

INDEX

*The number attached to a much-used technical term indicates
 the page where the term is first introduced*

- Ackermann, R., 225
 action and belief, 164–70
 acts of guessing, 168
 admissible estimates, 177–9
 after-trial betting, 95–102
 algebra
 Boolean, 32, 134
 sigma-, 32, 134
 Anscombe, F. J., 103
 antisymmetry (in the logic of support), 33 f.
 Arbuthnot, J., 75–81
 axioms
 absolute support (Kolmogoroff), 134 f.
 betting rates (Kolmogoroff), 193, 210 f.
 chances (Kolmogoroff), 18 f.
 relative support (Koopman), 32 f.
- Barnard, G.
 on kinds of trial, 88
 on likelihood, 58
 on the likelihood principle, 65, 219
 on subjective statistics, 224
 Bayes, T., 66, 112, 188, 190–227 *passim*
 definition of probability, 191 f.
 assumptions about betting rates, 192–5
 postulate of, 198–200
 before trial betting, 95–102
 belief and action, 164–70
 belief-guesses, belief-estimates, 168 f.
 Bernouilli, Daniel, 63 f., 176
 Bernouilli, James, 23
 Bernouilli, Nicholas, 77
 betting, before- and after-trial, 95–102
 on hypotheses, 215–17
 rates: axioms for, 210 f. and 193–220 *passim*; Bayes' use of, 192–5
 Birnbaum, A., 65, 110, 220
 Boolean algebra, 32, 134
 Box, G. E. P., 206
 Braithwaite, R. B., 10, 50, 74, 114, 216
 theory of chance, 114–17
 Brillinger, D., 150 n., 151 n.
 Brown, G. Spencer, 132
- Cargile, J., 121
 Carnap, R., 166–8, 171, 187
 chance, 10
 conditional, 19 f.
 chance process, 15, 26
 chance set up, 13
 tandem, 195 f.
 chrysanthemum experiment, 88
 Church, A., 119
 collective (von Mises), 5
 completeness
 of fiducial theory, 154 f.
 of postulates, 35
 compound trials, 21–3
 conditional chance, 19 f.
 trials, 14, 19 f.
 confidence intervals, 159 f.
 consistency of fiducial theory, 150
 consistent estimators, 184
 Cournot, A. A., 5, 13
 Cox, D. R., 206 n.
 Cox, R. T., 134 n., 215
 critical likelihood ratio, 89, 111–13
 cumulative distribution function, 17 f.
 cumulative graph, 16
- decision theory, 29–32, 75, 164, 186–8
 definition, 4 f.
 Dempster, A. P., 103, 151 n.
 density function, 18
 experimental, 68–70, 148 f.
 Derham, W., 77 n.
 distribution, 16
 binomial, 23 f.
 cumulative, 17 f.
 Normal, 71, 156–8, 182–6
 Dürrenmatt, F., 32
 Dutch book, 211
- efficiency of estimates, 185
 Ellis, L., 5
 epidemics, 1, 9, 86 f.
 epistemic utility, 31
 errors, theory of, 155, 175
 estimates and estimators, 28 f., 62, 161–89 *passim*

- estimates and estimators (*cont.*)
 admissible, 177–9
 belief-estimates, 168 f.
 consistent, 184 f.
 fiducial argument for, 181–7
 invariance of, 172
 maximum likelihood, 49, 62–4, 126, 176, 185 f.
 minimax, 186 f.
 minimum variance, 183 f.
 Savage's criterion for, 179–81
 scales for, 171–3
 unbiased, 182 f.
 uniformly better, 177–9
 exchangeable events, 212
 expectation, 30, 102
 experimental density, 68–70, 148 f.
- fair stake, 192
 Feller, W., 9
 fiducial argument
 application: to confidence intervals, 159 f.; to Jeffreys' theory, 147 f., 204; to Normal distribution, 156–8; to theory of errors, 155
 completeness of 154 f.
 consistency of, 150; inconsistencies in Fisher's form of, 151
 examples of, 136–9, 143–5
 origin of, 133
 postulates for: frequency principle, 135; principle of irrelevance, 145, 149
 structure of, 139 f.
- Finetti, B. de, 208–25 *passim*
 on axioms for betting rates, 210
 on betting about hypotheses, 215–17
 on chance, 211–15
- Fisher, R. A.
 on Bayes, 200
 on fiducial argument, 133–60
 on hypothetical infinite populations, 7, 13, 25, 122
 on likelihood, 56 f., 62, 219
 on invariance in estimation, 173
 on maximum likelihood estimates, 49, 176 f., 184–6
 on sampling, 130
 on sufficient statistics, 80, 110
 on testing hypotheses, 80–3
- Fraser, D. A. S., 220 n.
 Frege, G., 151, 201
 frequency principle, 135
- Fundamental Lemma of Neyman and Pearson, 93
- Galton, F., 72
 gambling system, impossibility of, 22
 Gauss, K. F., 25, 72, 175 f., 186
 Gödel, K., 36
 Good, I. J., 110 n.
 Goodman, N., 41 f.
 Gossett, W. S., 72, 82 f., 113
 s'Gravesande, W. J., 77
 guesses and acts of guessing, 168–70
- Halmos, P., 70 n., 110 n.
 Hewitt, E., 216 n.
 histogram, 16
 Hume, D., 52
 hypothesis
 statistical, 27
 unexpected, 221, 225
 hypothetical infinite population, 7, 13, 25 f., 122
- independence, 20–3
 induction, 52, 125 f.
 initial support, 146
 invariance of estimators, 172
 invariant tests, 97–9
 irrelevance, 141–60
 principle of, 145, 149
- Jeffreys, H.,
 on axioms for probability, 38, 134, 215
 on chance, 11
 on the fiducial argument, 140, 147
 on initial probabilities, 147, 152–4, 201–7
 on Neyman–Pearson theory, 103
 on simplicity, 225
 joint proposition, 56–8
 simple, 57
- Kendall, M. G.
 on D. Bernoulli, 64
 on likelihood ratio tests, 92 n.
 on minimum variance estimators, 183 f.
 on random sampling, 130–2
- Kneale, W. C., 11
 Kolmogoroff's axioms
 for absolute support, 134 f.
 for betting rates, 193, 210 f.
 for chance, 8, 18 f.
- Koopman, B. O., 32–4

INDEX

231

- Laplace, P.S. de, 25, 76, 175 f., 200, 203
 law of likelihood
 continuous case, 70 f.
 discrete case, 59, 62
 learning from experience, 217 f.
 least squares, method of, 175
 Lehmann, E. L., 92 n., 186 n.
 Lexis, W., 72
 likelihood, 56–8
 given data, 61
 likelihood function, 148 f., 221 f.
 likelihood principle, 65 f., 218–21
 likelihood ratio, 70
 critical, 89, 111–13
 given data, 71, 149
 likelihood ratio tests, 91 f.
 likelihood tests, 89–114
 critical ratio of, 91, 111–13
 objections to, 110
 Lindley, D. V., 112 n., 151 n., 155
 logic, the rôle of, 34–8
 underlying, 34 f., 225 f.
 Loève, M., 2 f.
 long run justification, 39–52
 long run rule, 40–5
- Maximum likelihood, 49, 62–4, 126, 176, 185 f.
 Menger, K., 15 n.
 Méré, Chevalier de, 75
 Mill, J. S., 126
 minimax argument for long run rule, 43–5
 in decision theory, 49 f.
 in estimation, 183 f.
 minimum variance estimates, 183 f.
 Mises, R. von, 5–7, 9, 13, 21, 25, 214
 misleading samples, 126–32
 mixed strategy, 49 f.
 mixed tests, 93–9
 models, 7–9, 35
 Moivre, A. de, 71, 77
 moments, method of, 175
 Montmort, P. R. de, 77
- Neumann, J. von, 102
 Neurath, O., 37
 Newton, I., 23
 Neyman, J.
 on confidence intervals, 159 f.
 on fundamental probability sets, 13
 on rival hypotheses, 81
- Neyman, J. and Pearson, E. S.
 Fundamental Lemma of, 93
 on likelihood ratio tests, 91 f.
 theory of testing, 92–111; domain of, 99–101; rationale for, 103 f.
 Normal distribution, 71, 156–8, 182–8
- optional stopping, 107–9
 outcome (of a trial) 14
 sure, 15
- partition of data, 143
 Pearson, E. S., 25, 83, 103, 113; *See* Neyman and Pearson
 Pearson, K., 25, 72, 175
 Peirce, C. S., 47, 123
 personal betting rates, 209–25
 axioms for, 210 f.
 personal probability, 209
 pivotal quantities, 140
 pivotal trials, 140
 Poisson, S. D., 85
 Polya, G., 9
 Popper, K., 10, 14, 121
 populations
 hypothetical infinite, 7, 13, 25 f., 122
 open and closed, 122
 postulational definition, 4 f.
 power of a test, 92–9
 predicate, projectible, 41
Principia Mathematica, 36, 205
 principle
 frequency principle, 135
 of indifference, 51, 147, 201, 207
 of irrelevance, 145, 149
 likelihood principle, 65 f., 218, 221
 of sufficiency, 110
 ‘probability’, 2, 15, 28, 136, 209, 225
 probability theory, 7
 process, chance or stochastic, 15
 projectible predicate, 41
 proposition, joint, 57
 pseudo-distribution, 152–4, 204
 Quetelet, L. A. J., 72
 Quine, W. v. O., 15
- Radon–Nikodym theorem, 70 n., 110 n.
 Ramsey, F. P., 208–17
 random, 2, 7, 119
 random sampling, 119–32 *passim*
 random sampling numbers, 129–32
 random sequence, 120 f.
 random trials, 119 f.

232

random variables, 15
 refutation, 113 f.
 Reichenbach, H., 6, 40, 51
 result (of a trial), 13
 Russell, B., 36, 151, 201, 205

Salmon, W. C., 51
 samples, misleading, 126–32
 sampling, random, 119–32 *passim*
 with and without replacement,
 122–4
 Savage, L. J.
 on axioms for betting rates, 210
 on estimation, 167, 179–81
 on likelihood, 70
 on the likelihood principle, 65 f.,
 218–21
 on sufficient statistics, 110
 on unexpected hypothesis, 223
 scales for estimation, 171–3
 Schlaiffer, R., 226
 sequence, random, 120 f.
 sequential test, 106
 sigma-algebra, 32, 134
 simple joint proposition, 57
 simplicity, 85, 222, 225
 size of a test, 92–9
 Smith, B. Babington, 130 f.
 specification of a problem, 59, 84
 stake, fair, 192
 statistic, sufficient, 81, 110
 statistical data, 56–9, 84, 208
 statistical hypothesis, 27
 stochastic process, 15
 strategy, mixed, 49 f.
 stringency of tests, 75, 111–13
 Stuart, A. S., 57 n. 92 n., 131 n., 183 n.
 subjective *v.* objective betting rates,
 193 f.
 subjective theory on statistics
 axioms for, 210 f.
 compared with logic of support,
 208–10
 learning from experience in, 217–18
 likelihood principle in, 218–21
 origin of, 208
 unexpected hypotheses, 221–5
 views on chance, 211–15
 sufficient statistics, 81, 110
 support
 absolute, 133–5
 initial, 146 f., 203–6
 relative, 27–38

INDEX

sure outcome, 15
 Süssmilch, J. P., 77 n.

t-test, 82
 tandem chance set ups, 195 f.
 tests, statistical
 Arbuthnot's, 75–80
 likelihood, 89–114 *passim*
 likelihood ratio, 91 f.
 mixed, 93–9
 Neyman–Pearson, 92–111
 of rival hypotheses, 79–83
 sequential, 106 f.
 size and power of, 92–9
 stringency of, 75, 111–3
 unbiased and invariant, 97–9
 uniformly most powerful, 94
 worse than useless, 99
 textual critic's hypothesis, 54
 Tippett, T., 129
 trial, 13
 conditional, 14, 19 f.
 independent, 20–3
 kind of, 13, 87 f.
 random, 119 f.
 Tukey, J. W., 84 n.

unbiased estimators, 182 f., tests, 97
 underlying logic, 34 f., 225
 unexpected hypothesis, 221, 225
 uniformly better estimates, 177–9
 uniformly most powerful tests, 94–9
 invariant and unbiased tests, 97–9
 unique case rule, 40
 urn models, 9, 11, 86
 example of three hypotheses, 48–52,
 60, 169
 utility, 28, 30 f., 192, 202, 210, 218
 epistemic, 31

variables, random, 15
 Venn, J., 5, 13, 25

waiting time, 17, 66, 152 f.
 Wald, A.
 on decision theory, 29, 102
 on maximum likelihood, 185
 on minimax estimation, 186 f.
 on sequential tests, 107
 Whitehead, A. N., 36, 201, 205
 Williams, R. M., 151
 'worse than useless' tests, 99
 Wright, G. H. von, 120