

Cambridge University Press
978-1-107-01006-2 - Experimental Human–Computer Interaction: A Practical Guide with
Visual Examples
Helen C. Purchase
Index
More information

```
aggregation, 17, 118, 160
                                                  data
  over experimental objects, 18, 19, 118, 171
                                                     cleaning, 122
  over participants, 17, 96, 171
                                                     eye-tracking, 107
                                                     fabricated, 97, 196
  over tasks, 18, 118
                                                     interaction, 107
  using secondary factors, 170
analysis of variance (ANOVA), 133, 206
                                                     interval scale, 155
  critical F value, 133
                                                     outliers, 176
                                                     overview, 120
  formula (independent measures), 220
  formula (repeated measures), 219
                                                     presentation, 120-121, 187, 188
  independent measures, 206
                                                     qualitative, 95, 114
                                                     quantitative, 95, 114
  repeated measures, 133
Archambault, D., 41, 72
                                                     quantitative and qualitative, 197
Aropä evaluation, 49, 113
                                                     ranked, 105, 155
Aural Tables experiment, 31, 36, 131, 178
                                                     rated, 105, 154
                                                     relative, 155
between-participants experiment, 52-53,
                                                  data analysis, 95
    56
                                                     by more than one person, 100, 102, 179
Bonferroni adjustment, 138, 172, 233
                                                     flowcharts, 179, 215
Bourqui, R., 14
                                                     interactions between dependent variables,
Brewster, S., 31, 32
                                                       104, 105, 112, 158, 159-161
                                                     multiple analysis of data, 78, 137-138,
ceiling effect, 29, 69
Clustering experiment, 72, 144, 174
                                                     qualitative, 98-102
cognitive shift, 65
                                                     quantitative, 116-181, 204-215
Cohen, R.F., 37
                                                     quantitative and qualitative, 178
Colpoys, L., 43
                                                  demographics, 23, 75, 76, 175, 186
                                                  dependent variables, 117, 118
comparative experiments, 2, 3-4, 5
conditions, 8, 10, 15, 22, 117
                                                  Dunn test, 214
  allocating to participants, 51-52
                                                     formula, 225
  condition-group, 52
confounding factors, 15, 77, 167, 177
                                                  effect
correlation co-efficient, 158, 161
                                                     main, 165, 166
                                                     size, 178
DAGMap experiment, 23, 31, 36, 40, 61, 65,
                                                     three-way interaction, 165
     121, 134, 138
                                                     two-way interaction, 165
```



Cambridge University Press 978-1-107-01006-2 - Experimental Human-Computer Interaction: A Practical Guide with Visual Examples Helen C. Purchase Index More information

Entity Relationship Diagrams experiment,	confounding, 15, 77, 167, 177 controlled, 16
ethical approval, 87–91, 193	demographic, 175
Euler Diagrams experiment, 24, 33, 36, 40, 46,	interaction between, 165
70, 86, 96, 97, 103, 125, 148, 153, 183	secondary, 163, 166, 170, 171, 177
evaluations	fatigue effect, 56
data collection, 112–113	Five P's of data collection, 102, 111, 114
ethical approval, 94	perception, 103, 106–107
evaluation question, 47	performance, 102, 103–104
feedback, 5, 113	preference, 103, 104–106, 154
generalisability, 48	process, 103, 107–109
pilot evaluations, 93	-
	product, 103, 109–111
problems, 198	floor effect, 29, 56, 69 Freeman, E., 82
report, 191	
scenarios, 48	Friedman test, 146
user experience, 91–92	critical χ^2 value, 146
user recruitment and management, 93	formula, 223
experimental design, 6, 15, 50, 184	11 1 11 0 10 00 76
choices, 184–186	generalisability, 8, 18, 22, 76
experimental materials, 91	limitations, 189
participant information sheet, 73	over experimental objects, 19, 163
procedure document, 87	over participants, 17
questionnaires, 75	over tasks, 29, 163
software, 71–72	overgeneralisation, 188
tutorial, 73	Graph Aesthetics experiment, 30, 37, 46, 78
worked example, 74	83
experimental objects, 8, 17, 19, 22	Graph Algorithms experiment, 19, 22, 30,
domain, 46, 185	46
random generation, 27	Grundon, S., 53
experimental parameters, 58–60	
blocks, 58	Hamer, J., 49, 80, 82
in pilot tests, 68	Hoggan, E., 11
number of trials, 58	
practice trials, 58	independent measures analysis, 128
timing of trials, 60	independent variable, 8, 10, 15, 117, 118
experimental principles, 199-201	primary, 163, 170, 227
experimental process, 199	secondary, 163, 170, 227
debriefing, 76, 91	
interaction, 79	James, M., 37
postexperiment, 74–76	Jamieson, A., 12
preexperiment, 72–74	Jourdan, F., 13
experimental report, 190	
	Kildal, J., 31
fact versus opinion, 188	Koenig, P-Y., 23
factor analysis, 163-176, 227	Kruskal-Wallis test, 146, 212
demographic, 175–176	critical H value, 146
example, 234	formula, 223
multi-way, 164–167, 227–230	
secondary, 171	Latin square design, 65
selective, 164, 170–173, 234	learning effect, 55
factors, 16	Lettersets experiment, 80
	=



Cambridge University Press 978-1-107-01006-2 - Experimental Human—Computer Interaction: A Practical Guide with Visual Examples Helen C. Purchase Index More information

limitations, 188	post-hoc pair-wise comparisons, repeated
as opportunities, 190	measures (Tukey test), 136
external validity, 189	two conditions, independent measures
internal validity, 189	(t-test), 203
participants, 76	two conditions, repeated measures (t-test),
reliability, 189	129
•	versus non-parametric statistics, 128, 142
Mann-Whitney test, 142, 210	participant experience, 51, 58, 63-65
critical U value, 142	participants
formula, 222	anonymity, 91
Mental Model experiment, 62, 66, 69, 70, 71,	consent, 74, 89
109, 111, 183	groups, 83
Metabolic Pathways experiment, 13, 17, 23,	management, 77, 194
40, 107, 212, 214	minimum age, 90
Metro Maps experiment, 84, 184	number, 77–78, 186, 194, 197
mixed methods, 112	payment, 77, 80, 90
multiple analysis of data, 78, 137–138, 172	prior knowledge, 15, 52
mutuple unarysis of data, 70, 137–130, 172	recruiting, 61, 76–77, 186
Nemenyi test, 151, 214	variability, 52, 55
formula (independent measures), 226	voluntary participation, 90
	* * *
formula (repeated measures), 225	pilot experiments, 68–71, 186, 193
non-parametric statistics, 125, 141–151,	number, 70
209–215	pre-pilot tests, 69, 193
more than two conditions, independent	Pinaud, B., 41, 72
measures (Kruskal-Wallis test), 146, 212	population, 8, 16, 76, 124
more than two conditions, repeated	post-hoc pair-wise analysis, 133, 136–141,
measures(Friedman), 146	208–209
post-hoc pair-wise comparisons,	critical difference, 136, 137, 140, 151
independent measures (Dunn test), 214	independent measures (Dunn test), 214
post-hoc pair-wise comparisons,	independent measures (Nemenyi test), 214
independent measures (Nemenyi test),	multiple analysis adjustments, 138
214	repeated measures (Nemenyi test), 151
post-hoc pair-wise comparisons, repeated measures (Nemenyi test), 151	single-step method, 137, 138, 140, 151, 229, 231
rank transformation, 141, 209	Tukey's Honestly Significant Difference,
two conditions, independent measures	137
(Mann-Whitney test), 142, 210	preference data
two conditions, repeated measures	analysis, 154–155
*	•
(Wilcoxon test), 142	ranked, 155
versus parametric statistics, 128, 142	rated, 155
normal distribution, 125, 141	
determining normality, 125	qualitative data, 80, 95, 176
0.4 10 11.15.16	analysis, 98–102, 187
Orthogonal Corners experiment, 11, 15, 16,	artefact, 102, 111
78, 206, 208	perception, 106
	preference, 105
parametric statistics, 125, 129–141, 204–209	process, 108–109
more than two conditions, independent	product, 110
measures (ANOVA), 206	text, 100–101
more than two conditions, repeated	video, 101–102, 108
measures (ANOVA), 133	qualitative difference, 163, 167



Cambridge University Press 978-1-107-01006-2 - Experimental Human—Computer Interaction: A Practical Guide with Visual Examples Helen C. Purchase Index More information

quantitative data, 80, 95 analysis, 116–117, 187	Kruskal-Wallis (independent measures), 224
errors, 103, 104, 117, 159 process, 107–108	Mann-Whitney (independent measures), 222
product, 111 rankings, 105	Nemenyi (independent measures, equal sample sizes), 225
ratings, 105	Nemenyi (repeated measures), 225
response time, 103, 104, 159	t-test (independent measures), 218 t-test (repeated measures), 217
randomisation	Tukey's HSD (independent measures), 221
of experimental objects, 18	Tukey's HSD (repeated measures), 221
of participants to conditions, 53	Wilcoxon (repeated measures), 222
of trials, 55, 56, 64	statistical power, 77
ranking data, 155	statistical significance, 125, 178, 196, 197
rating data, 154	stimulus, 8, 23
repeated measures analysis, 128	dynamic, 33
research question, 8, 10, 91, 96, 112, 183, 187,	transformation of, 35
192, 196	Stott, J., 84
primary, 164, 165, 170, 173, 231	system development cycle, 4, 91
second-level, 164, 170, 233	
reviewers, 182, 197	tasks, 8, 17, 30, 185
comments, 183	complexity, 86
concerns, 182-183, 192	distracter tasks, 68
Rodgers, P., 25	filler tasks, 66
Ryan, O., 12	task-variants, 35
,,, -	time/accuracy trade-off, 160
Salimun, C., 32	timing, 60–62
sample, 17, 76, 90, 124	of experiment, 56, 61, 70, 89, 111
Samra, A., 33	of trials, 60, 64, 103, 186
Screen Layout experiment, 32, 184	trials, 8, 36
Shortest Path experiment, 27, 35,	blocks, 58, 64
184	labelling, 40, 104
Simmons, D., 32	number, 58
Small Multiples/Animation experiment, 41,	practice, 56, 58, 64
204	timing, 60, 64, 104, 186
Smalltalk experiment, 53, 55, 210	triangulation, 112
Spring Dynamic Graph experiment, 33, 36, 38,	t-test, 129, 203
69, 106, 167	critical t value, 130
statistic, 118	formula (independent measures), 218
statistical analysis, 124	formula (repeated measures), 217
independent measures, 128	independent measures, 203
probabilities, 124–125	one-tailed, 129
process, 123	repeated measures, 129
repeated measures, 128	two-tailed, 129
tools, 123	Tukey's Honestly Significant Difference,
statistical formulae	137
ANOVA (independent measures), 220	formula (independent measures), 221
ANOVA (repeated measures), 219	formula (repeated measures), 221
Dunn (independent measures, unequal	(10)00000 11000000), 221
sample sizes), 226	UML notation experiment, 43
Friedman (repeated measures) 223	usability evaluation 2, 4–5



Cambridge University Press
978-1-107-01006-2 - Experimental Human-Computer Interaction: A Practical Guide with
Visual Examples
Helen C. Purchase
Index
More information

Index 245

Visual Complexity experiment, 82, 98

Ware, C., 27 web experiments, 79–80 Web Page Aesthetics experiment, 12, 15, 16, 22, 61, 105, 155 Wilcoxon test, 142 critical T value, 142 formula, 222 within-participants experiment, 55–56

Zhang, L., 24