

## A Footnote to "Statistical Decision Functions"

by

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The following theorem is one of the important results in the theory of two-person games given by Wald in his book [1].

Theorem 2.22 (p. 54). If A and B are the spaces of mixed strategies for a two-person zero-sum game, A being the strategies for player 1, and A is separable and B is weakly compact, then the class of all admissible strategies of player 2 is a complete class [2].

Wald says of this result, in a footnote, "This theorem is related to a theorem of Zorn [3] on partially ordered sets . . . but cannot be derived from it, since Zorn assumes that each simply ordered subset has an upper bound in the system, whereas in our case merely each denumerable and simply ordered subset can be shown to have an upper bound." Wald's

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1. Statistical Decision Functions, Wiley Publications in Statistics, 1950.
  2. Throughout, I use Wald's notation and definitions. I will remind the reader, however, that a strategy is admissible if there is no uniformly better strategy; and that a family of strategies is complete if for any strategy not in the family, one in the family is uniformly better.
  3. See Lefschetz, Algebraic Topology, Amer. Math. Soc. Colloquium Publ., 27 (1942).