

Christopher Jennison

Publications

Book

Jennison, C. and Turnbull, B. W. (2000) *Group Sequential Tests with Applications to Clinical Trials*, Chapman and Hall/CRC, 390 pages. Translated into Japanese, 2011.

Articles

Jennison, C., Johnstone, I. M. and Turnbull, B. W. (1982) Asymptotically optimal procedures for sequential adaptive selection of the best of several normal means. In *Statistical Decision Theory and Related Topics III, Vol. 2*, (eds S. S. Gupta and J. Berger) New York: Academic Press **2**, 55–86.

Jennison, C. (1983) Equal probability of correct selection for Bernoulli selection procedures. *Comm. Statist.*, **A12**, 2887–2896.

Jennison, C. and Turnbull, B. W. (1983) Confidence intervals for a binomial parameter following a multistage test with applications to MIL-STD 105D and medical trials. *Technometrics*, **25**, 49–58.

Hoy, C. W., Jennison, C., Shelton, A. M. and Andaloro, J. T. (1983) Variable intensity sampling: A new technique for decision making in pest management. *J. Economic Entomology*, **76**, Section F, 139–143.

Jennison, C. (1984) On the expected sample size for the Bechhofer-Kulkarni Bernoulli selection procedure. *Sequential Analysis*, **3**, 39–49.

Jennison, C. and Kulkarni, R. V. (1984) Optimal procedures for selecting the best s out of k Bernoulli populations. *Design of Experiments, ranking and selection*. (eds T. J. Santner and A. C. Tamhane) New York: Marcel Dekker, 113–125.

Jennison, C. and Turnbull, B. W. (1984) Repeated confidence intervals for group sequential clinical trials. *Controlled Clinical Trials*, **5**, 33–45.

Jennison, C. and Turnbull, B. W. (1985) Repeated confidence intervals for the median survival time. *Biometrika*, **72**, 619–625.

Green, P. J, Jennison, C. and Seheult, A. H. (1985) Analysis of field experiments by least squares smoothing. *J. Roy. Statist. Soc., B*, **47**, 299–315.

Jennison, C. (1986) The design and analysis of field trials in the presence of fertility effects. *Proc. 1st World Congress of the Bernoulli Soc.*, **2**, 179–182.

Kulkarni, R. V. and Jennison, C. (1986) Optimal properties of the Bechhofer-Kulkarni Bernoulli selection procedure. *Ann. Statist.*, **14**, 298–314.

Jennison, C. (1987) Efficient group sequential tests with unpredictable group sizes. *Biometrika*, **74**, 155–165.

Jennison, C. and Jubb, M. (1988) Statistical image restoration and refinement. *Information Processing in Medical Imaging* (eds C. N. deGraaf and M. A. Viergever), 255–262.

Jennison C. (1989) On the stochastic minimization of sample size by the Bechhofer-Kulkarni sequential selection procedure. *Sequential Analysis*, **8**, 281–291.

Jennison, C. and Turnbull, B. W. (1989) Interim analyses: the repeated confidence interval approach (with discussion). *J. Roy. Statist. Soc., B*, **51** 305–361.

Bechhofer R. E., Goldsman D. M. and Jennison C. (1989) A single-stage selection procedure for multi-factor multinomial experiments with multiplicativity. *Comm. Statist., Simulation and Computation*, **18**, 31–61.

Jennison C. and Turnbull, B. W. (1990) Statistical approaches to interim monitoring of medical trials: a review and commentary. *Statistical Science*, **5**, 299–317.

Silverman, B. W., Jennison, C. Stander, J. and Brown, T. C. (1990) The specification of edge penalties for regular and irregular pixel images. *IEEE Trans on Pattern Analysis and Machine Intelligence*, **12**, 1017–1024.

Jennison C. and Turnbull, B. W. (1991) Exact calculations for sequential t , χ^2 and F tests. *Biometrika*, **78**, 133–141.

Jennison, C. and Turnbull, B. W. (1991) A note on the asymptotic joint distribution

of successive Mantel-Haenszel estimates of the odds ratio based on accumulating data. *Sequential Analysis*, **10**, 201–209.

Jennison C. and Turnbull, B. W. (1991) Group sequential tests and repeated confidence intervals. In *Handbook of Sequential Analysis* (eds B. K. Ghosh and P. K. Sen), Marcel Dekker, 283–311.

Jubb, M. D. and Jennison, C. (1991) Aggregation and refinement in binary image restoration. In *Spatial Statistics and Imaging* (ed. A. Possolo), IMS Lecture Notes, **20**, 150–162.

Jennison, C. (1992) Bootstrap tests and confidence intervals for a hazard ratio when the number of observed failures is small, with applications to group sequential survival studies. In *Computing Science and Statistics, Volume 22*, (eds C. Page and R. LePage), Springer-Verlag, 89–97.

Eales, J. D. and Jennison, C. (1992) An improved method for deriving optimal one-sided group sequential tests. *Biometrika*, **79**, 13–24.

Jennison, C. and Silverman, B. W. (1992) How to charge for boundaries in a pixel image. In *The Art of Statistical Science: A Tribute to G. S. Watson*, (ed. K. V. Mardia), New York: Wiley, 209–230.

Jennison, C. and Turnbull, B. W. (1993) One-sided sequential tests to establish equivalence between treatments with special reference to normal and binary responses. In *Multiple Comparisons in Biostatistics: Current Research in the Topics of C. W. Dunnett*, (ed. F. M. Hoppe), New York: Dekker, 315–330.

Jennison, C. and Turnbull, B. W. (1993) Sequential equivalence testing and repeated confidence intervals, with applications to normal and binary responses. *Biometrics*, **49**, 31–43.

Jennison, C. and Turnbull, B. W. (1993) Group sequential tests for bivariate response: interim analyses of clinical trials with both efficacy and safety endpoints. *Biometrics* **49**, 741–752.

Hurn, M. A. and Jennison, C. (1993) Multiple-site updates in maximum a posteriori (MAP) and marginal posterior modes (MPM) image estimation. In *Statistics and Images: 1*, (eds K. V. Mardia and G. K. Kanji), Oxford: Carfax Publishing Company, 155–186.

- Jennison, C. (1994) Numerical computations for group sequential tests. In *Computing Science and Statistics, Volume 25*, (eds M. Tarter and M. D. Lock), Interface Foundation of North America, 263–272.
- Barker, A., Hawton, K. Fagg, J. and Jennison, C. (1994) Seasonal and weather factors in parasuicide. *British Journal of Psychiatry*, **165**, 375–380.
- Gavin, J. and Jennison, C. (1994) Subpixel reconstruction in image analysis. In *Proceedings of the Section on Statistical Computing, ASA Annual Meetings, August 1995*.
- Jennison, C., Franconi, L. and Sheehan, N. A. (1995) Stochastic optimisation: simulated annealing and the genetic algorithm. In *Complex Stochastic Systems and Engineering*, (ed. D. M. Titterton), Oxford: Clarendon Press, 209–213.
- Jennison, C. and Sheehan, N. A. (1995) Theoretical and empirical properties of the genetic algorithm as a numerical optimizer. *J. Computational and Graphical Statistics*, **4**, 296–318.
- Hurn, M. A. and Jennison, C. (1995) A study of simulated annealing and a revised cascade algorithm for image reconstruction. *Statistics and Computing*, **5**, 175–190.
- Crook, B., Nijhoff, P., Van Der Kemp, P. and Jennison, C. (1995) The chronotropic response of the sinus node to exercise: a new method of analysis and a study of pacemaker patients. *European Heart Journal*, **16**, 993–998.
- Barker, A., Jones, R. and Jennison, C. (1995) A prevalence study of age-associated memory impairment. *British Journal of Psychiatry*, **167**, 642–648.
- Eales, J. D. and Jennison, C. (1995) Optimal two-sided group sequential tests. *Sequential Analysis*, **14**, 273–286.
- Hurn, M. A. and Jennison, C. (1996) An extension of Geman and Reynolds' approach to constrained restoration and the recovery of discontinuities. *IEEE Trans on Pattern Analysis and Machine Intelligence*, **18**, 657–662.
- Jennison, C. and Turnbull, B. W. (1997) Group sequential analysis incorporating covariate information. *J. American Statist. Assoc.*, **92**, 1330–1341.
- Jennison, C. and Turnbull, B. W. (1997) Distribution theory of group sequential t ,

- χ^2 and F tests for general linear models. *Sequential Analysis*, **16**, 295–317.
- Franconi, L. and Jennison, C. (1997) Comparison of a genetic algorithm and simulated annealing in an application to statistical image reconstruction. *Statistics and Computing*, **7**, 193–207.
- Gavin, J. and Jennison, C. (1997) A subpixel image restoration algorithm. *J. Computational and Graphical Statistics*, **6**, 182–201.
- Denne, J. S. and Jennison, C. (1999) Estimating the sample size for a t -test using an internal pilot. *Statistics in Medicine*, **18**, 1575–1585.
- Denne, J. S. and Jennison, C. (1999) Improving the post-experimental properties of Stein's two-stage procedure. *Sequential Analysis*, **18**, 43–56.
- Barber, S. and Jennison, C. (1999) Symmetric tests and confidence intervals for survival probabilities and quantiles of censored survival data. *Biometrics*, **55**, 430–436.
- Abbot, S. E., Whish W. J. D., Jennison, C., Blake D. R. and Stevens C. R. (1999) Tumour necrosis factor α stimulated rheumatoid synovial microvascular endothelial cells exhibit increased shear rate dependent leucocyte adhesion in vitro. *Annals of the Rheumatic Diseases*, **58**, 573–581.
- Denne, J. S. and Jennison, C. (2000) A group sequential t -test with updating of sample size. *Biometrika*, **87**, 125–134.
- Jennison, C. and Turnbull, B. W. (2001) On group sequential tests for data in unequally sized groups and with unknown variance. *J. Statist. Planning and Inference*, **96**, 263–288.
- Jennison, C. and Turnbull, B. W. (2001) Group sequential tests with outcome-dependent treatment assignment. *Sequential Analysis*, **20**, 209–234.
- Barber, S. and Jennison, C. (2002) Optimal asymmetric one-sided group sequential tests. *Biometrika*, **89**, 49–60.
- Jennison, C. and Turnbull, B. W. (2003) Mid-course sample size modification in clinical trials based on the observed treatment effect. *Statistics in Medicine*, **22**, 971–993.
- Leonard, L., Williamson, D. M., Ivory, J. P. and Jennison, C. (2003) An evaluation

of the safety and efficacy of simultaneous bilateral total knee arthroplasty. *The Journal of Arthroplasty*, **18**, 972–978.

Milner, P. C., Payne, J. N., Stanfield, R. C., Lewis, P. A., Jennison, C. and Saul, C. (2004) Inequalities in accessing hip joint replacement for people in need. *European Journal of Public Health*, **14**, 58–62.

Al-Awadhi, F., Hurn, M. A. and Jennison, C. (2004) Improving the acceptance rate of reversible jump MCMC proposals. *Statistics and Probability Letters*, **69**, 189–198.

Al-Awadhi, F., Jennison, C. and Hurn, M. A. (2004) Statistical image analysis for a confocal microscopy two-dimensional section of cartilage growth. *J. Roy. Statist. Soc., C, Applied Statistics*, **53**, 31–49.

Yong, P. F. K., Milner, P. C., Payne, J. N., Lewis, P. A., Jennison, C. (2004) Inequalities in access to knee joint replacements for people in need. *Annals of the Rheumatic Diseases*, **63**, 1483–1489.

Jennison, C. and Turnbull, B. W. (2005) Meta-analyses and adaptive group sequential designs in the clinical development process. *Journal of Biopharmaceutical Statistics*, **15**, 537–558.

Jennison, C. and Turnbull, B. W. (2006) Efficient group sequential designs when there are several effect sizes under consideration. *Statistics in Medicine*, **25**, 917–932.

Jennison, C. and Turnbull, B. W. (2006) Adaptive and non-adaptive group sequential tests. *Biometrika*, **93**, 1–21.

Jennison, C. and Turnbull, B. W. (2006) Discussion of “Executive summary of the PhRMA Working group on adaptive designs in clinical drug development”. *J. Biopharmaceutical Statistics* **16**, 293–298.

Jennison, C. and Turnbull, B. W. (2006) Discussion of “Are flexible designs sound?” by C.-F. Burman and C. Sonneson. *Biometrics* **62**, 670–673.

Jennison, C. and Turnbull, B. W. (2006) Confirmatory seamless phase II/III clinical trials with hypotheses selection at interim: opportunities and limitations. *Biometrical Journal* **48**, 650–655.

Jennison, C. and Turnbull, B. W. (2007) Adaptive seamless designs: Selection and prospective testing of hypotheses. *Journal of Biopharmaceutical Statistics* **17**, 1135–1161.

Turnbull, B.W. and Jennison, C. (2009) Comparing efficiency for adaptive and non-adaptive group sequential designs. *Proceedings of the 57th ISI conference, Durban, South Africa, August 2009*

Öhrn, F. and Jennison, C. (2010) Optimal group sequential designs for simultaneous testing of superiority and non-inferiority. *Statistics in Medicine* **29**, 743–759.

Jennison, C. and Turnbull, B. W. (2010) From group sequential to adaptive designs. In *Handbook of Adaptive Design in Pharmaceutical and Clinical Development*, (ed. A. Pong and S.-C. Chow), New York: CRC Press, 5-1 – 5-25.

Al-Awadhi, F., Hurn, M. A. and Jennison, C. (2011) Three-dimensional Bayesian image analysis and confocal microscopy. *Journal of Applied Statistics* **38**, 29–46.

Khorsheed, E., Hurn, M. A. and Jennison, C. (2011) Mapping electron density in the ionosphere: A principal component MCMC algorithm. *Computational Statistics and Data Analysis* **55**, 338–352.

Jenkins, M., Stone, A. and Jennison, C. (2011) An adaptive seamless phase II/III design for oncology trials with subpopulation selection using correlated survival endpoints. *Pharmaceutical Statistics* **10**, 347–356.

Hampson, L. V. and Jennison, C. (2013) Group sequential tests for delayed responses (with discussion). *J. Roy. Statist. Soc., B*, **75**, 3–54.

Jennison, C. and Turnbull, B. W. (2013) Interim monitoring of clinical trials: Decision theory, dynamic programming and optimal stopping. *Kuwait Journal of Science*, **40**, 43–59.

Jennison, C. and Turnbull, B. W. (2013) Group Sequential Designs for Survival Data. In *Handbook of Survival Analysis*, (ed. J.P. Klein, J.G. Ibrahim, T.H. Scheike and H.C. van Houwelingen) New York: CRC Press, 595–613.

Zhou, K., Donnelly, L. A., Morris, A. D., Franks, P. W., Jennison, C., Palmer, C. N. A. and Pearson, E. R. (2014) Clinical and genetic determinants of progression

of type 2 diabetes: A DIRECT Study. *Diabetes Care*, **37**, 718–724.

Hampson, L. V. and Jennison, C. (2015) Optimising the data combination rule for seamless Phase II/III clinical trials. *Statistics in Medicine*, **34**, 39–58. doi: 10.1002/sim.6316.

Jennison C. and Turnbull, B. W. (2015) Adaptive sample size modification in clinical trials: Start small then ask for more? *Statistics in Medicine*, **34**, 3793–3810. doi: 10.1002/sim.6575.

Antonijevic, Z., Bolognese, J., Burman, C-F., Chuang-Stein, C., Jennison, C., Kimber, M., Marchenko, O., Patel, N. R. and Pinheiro, J. (2015) Impact of Phase 2b strategies on optimization of drug development programs. In *Optimization of Pharmaceutical R&D Programs and Portfolios: Design and Investment Strategy*, (ed. Z. Antonijevic) Heidelberg: Springer, 83–103.

Stone, A., Macpherson, E., Smith, A. and Jennison C. (2015) Model free audit methodology for bias evaluation of tumour progression in oncology *Pharmaceutical Statistics*, **14**, 455–463. doi: 10.1002/pst.1707

Parke, T., Marchenko, O., Anisimov, V., Ivanova, A., Jennison, C., Perevozskaya, I. and Song, G. (2017) Comparing oncology clinical programs by use of innovative designs and expected net present value optimization: Which adaptive approach leads to the best result? *Journal of Biopharmaceutical Statistics*, **27**, 457–476. doi: 10.1080/10543406.2017.1289949

Wason, J., Stallard, N., Bowden, J. and Jennison C. (2017) A multi-stage drop-the-losers design for multi-arm clinical trials. *Statistical Methods in Medical Research*, **26**, 508–524. doi: 10.1177/0962280214550759.

Eibich, P., Green, A., Hattersley, A., Jennison, C., Lonergan, M., Pearson, E. and Gray, A. (2017) Costs and treatment pathways for type 2 diabetes in the UK: A Mastermind cohort study. *Diabetes Therapy*, **8**, 1031–1045. doi: 10.1007/s13300-017-0296-x

Donnelly., L. A., Zhou, K., Doney, A. S. F., Jennison, C., Franks., P. W., and Pearson, E. R. (2017) Rates of glycaemic deterioration in a real-world population with type 2 diabetes. *Diabetologia*, **61**, 607–15. doi: 10.1007/s00125-017-4519-5

Tamhane, A. C., Gou, J., Jennison, C., Mehta, C. R. and Curto, T. (2018) A gatekeeping procedure to test a primary and a secondary endpoint in a group

sequential design with multiple interim looks. *Biometrics*, **74**, 40–48. doi: 10.1111/biom.12732

Li, H., Wang, J., Luo, X., Grechko, J. and Jennison, C. (2018) Improved two-stage group sequential procedures For testing a secondary endpoint after the primary endpoint achieves significance. *Biometrical Journal*, **60**, 1–10. doi: 10.1002/bimj.201700231