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BOOK REVIEW

J. PFANZAGL WITH THE ASSISTANCE OF W. WEFELMEYER, *Contributions to a General Asymptotic Statistical Theory. Springer Lecture Notes in Statistics* **13**, 1982, vii + 315 pages, $16.80.

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In this monograph Pfanzagl has made an important contribution to asymptotic estimation and testing theory in nonparametric models. The main questions he addresses are the following:

Consider models according to which we observe $X_1, \cdots, X_n$ which take values in a sample space $\mathscr{X}$ and are independent and identically distributed according to $P \in \mathscr{P}$.

1) How well can we (asymptotically) estimate a Euclidean parameter $K(P)$?

Here $K: \mathscr{P} \to R^m$ for some m.

2) How well can we test hypotheses of the form $H: K(P) = c, P \in \mathscr{P}$?

If $\mathscr{P}$ is "parametric", $\mathscr{P} = \{P_\theta : \theta \in \Theta\}$, Θ Euclidean, $\theta \to P_\theta$ smooth, the answers are standard.

Pfanzagl develops a method introduced by Koshevnik and Levit (1976), itself based on an old idea of Stein's (1956), for obtaining "information bounds" in "nonparametric" or what one might call semiparametric models. Here are a few examples of such models; a wealth of others can be found in Chapters 2, 14–18 of Pfanzagl.

a) The symmetric location model: The parameter of interest $K(P)$ here is the centre of symmetry.
b) The linear regression model with stochastic independent variables and i.i.d. but not necessarily normally distributed errors. The parameters of interest are the regression coefficients other than the constant.
c) The Cox (1972) regression model with time independent covariates. Here stochastic independent variables (covariates) and survival times are observed, the latter possibly with censoring independent of the survival time given the covariates. The hazard rate of a survival time (precensoring) given the covariates c is given by

$$\lambda(t \mid c) = \exp\{c^T\beta\}\lambda_0(t)$$

where λ_0 is an unknown fixed hazard rate. The parameter β is of interest.

As these examples suggest, the models of interest are described through a parametrization $(\theta, G) \to P_{(\theta,G)}$ where θ is Euclidean and G ranges over an abstract space, typically a set of probability distributions on some space. The parameters

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