BOOK REVIEW

P. McCullagh and J. A. Nelder, *Generalized Linear Models*, 1983, xiii + 261 pages, $31.00.

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1. Introduction. A generalized linear model is composed of three parts:

(i) a *random component* $f(y; \mu)$ specifying the stochastic behavior of a response variable Y;

(ii) a *systematic component* $\eta = x\beta$ specifying the variation in the response variable accounted for by known covariates x; and

(iii) a *link function* $g(\mu) = \eta$ specifying the relationship between the random and systematic components.

The random component $f(y; \mu)$ is typically an exponential family distribution with $E(Y) = \mu$. The link function g is any strictly monotone differentiable function.

Particular instances of generalized linear models have appeared in the statistical literature over the past century. These include classical linear models, logit and probit models for proportions, loglinear models for counts, and regression models with constant coefficient of variation rather than constant variance.

Grizzle, Starmer, and Koch (1969) proposed the general class of models defined by (ii) and (iii) above but (implicitly) with $f(y; \mu) = \text{Poisson}(\mu)$ in (i). Dempster (1971) proposed the general class of models defined by (i) and (ii) above but (implicitly) with $g(\mu) = \theta$, the canonical link, in (iii). Nelder and Wedderburn (1972) unified the theory and coined the name "generalized linear model." Wedderburn (1974) extended the theory to the important class of quasi-likelihoods where the assumption of an exponential family distribution in (i) is relaxed by second-moment assumptions of the form $\text{var}(Y) \propto V(\mu)$. Numerous other papers have been written on various aspects of generalized linear models in the past decade. An international conference on generalized linear models was held in London (Gilchrist, 1982). An important software package, GLIM (Baker and Nelder, 1978), specifically designed to fit generalized linear models, is used widely.

The monograph by McCullagh and Nelder is the first extensive treatment of generalized linear models. It is important for at least two reasons:

• it makes the theory and application of generalized linear models accessible to a wide audience which until now has (largely) been restricted to the British school; and