WHITTLE, P. (1953). Estimation and information in stationary time series. *Ark. Mat. Astron. Fys.* **2** 423–434.

WHITTLE, P. (1961). Gaussian estimation in stationary time series. *Bull. Inst. Internat. Statist.* **33** 105–130.

WIENER, N. (1958). *Nonlinear Problems in Random Theory*. M. I. T. Press, Cambridge.

DEPARTMENT OF STATISTICS,
UNIVERSITY OF CALIFORNIA,
BERKELEY, CALIFORNIA 94720

DISCUSSION ON PROFESSOR BRILLINGER'S PAPER

D. R. COX (*Imperial College, London*) My comments concern the statistical aspects of Dr. Brillinger's interesting paper. First, when it is required to study the dependence of a process $\{N\}$ on an explanatory process $\{M\}$, there are often strong arguments for arguing conditionally on the observed process $\{m\}$. In particular, assumptions about $\{M\}$ itself are avoided; even its stationarity is not required so long as the interrelations are time-invariant.

Secondly, some qualification seems desirable of Dr. Brillinger's blanket recommendation that $\{M\}$ should, where possible, be chosen to be Poisson. Will not much depend on the constraints on observation and on the nature of the interrelations? For instance, one can envisage situations where it would be more informative to take $\{M\}$ as a regular sequence of widely spread points, supplemented, perhaps, by some pairs of points close together to examine linearity.

Thirdly, an alternative to the study of interrelations is via the modulation of simple models for $\{N\}$ (Cox, 1972). In this the intensity of the $\{N\}$ process is modified by a factor depending on relevant aspects of the $\{M\}$ process. Two advantages of this approach are that in certain cases likelihood functions can be obtained and that simple relations, nonlinear in Dr. Brillinger's special sense, can be accommodated; for example, the backward recurrence time in the $\{M\}$ process may be particularly relevant. An advantage of Dr. Brillinger's approach is that special assumptions about $\{N\}$ are avoided.

REFERENCES

COX, D. R. (1972). The statistical analysis of dependences in point processes. In *Stochastic Point Processes*, P. A. W. Lewis, ed. Wiley, New York.

P. Z. MARMARELIS (*California Institute of Technology*) Professor Brillinger's well-written paper on the identification of point process systems fulfills, among others, a long-standing need for such work in the field of neurophysiological system analysis. I expect that many applications of these techniques on point process systems (certainly on neural systems) will come to fruition following Brillinger's work.