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DISCUSSION

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The past 15 years have shown considerable progress in generalizations and modifications of classical principal component analysis. This includes distribution theory for sample principal components in elliptical families [Muirhead (1982) and references therein], robust estimation and testing [Campbell (1980), Devlin, Gnanadesikan and Kettenring (1981) and Tyler (1981, 1983)], *common principal components* in several groups [Flury (1988)], principal components of patterned covariance matrices [Neuenschwander (1991) and Flury and Neuenschwander (1993)] and last but not least, generalizations to nonlinear situations, which constitute perhaps the thorniest area. Donnell, Buja and Stuetzle (DBS) give a fundamental building block in this field, the previous most significant building block being the *principal curves* of Hastie and Stuetzle (1989).

DBS stress that their method is rooted in the psychometric literature, but there is at least one (to my knowledge) direct predecessor in the statistical literature as well: Gnanadesikan and Wilk's (1969) *Generalized Principal Component Analysis*, described in detail also in Gnanadesikan (1977), Seber (1984) and Jackson (1991), which imitates the successful use of polynomials in regression. Gnanadesikan and Wilk's approach was to introduce powers and products of the