Index

Page numbers in *italics* refer to full bibliographic references.

Adjustment *vs.* matching, 102–103
  in experiments, 119
  in observational studies, 121
Adjustment by regression, 75
Agriculture, gains in, 3
Analysis of covariance, 10, 75. *See also* Covariance
Analysis of variance, 75
Analytical surveys, 2, 3, 5
Announcement, pre-treatment, effect of, 133

Bartlett, M. S. 123, *128*
Beets, sugar, 69
Belson, W. A., 112, 113, *128*
Bias:
  adjustment for, 103
  appraising, 12
  from confounding, 74
  consistency of, 43
  control of, 8
  in controls, 42
  of differences, 17, 90
    regression models for, 90
  detection of, 37
  estimating, 12, 13
  everpresent, 26
  examples of, 24
  limits for, 26
  model for, 17
  from nonresponse, 66
  in observatational studies, 12
  in population, 22, 23
  removal of, 28
  sources of, 8
Bias effect:
  adjustments for, 112
  on confidence level, 26, 27
  on significance level, 58
  test of significance for, 28
Bias reduction:
  caliper matching, 88
  matching, 85
  mean matching, 90
  nearest available matching, 89
Billewicz, W. Z., 78, 82, 96, *100*, 111, 117, *128*
Blindness, 8
  of judges, 45
Blocking, 9, 75
Bombing raids, effect on German factories, 44
Boruch, R.F., 121, *129*
Box, G. E. P., 136, *138*
Brain-damaged boys, 77–78
Buck, A. A., 33, *49*

Caliper matching, 79, 88
Call-back, 67
Campbell, D.T., 121, *128*, 130, 132, 135–138, *138*, *139*
Campbell, E.Q., *14*
Cause, 1, 3
Chi-squared tests, 108
Classes:
  optimum, 38

optimum for matching, 86
optimum sizes, 39
Classified x's, 110
Clusters, samples from, 61, 62
Coca-chewing, effects of, 33, 34
Cochran, W. G., 22, *31*, 39, 49, 85–86, 96, 100, 105, 113, 118, 125, *129*, *138*
Cohen, J., 111, *129*
Coleman, J. S., 2, *14*
Collier, R. M., 132, *138*
Comparability of regressions, test of, 125
Comparison group, 42
Comparison of treatment effects, 57
Components of X^2, 108
Confidence intervals, 20, 21
Confounding, 8, 74
binomial variable, 76
handling of, 77
measured variable, 74
Connecticut, speeding crackdown in, 136–138
Contraceptive devices, use of, 40
Control, 7
by analysis, 10
for classified variables, 10
for continuous variables, 10
use of published statistics as, 43
Control group, 42
Cook, S.W., 24, *31*
Cook, T.D., *139*
Covariance:
adjustment for measured *y*'s and *x*'s, 109
analysis of, 10, 75
Covariates in exploratory studies, 36
Cox, D. R., 39, *49*, 86, 96, *100*
Crackdown on speeding in Connecticut, 136–138
Critics, use of, 71
Curvature, effect on linear regression adjustments, 113
Curvilinearity of response, 47

Dawber, T. R., 3, *14*
Decisions, keeping records of, 35
Deff, *see* Design effect
Design:
experimental, 4
of questionnaire, 66
of study, 35
Design effect:
on sample size, 65
on variance, 65
Differences, 4
analysis of, 6
bias in, 17
estimate of, 17
between population and control and treated group, 43
variability of, 15
Diphtheria, immunization for, 44
Distributions, of effects and grouping, 39
Douglas, J. W. B., 79, *100*
Dummy variables, 110–111

Effects:
direction of, 33, 34
sizes of, 34
Efficiency of grouping, 39
Emmett, B. P., 133, *139*
Erlebacher, A. E., 121, *129*
Errors in *X*, 118
Errors, reducing, 9
Estimate, 4
Estimate of difference, 17
Estimation *vs.* testing significance, 34
Experiments:
agricultural, 3, 5
blind, 8
controlled, 3
factorial, 6
natural, 2
pseudo, 2
quasi, 2
strategy of, 3

Factors, alternative causal, 137
Feller, W., 82, *100*
Fischer, A. K., *14*
Fisher, R. A., 97, *100*
Framingham Study, 3
F-test for power, 35

Glass, G. V., 136, *139*
Goals of study, 33
Graphs for series, 137
Group:
comparison, 42
control, 42
single, after only, 130–131
Grouping:
modes of, 40
vs. regression, 40

Haenszel, W., 106, *129*

Hald, A., 97, *100*
Health and housing, 24
Hill, A. B., 25, *31*, 44–45, *49*
Hiroshima, dosage estimation, 131
Hobson, C. J., *14*
Hopkins, J. A., 68, *73*
Housing:
effects of public, 24 and health, 24
Hypothesis:
null, 19
of study, 33

Immunization, diphtheria, 44
Inference, statistical, 16
Intervals, confidence, 20, 21

Judges, blindness of, 45

Keyfitz, N., 107, *129*
Kinsey, A. E., 2, 9, *14*
Kish, L., 8, *14*, 29, 31, 65, *73*
Knowelden, J., 44–45, *49*

Langner, T. S., *14*
Leighton, A. H., *14*
Leprosy examination, 24
Level, significance, 19
Limits, confidence, 20, 21
Lindley, D. V., 118, *129*
Logit scale, 105–106
Lord, F., 118, 123, *129*

McNemar, Q., 96, *100*
McPartland, J., *14*
Mantel, N., 106, *129*
Mantel-Haenszel test, 106
Martin, C. E., *14*
Matching, 9–10, 78
analysis of mean, 97
and bias removal, 115
caliper, 79, 87
degrees of, 84
delays in, 82
distortion from, 81
effect on variance of difference, 93–94
in experiments, 119
frequency, 76–77
imperfect, 80
kinds of variables, 78–79
mean, 80, 83, 97
nearest available, 80, 83, 89, 115
notation for, 80–81
in observational studies, 121
pair continuous, 95
pair discrete, 95
regression effect vs. nearest available, 115
reservoirs needed, 81
on several variables, 79–80
time required, 81
use of computers in, 82–83
within-class, 84
Measurement:
effect of pretrial, 133
quality of, 42, 45
after treatment only, 130
Measurement series, before and after treatment, 131–132
Meier, P., 104, *129*
Michael, S. T., *14*
Model, mathematical, 15, 16, 17
Model without bias, 16
Models, 8, 90–93
Mood, A. M., *14*
Moser, C. A., 70, *73*
Multiple regression, 11

Nonresponse:
effect on bias, 65
reducing, 66
Natural experiment, 2
Null hypothesis, 19
Nonlinearity, test of, 37

Objectives of study, 33
Observational studies:
bias in, 12
definition of, 2
examples of, 1, 2, 32
need for three levels, 37
properties of, 2
single-group, 130
Ogawa, J., 86, *100*
Opler, M.K., *14*

Pair matching, 95
Parten, M. B., 70, *73*
Photographs, aerial, 44
Polio, 44, 45
Pomeroy, W. B., *14*
Population:
broader, 5–7

differences between sampled and target, 68
sampled, 4, 6, 16
self-selected, 2
target, 4, 6, 16
Power, 35
of before-after studies, 55
example of, 51
increasing samples, 54
for matched samples, 54
of statistical tests, 36, 51
for two binomial samples, 53
Power function, 51
Precision, increased by regression adjustment, 115–116
Premature children, 79, 80
Pretests, 70
Probability:
of significant difference, 51
of wrong conclusion, 52
P-value, 18

Quasi experiments, 2

Radiation, aftereffects of, 38
Randomization, 7, 17
in blocking, 10
Record keeping of treatment levels, 41
Records:
of decisions, 35
pilot study of, 71
Regression:
component in contingency tables, 108
curvilinear, 11
vs. grouping, 40
linear, 38
multiple, 11
Regression adjustment *vs.* nearest available matching, 115
Regression model, 8
for bias in differences, 90–93
Rennie, T. A. C., *14*
Replication, 4, 6–7
Response, 44
definition, 33
estimation of linear, 47
variability of, 7
Response measurements, relevance of, 44
Ross, H. L., 136, 137, 138, *138*
Rubin, D. B., 79, 83, 88, *100–101*, 113–115, *129*

Samples:
independent before and after treatment, 133–134
nonrandom, 5
Sample size, 36, 37, 50
allocation of, 37
binomial, 56
calculations, 56
differing costs of optimum, 57
effect of, 36
for estimation, 55–56
of exploratory study, 50
large, 8
optimum, 37, 57
Sampling:
cluster, 62
nonrandom, 16
random, 16
Sartwell, P., 37, *49*
Seltser, R., 37, *49*
Series, time, 136
Significance:
estimation *vs.* testing, 34
level, 19
test of, 18
Size, sample, *see* Sample size
Smokers, age and death rates, 22
Smoking, 22, 23
levels of, 40
Speeding crackdown in Connecticut, 136–138
Srole, L., *14*
Standardization to handle cell-to-cell effects, 106–107
Standardized mortality rates for French females, 107
Stanley, J. C., 77, *101*, 130, 132, 135, *138*
Stuart, A., 96, *101*
Student's *t*, 18
Studies:
before-after, 55, 131
danger of large size, 46
pilot, 70
power of before-after, 55
restriction of, 46
Sums, weighted, 60
Surveys, analytical, 2, 3, 5

t-distribution, 18
Test:
effect of bias on, 28
one-tailed, 19, 20, 52

Test *(Continued)*
power, 52
of significance, 18
vs. estimation, 34
strengthening of, 35
two-tailed, 19, 20, 52
Tiao, G. C., 136, *138*
Time series, 136
Timing of measurements, 46, 47
Transformations to linearity, 109
Treatment, 35, 36
definition, 33
degrees of, 130–131
form of, 41
level of, 40
measurement of, 38
variability, 41
Treatments, pooling of, 41
TV educational program, 12, 23, 24

Variability:
of differences, 15
of response, 7
sources of, 7
Variables:
discrete, continuous, confounding, 78
random, 17
Variance of difference, effect of matching, 93
Variances:
pooled, 18
reduced by weighting, 105
unequal, 110
Variation, control of, 8
Variation in treatment, measurement of, 36

Walkley, R. P., 24, *31*
Weighted sums, 60
Weights:
when cell effects differ, 103–104
choice of, 77
to improve precision, 105
matched sample, 103
for pre-treatment measurement groups, 134
random sample, 103
Weinfeld, F. D., *14*
Wilner, D. M., 24, *31*

Yates, F., 44, *49*, 97, *100*
York, R. L., *14*