

# Testing for Parallel Carryover Effects in Redundant Systems

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## **Abstract**

Redundancy is an important approach to increase the reliability and availability of systems. There has been a recent interest in analyzing failure data from redundant systems to detect the effects of adverse events. A carryover effect is defined as an effect which may cause a temporary increase in the event intensity after the occurrence of a condition or event. We consider a parallel type of carryover effect in which the event intensity of a process is increased by the event occurrences of another process. In this study, our main goal is to develop formal test procedures for the assessment of parallel carryover effects in redundant systems with repairable components connected in parallel, and to discuss properties of the tests developed. We therefore develop partial score tests for the presence of parallel carryover effects. Asymptotic properties of the test statistics are discussed analytically as well as through simulations. A data set based on the information obtained from a power company is analyzed to illustrate the methods developed.