# Acknowledgments and citations

I am grateful to Richard L. Day for his advice after reading an early draft of this book. Iain Chalmers, Director of Britain's National Perinatal Epidemiology Unit, read the penultimate draft and made many valuable suggestions. It is a pleasure to acknowledge his wise counsel and to thank him for his many kind acts. My wife's contributions to this volume are substantial and I cannot thank her enough for her help and sensible suggestions.

I am very much indebted to the many authors whose evidence and opinions I have cited in this book. They are identified by name in the text or in legends for tables and graphs. The published source of the citations are given below in the order in which they occur in each chapter. I gratefully acknowledge the permission of copyright holders to use their material. In some cases permission has been impossible to obtain due to lack of available information as to the true copyright holder, despite every reasonable effort.

#### PREFACE

Burnet's comments are in Lancet (1953) i, 103-8.

For Susser's microscope analogy see Further Reading: Causal Thinking ...

Braunwald's comment is in *Hospital Practice* (1971) 6, 910.

Critical rationalism is discussed by Popper, see Further Reading: Conjectures ...

The toy set analogy is in Goffman's Relations in Public (1971), Basic Books.

#### CHAPTER 1

Part of this chapter was included in the Apgar Award Lecture published in *Perspectives in Biology and Medicine* (1981) 24, 339-51.

For Webster's discussion of Bacon's thesis see *The Great Instauration: Science*, *Medicine and Reform 1626-60* (1976), Holmes and Meier.

The contrast between Bacon's experiments and those of Galileo is made clear by Medawar, see Further Reading: Induction and ...

For Bernard's comments see Further Reading: An Introduction ...

Lind's experiment is described in A Treatise of the Scurvey (1953 reprint of the 1753 publication), Edinburgh Univ. Press.

Galbraith's aphorism is in The New Industrial State (1971), Houghton and Mifflin.

The unwitting experiment data is in *Snow on Cholera* (1936 reprint of John Snow's 1855 treatise), Commonwealth Fund.

Fisher's discussion is in J. Min. Agriculture (1926) 33, 503-13.

The roles of Karl Pearson and others are discussed by Mainland in Clin. Pharm. Therap. (1960) 1, 411-22 and (1963) 4, 580-6.

The tuberculosis treatment trial is discussed in Hill's Statistical Methods in Clinical and Preventive Medicine (1962), Oxford Univ. Press.

The choice between studies is adapted from Susser; see Further Reading: Causal Thinking ...

Fredrickson's comment is in Bull. N.Y. Acad. Med. (1968) 44, 985-93.

# CHAPTER 2

Postman's story is in Crazy Talk, Stupid Talk (1976), Delacorte.

For Popper's argument see Further Reading: Conjectures ...

For Bernard's levels of observation see Further Reading: An Introduction . . .

The line graph of 'passive' association in the Boston survey is redrawn (with permission) from Kinsey and Zacharias in J. Am. Med. Assoc. (1949) 139, 572-8.

Rarity, interest, and surprise are discussed by Weaver in *The Scientific Monthly* (1949) 67, 390-2.

Data in the Melbourne table (copyright 1951 M.J.A.) are Campbell's in Med. J. Aust. (1951) 2, 48-50.

The sailor's misunderstanding is quoted by Levinson in *The Science of Chance* (1939), Rinehart.

Selvin and Stuart's data-dredging metaphors are in *The American Statistician* (1966) **20**, 20-3.

Data in the 'hunting accident' table are from Allen and others in N. Eng. J. Med. (1949) 241, 799-806.

Galton's contribution is described by Pearson in Life and Letters of Francis Galton (1934), Cambridge Univ. Press.

Causal relationships are discussed by Susser, see Further Reading: Causal Thinking ...

The London Bill of Mortality is from David's Games, Gods and Gambling (1962), Charles Griffen and Co.; Petty's quotation is from Greenwood in Biometrika (1942) 32, 101-27, 203-25, and 33, 1-24.

Bronowski's observation is in A Sense of the Future (1977), M.I.T. Press.

For Venn's definition see Further Reading: The Logic of Chance.

The research questions analogy is from Kurman in Et Cetera (1977) 34, 265-76.

#### CHAPTER 3

For the distinction between pragmatic and explanatory emphasis see Schwartz and others in Further Reading: Clinical Trials.

For Venn's analogy see Further Reading: The Logic of Chance.

The estimation of proportions histogram and calculations are based on Mainland's sampling experiment, see *Elementary Medical Statistics* (1952), Saunders.

For Murphy's comment see Further Reading: The Logic of Medicine.

For Sackett's list of biases see Journal of Chronic Diseases (1979) 32, 51-63.

Data in the proportions of babies table are from Kinsey and Zacharias in J.A.M.A. (1949) 139, 572-8.

The tuberculosis treatment trial is described in Hill's Statistical Methods in Clinical and Preventive Medicine (1962), Oxford Univ. Press.

The national RLF trial details are given by Kinsey in Arch. Ophthalmol. (1956) 56, 481-543.

The cancer risk data are from Bibbo and others in N. Eng. J. Med. (1978) 298, 763-7.

Tukey's comments appear in his article in Science (1977) 198, 679-84.

#### **CHAPTER 4**

The looking backward comment of Schneiderman is in Am. J. Roent. (1966) 96, 230-55.

The scarlet fever and tuberculosis trends are redrawn (with permission) from McKeown's *The Modern Rise of Population* (1976), Edward Arnold.

The tuberculosis treatment trial is described in Hill's Statistical Methods in Clinical and Preventive Medicine (1962), Oxford Univ. Press.

Shifts in distribution of births is described by Morris in Am. J. Pub. Health (1975) 65, 359-62.

Odell's discovery is reported in *Pediatrics* (1959) **55**, 268–79.

Wesley's drawing of lots is quoted by David in *Games*, *Gods and Gambling* (1962), Charles Griffen and Co.

The print of Leombruno's painting is from Pinacoteca di Brera, Milan.

Fisher's explanation appears in his original textbook Statistical Methods for Research Workers (1925), Oliver and Boyd.

The advantages of random allotment are discussed by Byar and co-workers in N. Eng. J. Med. (1976) 295, 74-80.

# 188 Acknowledgments and citations

Prognostic stratification is discussed by Peto and others, see Further Readings: Design and ...

Chalmer's proposal appears in Med. Clin. N. Am. (1975) 59, 1035-8.

The experience of surgical treatment to prevent esophageal hemorrhage is summarized by Grace and others in *Gastroenterology* (1966) **50**, 684–91 and revised (copyright 1977 AAAS) by Gilbert and others in *Science* (1977) **198**, 684–9.

Play the winner plan is described by Zelen in J. Am. Stat. Assoc. (1969) 64, 131-45.

For the 'two armed bandit' approach see Weinstein in N. Eng. J. Med. (1974) 291, 1278-85.

#### CHAPTER 5

The national RLF trial details are given by Kinsey in Arch. Ophthalmol. (1956) 56, 481-543.

The wide range of outcomes bar graph is redrawn (with permission) from Fielding and others in *Lancet* (1978) ii, 778-9.

For Peto's comments concerning planning trials see Further Reading: Design and ...

For details of the ACTH experience see Further Reading: Retrolental ...

Oxygen dosage in the national RLF trial is given by Kinsey in Arch. Ophthalmol. (1956) 56, 481-543.

The cerebral palsy and RLF frequencies are from McDonald in Arch. Dis: Childhood (1963) 38, 579-88.

The influences of experimenters are discussed by Rosenthal in his book Experimenter's Effects in Behavioral Research (1976), Irvington, and in Et Cetera (1977) 34, 253-64.

Wolf's account of a placebo effect in asthma is in *Proc. Ass. Res. Nerv. Mental Dis.* (1959) 37, 147-61.

Conditional trial design is discussed by Feinstein, see Further Reading: Clinical Biostatistics.

The list of biases is from Sackett in J. Chron. Dis. (1979) 32, 51-63.

## CHAPTER 6

Dobson's observation is from Asher's lectures in *Trans. Med. Soc. Lond.* (1959) 75, 66-72.

Doctor Bell's observations and preliminary notes on Sherlock Holmes are from Michael and Mollie Hardwick's *The Man who was Sherlock Holmes* (1964), John Murray.

- The announcement of topics and the Hidden Man figures are from Asher's lectures printed in *Trans. Med. Soc. Lond.* (1959) 75, 66-72.
- Recording errors in behavioral research are noted by Rosenthal in his book Experimenter's Effects in Behavioral Research (1976), Irvington.

Properties of sets of measurements are discussed by Youden in Sci. Monthly (1953) 76, 143-7.

#### **CHAPTER 7**

The death and survival with handicap bar graph is redrawn (with permission) from Kitchen and others in *Dev. Med. Child Neurol.* (1979) 21, 582-9.

Assessments in surgical treatments are reported by Gilbert and co-workers in Science (1977) 198, 684-9.

The cusum line graph is redrawn (with permission) from Wohl in N. Eng. J. Med. (1977) 296, 1044-45.

The Rumplestiltskin effect is from Asher in *Trans. Med. Soc. Lond.* (1959) 75, 66-72.

The chance difference in mortality figure is redrawn (with permission) from Peto and others, see Further Reading: Design and . . .

#### **CHAPTER 8**

For Murphy's story about confoundment see Further Reading: The Logic of Medicine.

Calculation of standardized event rates is explained by Hill in *Principles of Medical Statistics* (1966), Oxford Univ. Press. For Feinstein's examples of unequal prognoses and unequal compliance see Further Reading: *Clinical Biostatistics*.

Mainland's guidelines are in J. Chron. Dis. (1960) 11, 480-96.

The exclusions ... figure is redrawn (with permission) from Peto and others, see Further Reading. Design and ...

The clinical trial committee suggestions are Klimt's, see *Cont. Clin. Trials* (1981) 1, 283-93.

#### **CHAPTER 9**

Positive-pressure treatment is described by Gregory and others in N. Eng. J. Med. (1971) 284, 1333-40.

The idealized model of diagnosis is redrawn (with permission) from Card and Good, see Further Reading: A Logical Analysis...

- The role of hypothesis testing in clinical trials is discussed in reports of a biometrics seminar, see J. Chron. Dis. (1966) 19, 857-82.
- The number of patients to enroll figures are redrawn (with permission) from Clark and Downie in *Lancet* (1966) ii, 1357-8.
- Freiman and collaborators' review of negative trials is in N. Eng. J. Med. (1978) 299, 690-4.
- Data in the high versus low oxygen table are from Lanman and others in the J.A.M.A. (1954) 155, 223-6.
- The 'peeking' problem bar graph (redrawn with permission) and the adjusted significance levels are from McPherson in N. Eng. J. Med. (1974) 290, 501-2.

#### CHAPTER 10

- The roles of Pearson and Fisher are discussed by Mainland in Clin. Pharm. Therap. (1963) 4, 580-6.
- The single hospital experiment results are from Lanman and others in J.A.M.A. (1954) 155, 223-6.
- The number of trials table is from Peto and others, see Further Reading: Design and...
- The publication decisions story is from Hudson's A Case of Need (1968), New American Library.
- Sterling's arguments are in J.A. Stat. Assoc. (1959) 54, 30-6.
- The probabilities in the multiplicity of classes bar graph (copyright 1977 AAAS) are from Tukey in Science (1977) 198, 679-84.
- Statistical proof is discussed by Darlington, see Further Reading: Radicals and ...
- The Bayesian example is based on Mainland's discussion in Clin. Pharm. Therap. (1967) 8, 738-48.
- For Darlington's suggestion about the interpretation of 'significance' see Further Reading: Radicals and ...
- Smithell's comment is in Arch. Dis. Childhood (1978) 53, 604-7.

#### CHAPTER 11

- Cardano's portrait is from the Bettman Archive.
- Shapiro's evaluation of clinical predictions is in N. Eng. J. Med. (1977) 296, 1509-14.
- Formulation of a decision problem is from Raiffa's Decision Analysis: Introductory Lectures on Choices Under Uncertainty (1968), Addison-Wesley.

- Decision theory terms and a medical decision model (redrawn with permission) are from Card and Good, see Further Reading: A Logical Analysis...
- The benefits and costs figure is redrawn (with permission) from Pauker and Kassirer in N. Eng. J. Med. (1975) 293, 229-34.
- Subjective judgment is discussed by Raiffa in Decision Analysis ... (1968), Addison-Wesley.
- Fisher's comment is quoted by Mainland in Clin. Pharm. Therap. (1960) 1, 411-22.
- Mahler's reasoning appears in WHO Chron. (1977) 31, 8-12.
- 'Evangelists' and 'snails' are compared by Sackett in Lancet (1975) ii, 357-61.
- Mumford's comment is in Values for Survival (1946), Brace and Co.

#### CHAPTER 12

- A modified version of this chapter appeared in Persp. Biol. Med. (1983) 26, 343-53.
- Haggard's description of the treatment of King Charles is from *Devils*, *Drugs and Doctors* (1929), Harper.
- The proliferation of codes is discussed by Katz in a report to H.E.W. Assistant Secretary for Health, M.K. Duval (unpublished, dated 1973).
- The cancer cells incident is described in Katz's Experimentation with Human Beings (1972), Russell Sage Foundation.
- Comroe and Dripps review is in Science (1976) 192, 105-11.
- Rabi's comment is in *The Nature of Scientific Discovery* (1975, Owen Gingerich, editor), Smithsonian Institution Press.
- Dworkin's definitions are in his book, see Further Reading: Taking Rights ...
- Sigerist's comments about the people's health are from Medicine and Human Welfare (1941), Yale Univ. Press.
- The outcomes in trials data (copyright 1977 AAAS) are from Gilbert and co-workers in *Science* (1977) **198**, 684-9.
- The findings of the National Institutes of Health task force are reported by Cardon and others in N. Eng. J. Med. (1976) 295, 650-4.
- Cassileth and co-workers' findings are in J.A.M.A. (1982) 248, 968-70.
- The National Commission ... recommendations are discussed by Levine, see Further Reading: Ethics and Regulation.
- Jonas' reflections are in Daedalus (1969) 219, 235-41.
- Eisenberg's comments are in Science (1977) 198, 1105-8.
- Preliminary data in Simes and Tattersall's survey are cited in B.M.J. (1983) 286, 1972-3.

# 192 Acknowledgments and citations

Chalmers' findings are in Mt Sinai J. Med. (1974) 41, 753-8.

For Freidson's comments see Further Reading: The Profession ...

For Popper's parable see Further Reading: Conjectures ...

#### APPENDIX A

For details of the RLF story see Further Reading: Retrolental ...

## APPENDIX B

The check list for randomized trials is from Chalmers and others in Cont. Clin. Trials (1981) 2, 31-49.