- Sensory professionals
 attributes, 338
 duties, 23, 33, 35
 education and, 339–43
 management skills and, 33
 need for, 337–8
- Sensory programs
 impact of, 280
 lack of success, 313–14
 time to develop, 337
- Sensory technicians, 33
- Sequential analysis, 68, 166
 in subject selection, 58
- Serving order, 134–6
 directional paired-comparison test, 171
 monadic sequential, 117, 125, 136, 168, 195
 paired same-or-different test, 172
 triangle test, balanced order, 173
 duo-trio test, balanced reference, 172
 duo-trio test, constant reference, 173
 three-product test, 137, 137–8
 four-product random test, 135
 four-product test, 138, 138
 four-product test with replication, 139, 139
 five-product test, 139, 140
 twelve-product test, 139, 141
- Shelf life, 295–7, 301
- Signal detection theory, 18, 149, 185
- Single-sample presentation, 3
- Single-stimulus method, 195
- “Sip and spit” procedure, 200
- Skewness, 120, 121
- Smith’s procedure, 188
- Software
 reliance on standard packages, 1, 2
 statistical packages, 124
- Spectrum Descriptive Analysis, 210, 211, 235–8
 subject training, 235
- Split-plot (mixed) designs and analysis, 111,
 128–33, 300
 one-within and one-between, 128, 129, 260
 one-within and two-between, 128, 132–3
 two-within and one-between, 128, 130–1
- Stability testing, *see* Product stability testing
- Staff, professional, 26, 31–6
 clerical/data processing, 34, 35
 core group, 34
 numbers needed, 34, 35, 36
 recruiting, 31–2
see also Employees; Sensory analysts; Sensory
 professional-managers; Sensory
 professionals; Sensory technicians
- Statistical considerations, 111–33
 database review, 122
 external validity, 114
 judgments, 117
 reliability, 113–15

- replication, 115–17
- risk, 112
- risk in decision-making, 117–20
- subject selection, 117
 - Types 1 and 2 errors, 117–20
 - validity, 113–15
- Statistical measures, 120–33
 - analysis of variance (AOV), *see* Analysis of variance
 - general linear model (GLM) hypothesis, 123
 - kurtosis, 120, 121
 - multiple-factor designs and analyses, 125–33
 - skewness, 120, 121
 - t*-test, 122–3
- Statistical methods
 - parametric/non-parametric, 112–13
 - sequential analysis, 68, 166
- Statistical power, 119
- Statistical significance tables, discrimination testing, 174, 175–83
- Statisticians, delegation to, 111
- Statistics
 - computer software packages, 124
 - factor analysis, 210–11
 - in Free-Choice profiling, 207
 - misunderstanding/misuse of, 210
- Steven's Power Law, 85
- Stimulus error, 107
- Storage stability, 24
- Storage testing, descriptive analysis and, 243
- Strategic thinking, 23
- Structuralism, 207
- Stuart–Maxwell test, 93–5
- Student's *t* distribution, *see t*-test
- Subject bias, 52, 260
- Subject performance
 - in discrimination testing, 165, 166
 - quality control monitoring, 322
- Subject pool, 26
 - changing membership, 55
 - size of, 52
 - time needed to build up, 52–3
- Subject screening, 26, 53, 53–9, 259
 - for descriptive analysis, 204–5
 - difference tests, 56–7
 - discrimination tests, 57–8
 - multiple product types, 204–5
 - product category specific, 204
 - purpose of, 204
 - for quality control monitoring, 320
 - screening tests, 53–5
 - selection of products for, 58
 - survey forms, 53, 54, 55
 - threshold tests, 56
- Subject selection, 50–3
 - criteria, 259–60
 - descriptive analysis, 203–4
 - discrimination testing, 162–6
 - sequential analysis, 58
- Subject training, 5–6
 - acceptance testing *v.* discrimination/descriptive testing, 260
 - activities forming part of, 205
 - for descriptive analysis, 205–10
 - descriptive language and, 205
 - objectives of, 210–11
 - QDA method, 208, 241
 - for quality control monitoring, 320–1
 - references, 209–10
- Subject variability, 5
 - colored lighting and, 42–4
- Subjects
 - access to booths, 46
 - availability of, 38
 - compensation/rewards, 60, 164, 262, 272
 - frequency of participation, 39, 51–2, 260
 - guidelines on working with, 51
 - motivation, 59–61
 - motivation guidelines, 60
 - movements to/from facility, 38, 39
 - non-employees as, 261–2, 272
 - performance monitoring, 26, 59–61
 - pool of, *see* Subject pool
 - qualified to participate, 51, 56, 58–9, 120, 218
 - random selection, 117
 - response behavior, 225, 225–6
 - screening, *see* Subject screening
 - selection of, *see* Subject selection
 - training, *see* Subject training
 - variability of, 5, 42–5
- Sweetness, 11
- t*-test, 122–3
 - dependent *t* formula, 122
 - paired-variate procedure, 122
- Teams, project team in product development, 311
- Test facilities, 26, 36–50
 - booths, *see* Booths
 - data processing, *see* Data processing
 - description, 37
 - design of, 36–7
 - equipment, 40
 - individual areas, 39, 47
 - information base, 37
 - panel discussion area, 47
 - preparation area, 46–8
 - as public relations activity, 50
 - satellite facilities, 38, 49, 49
 - space requirements, 37, 38–9, 39, 40, 47
 - ventilation, 37, 44
 - working with architect, 37, 41, 44*
- Test fatigue, 163
- Test methods, 50
 - ability to use, 26
 - categorization, 50
 - selecting, 100
 - see also individual testing methods*

- Test requests, 26, 61–3, 101–2
completeness of, 102
discrimination testing, 158, 158
establishment of objectives, 62–3
reasonableness of, 102
rejection of, 102–3
- Test selection, discrimination testing, 160–2
- Test strategy, 99–101
- Testing
errors in, *see* Errors in testing
stages in process of, 30
- Tests
facilities for, *see* Test facilities
increasing volume of, 35–6
methods, *see* Test methods
objectives, 99–100, 102, 158–9
reliability and validity of results, 4, 113–15
reports, 26, 63–5
requests for, *see* Test requests
single-product (monadic) tests, 104
types and distribution, 35, 50
see also individual testing methods
- Texture analysis, references in, 209
- Texture Profile, 211, 213–15
concerns with, 214–15
references in, 213–14
textual parameters v. popular terms, 213, 214
- Threshold testing, 56, 148, 162–3
see also Difference testing
- Time-order error, 105–7
- Tongues, electronic, 59–60, 282, 325
- Training, *see* Education; Subject training
- Treatment-by-treatment-by-subject ($T \times T \times S$)
design, 126, 127
- Treatments-by-subject ($T \times S$) design, 125–7
with replication, 125–6
source of variance tables, 125–6
- Triangle test, 3, 153–5, 160, 171, 174
one tailed, 184
scorecards, 154
serving order, 173
- Tukey (a) and (b) tests, 124, 230, 231–2, 232, 233, 233
and errors, 119
- TURF analysis, 95, 259
- Univariate analysis, 342
- US Army Quartermaster Food and Container
Institute, 7
- Usage and Attitude (U&A) data, 334
- Validity, 113–15
external validity, 114
face validity, 114
of response scales, 72
of results, 4, 113–15
- Variability
in products, 187, 274
in responses, 6
of subjects, 5, 42–5
- Visitor access, 39
- Web sites, sensory evaluation, 340
- Weber, -, 17, 18
- Weber–Fechner Law, 17–18
- Word anchors, for rating scales, 79–81
- Workshops, sensory evaluation, 340, 343