Accuracy of Derived Priorities

The accuracy of the priorities computed from pairwise relative comparisons has been validated over the years in numerous studies.

First, it has been shown that for a pairwise comparison matrix A = [*a ij*] that is consistent (sometimes called super-transitivity), where *aij = a ik a kj*, then the ratio-scale components of the right-eigenvector give the true, actual priorities (weights) of the items being compared (Mirkin 1979 -- Mirkin, B. G. 1979. Group Choice, John Wiley & Sons, NY).

If consistency does not hold, and in general it does *not*, error analysis has shown that the eigenvector still produces a set of priorities that are good approximations of the true (unknown in most cases) values. This happens because, as Saaty (1980 --- Saaty, T. L. 1980. The Analytic Hierarchy Process, McGraw-Hill Book Co., N.Y.) has shown mathematically, the eigenvector calculation has an averaging effect – it corresponds to finding the dominance of each alternative along all walks of length k, as k goes to infinity. Because of this, and provided there is adequate variety and redundancy, the impact of errors in judgments, such as those introduced by using an ordinal verbal scale, can be greatly reduced.

Empirical research and numerous validation studies involving brightness of light, distance, and areas of geometric shapes have shown that it is also true for judgments from the fundamental verbal scale (ordinal measures), provided there is adequate variety in the elements being compared and adequate redundancy in the judgments (that is, *n**(*n*-1) sufficiently larger than *n*-1).