Adaptive Designs
IMS Lecture Notes - Monograph Series (1995) Volume 25

BIASED COIN DESIGNS: SOME PROPERTIES AND APPLICATIONS

BY JEFFREY R. EISELE*

CIBA-GEIGY AG

Abstract

A brief review of biased coin designs is presented. Some asymptotic properties of the adaptive biased coin designs of Wei (1978) and Eisele (1994) are given. Applications of biased coin designs to estimation and testing problems are also given.

1. Introduction: biased coin designs. In designing a clinical trial, the method of treatment allocation is a primary consideration. Because patients arrive sequentially from a population that may be very heterogeneous it is only in completion of the study that the characteristics of the patient population are known. In addition, the size of the study cannot be determined in advance. Because of this, much of the traditional experimental design methodology is inapplicable. Randomization has been used in treatment allocation due to the following advantages. First, it minimizes the possibility of selection bias which may occur if the experimenter is aware of which treatment the next patient will receive. A second advantage is freedom from accidental bias which could result, for example, if time trends are present in the

Received September 1992; revised April 1993.

*Research supported by the U.S. Army Research Office under DAAL-03-88-0122 and by NIH/NEI Grant T32-EY07119.

AMS 1991 subject classification. Primary 62L05, secondary 62E20.

Key words and phrases. Clinical trial, exponential families, invariance principle, martingale central limit theorem, restricted randomization, sequential allocation, sequential probability ratio test.