Discussiones Mathematicae
Probability and Statistics 29 (2009) 115–129
doi:10.7151/dmps.1110

INFERENCE ON THE LOCATION PARAMETER OF EXPONENTIAL POPULATIONS

Maria de Fátima Brilhante

Universidade dos Açores, DM, and CEAUL

Sandra Mendonça

Universidade da Madeira, CCEE, and CEAUL

Dinis Duarte Pestana

Universidade de Lisboa, DEIO and CEAUL

and

Maria Luísa Rocha

Universidade dos Açores, DEG, CEEAplA and CEAUL

A token of friendship to Professor J. T. Mexia on his 70th birthday

Abstract

Studentization and analysis of variance are simple in Gaussian families because $\overline{X}$ and S^2 are independent random variables. We exploit the independence of the spacings in exponential populations with location λ and scale δ to develop simple ways of dealing with inference on the location parameter, namely by developing an analysis of scale in the homocedastic independent k-sample problem.

Keywords: studentization, analysis of scale, characterizations, independence of exponential spacings, location-scale families, F-ratio.

2000 Mathematics Subject Classification: 60E05.

Research partially supported by FCT/OET.

References

[1] A.A. Aspin, *An examination and further developments of a formula arising in the problem of comparing two mean values,* Biometrika **35** (1948), 88–97.

[2] A.A. Aspin, *Tables for use in comparisons whose accuracy involves two variances, separately estimated,* Biometrika **36** (1949), 290–293.

[3] M.F. Brilhante and S. Kotz, *Infinite divisibility of the spacings of a Kotz-Kozubowski–Podgórski generalized Laplace model,* Statistics & Probability Letters **78** (2008), 2433–2436.

[4] M.F. Brilhante, D. Pestana, J. Rocha and S. Velosa, *Inferência Estatística Sobre Localização e Escala*, Sociedade Portuguesa de Estatística, Ponta Delgada 2001.

[5] H.A. David and H.N. Nagaraja, Order Statistics, 3rd ed., Wiley, New York 2003.

[6] R.A. Fisher, Statistical Methods for Research Workers, Oliver and Boyd, Edinburgh 1925.

[7] N.L. Johnson, S. Kotz and N. Balakrishnan, Continuous Univariate Distributions, vol. 2, 2nd ed., Wiley, New York 1995.

[8] G.W. Oehlert, A First Course in Design and Analysis of Experiments, Freeman, New York 2000.

[9] V. Perlo, *On the distribution of 'Student's' ratio for samples of three drawn from the rectangular distribution*, Biometrika **25** (1933), 203–204.

[10] D. Pestana, F. Brilhante and J. Rocha, *The analysis of variance revisited,* in Extreme Values and Additive Laws, Lisboa (1999), 73–77.

[11] D. Pestana and J. Rocha, *Análise de escala – modelo exponencial,* in *A Estatística e o Futuro e o Futuro da Estatística*, Salamandra, Lisboa (1993), 295–303.

[12] J. Rocha, *Localização e Escala em Situações não Clássicas,* Dissertação de Doutoramento, Universidade dos Açores, Ponta Delgada 1995.

[13] J. Rocha, *Inference on location parameters – internally studentized statistics,* Rev. Estat. (2001), 355–356.

[14] F.E. Satterthwaite, *An approximate distribution of estimates of variance components,* Biometrics Bulletin **2** (1946), 110–114.

[15] H. Scheffé, *On solutions of the Behrens-Fisher problem based on the $t-$distribution,* Ann. Math. Stat. **14** (1943), 35–44.

[16] H. Scheffé, *A note on the Behrens-Fisher problem,* Ann. Math. Stat. **15** (1944), 430–432.

[17] H. Smith, *The problem of comparing the results of two experiments with unequal means,* J. Council Sci. Industr. Res. **9** (1936), 211–212.

[18] Student, *The probable error of the mean,* (Reprinted in E.S. Pearson and J. Wishart, (1958) "Student's" Collected Papers, Cambridge Univ. Press, Cambridge), Biometrika **6** (1908), 1–25.

[19] B.L. Welch, *The significance of the difference between two means when the population variances are unequal,* Biometrika **29** (1938), 350–361.

[20] B.L. Welch, *On the comparison of several mean values: an alternative approach,* Biometrika **38** (1951), 330–336.

Received 8 September 2009