

**Meeting:** 1003, Atlanta, Georgia, MAA CP P1, MAA Session on Philosophy of Mathematics

1003-P1-597      **Frederik S Herzberg\*** ([herzberg@maths.ox.ac.uk](mailto:herzberg@maths.ox.ac.uk)), Merton College, OX1 4JD Oxford, England. *Generalised likelihoods, ideals and infinitesimal chances - how to approach the "zero-fit problem"*.

The "zero-fit problem" is crucial for any investigation into the epistemological limitations of statistics, for it asks which methods there are to compare two atomless probability spaces (the canonical situation for infinite state spaces) - both of which have to assign probability ("fit") zero to the actual observation. Adam Elga claims to be able to reject David Lewis' suggestion of considering nonstandard probability measures - which can also attain infinitesimal values - as one way of tackling the zero-fit problem. We will indicate two major flaws in his general argument and apply our critique to the "toy problem" he employs to illustrate it. We will construct a nonstandard probability measure that solves the zero-fit problem in this particular case and give hints how to proceed in more general situations. In an appendix to his said paper, Elga also argues that a generalisation of the maximum likelihood technique (most common in theoretical statistics) is not suitable to solve the zero-fit problem. However, the mathematical reason behind any possible failure of that approach (the Radon-Nikodym Theorem) actually provides another interesting possibility to attack the zero-fit problem: The comparison of the ideals of null sets associated with the probability measures in question. (Received September 23, 2004)