

# Nuclear weapons, rattlesnakes, coral, pneumonia, cancer, hotel choice, . . . and second-order asymptotics!



Firth D (1993), Bias reduction of maximum likelihood estimates. *Biometrika* 80, 27-38

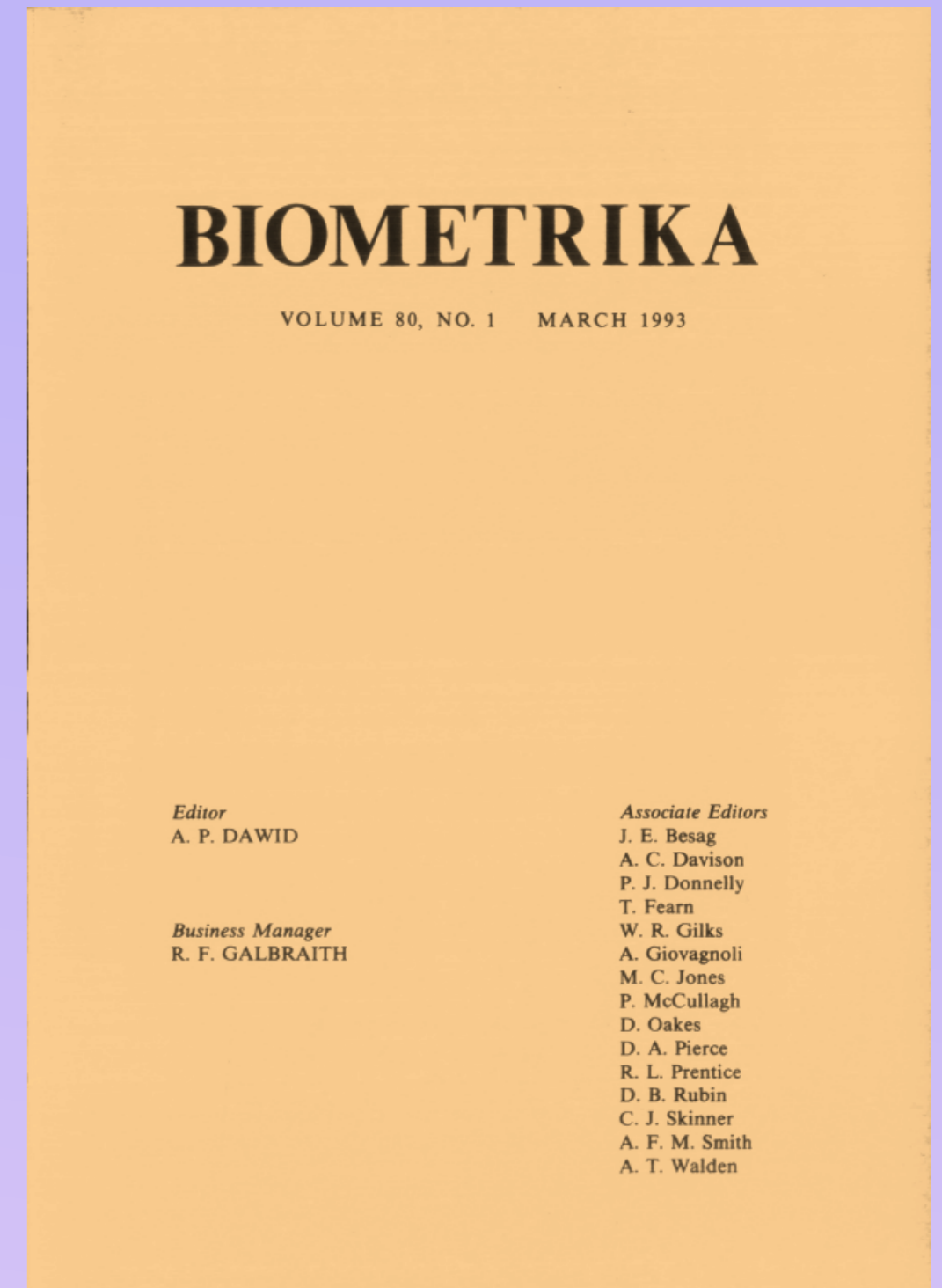
If  $\theta$  is the canonical parameter of an exponential family model,  $\kappa_{r,st} = 0$  for all  $r, s$  and  $t$ . Therefore the  $r$ th element of  $A^{(E)}(\theta)$ , or equivalently of  $A^{(O)}(\theta)$ , is given by

$$a_r = -n\kappa_{r,s}b_1^s/n = \kappa_{r,s}\kappa^{s,t}\kappa^{u,v}\kappa_{t,u,v}/2 = \kappa^{u,v}\kappa_{r,u,v}/2 = -\kappa^{u,v}\kappa_{ruv}/2,$$

using the identities (2.2). In matrix notation, this may be written as

$$a_r = \frac{1}{2} \text{tr} \left\{ i^{-1} \left( \frac{\partial i}{\partial \theta_r} \right) \right\} = \frac{\partial}{\partial \theta_r} \left\{ \frac{1}{2} \log |i(\theta)| \right\}.$$

This is a typical extract from the 1993 *Biometrika* paper. It is *second-order asymptotic statistical theory*. (It uses Einstein's summation convention—for clarity!)



## Selected citations from 2012 and 2013

### Politics

Questioning the effect of nuclear weapons on conflict. *Journal of Conflict Resolution*.

Nation-building and conflict in modern Africa. *World Development*.

### Animal Behaviour and Ecology

Ground squirrel tail-flag displays alter both predatory strike and ambush site selection behaviours of rattlesnakes. *Proceedings of the Royal Society B*.

Hosts of the Plio-Pleistocene past reflect modern-day coral vulnerability. *Proceedings of the Royal Society B*.

Spatio-temporal dynamics of pneumonia in bighorn sheep. *Journal of Animal Ecology*.

Sexual segregation in Eurasian wild sheep. *Behavioral Ecology*.

Rabies virus and canine distemper virus in wild and domestic carnivores in northern Kenya: Are domestic dogs the reservoir? *EcoHealth*.

### Plant Ecology

Snow cover manipulations alter survival of early life stages of cold-temperate tree species. *Oikos*.

Fine fuels consumption and CO<sub>2</sub> emissions from surface fire experiments in maritime pine stands in northern Portugal. *Forest Ecology and Management*.

### Agriculture and Fisheries

What is an endangered species worth? Threshold costs for protecting imperilled fishes in Canada. *Marine Policy*.

Oocyte dynamics and reproductive strategy of *Aphanopus carbo* in the NE Atlantic—Implications for fisheries management. *Fisheries Research*.

### Sport

Performance outcomes after repair of complete Achilles tendon ruptures in National Basketball Association players. *American Journal of Sports Medicine*.

### Criminology

Reducing violence by transforming neighborhoods: A natural experiment in Medellin, Colombia. *American Journal of Epidemiology*.

Psychiatric characteristics of homicide defendants. *American Journal of Psychiatry*.

### Psychology and Psychiatry

Seeking help for psychological distress in urban China. *Journal of Community Psychology*.

Childhood anxiety: An early predictor of mood disorders in offspring of bipolar parents. *Journal of Affective Disorders*.

### Health Sciences

Fracture risk in women with breast cancer: A population-based study. *Journal of Bone and Mineral Research*.

Predisposing factors associated with delirium among demented long-term care residents. *Nursing Research*.

Positioning injuries associated with robotic assisted urological surgery. *Journal of Urology*.

Prevalence and predictors of maternal seasonal influenza vaccination in Hong Kong. *Vaccine*.

Burden and aetiology of diarrhoeal disease in infants and young children in developing countries. *The Lancet*.

*Staphylococcus aureus* infections after liver transplantation. *Infection*.

Periodontal disease and decreased kidney function in Japanese elderly. *American Journal of Kidney Diseases*.

### Commerce

Pricing in a social world: The influence of non-price information on hotel choice. *Journal of Revenue and Pricing Management*.

Effect of effort and deadlines on consumer product returns. *Journal of Consumer Psychology*.

### Paleolimnology

Climate-mediated changes in small lakes inferred from midge assemblages: The influence of thermal regime and lake depth. *Journal of Paleolimnology*.

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2012