Insensitivity Selten [1] defines scores in a categorical setting where there are n possible states. He defines a forecast as a vector $p = (p_1, ...p_n)$ where each p_i is the probability ascribed to event i occurring, summing to unity over n since the events are a complete description of all possible events and are mutually exclusive. He defines Δ_n to be the set of all such probability distributions and then defines the score given to forecast p if event i occurs as $S_i(p)$. The expected score of p under another distribution r is defined as $V(p|r) = \sum_i^n r_i S_i(p)$, the **'expected score loss'** is then defined as $L(p|r) = V(r|r) - V(p|r)$. A score is then strictly Proper if $L(p|r) > 0 \ \forall p, r \in \Delta_n$ such that $p \neq r$.

Given p is such that $p_j = 0$ and q another forecast such that $q_j > 0$ Selten then suggests a skill score is **'insensitive'** if $L(p|(1-\alpha)q+\alpha p) = +\infty$ for any $0 \leq \alpha < 1$; here he uses the positive orientation and defines $L(p|r) = +\infty$ if $V(r|r) > -\infty$ and $V(p|r) = -\infty$.

This is motivated as follows. Let $r = (1 - \alpha)q + \alpha p$ for an arbitrary p and q. Then he suggests that as α tends to 1, r is 'closer' to p. So that $L(p|r(\alpha))$ should, he argues, decrease as α increases. A score is insensitive if this does not happen for some p. Selten argues that insensitivity is undesirable.

Bibliography

[1] R. Selten. Axiomatic characterization of the quadratic scoring rule. Experimental Economics, 1:43–62, 1998.