

5

Comparing Clouds of Partial Individuals

Much multiple factor analysis (MFA) use involves comparing subtables, each made up of a group of variables. One aspect of this comparison was described in the previous chapter that of the factors of separate analyses. Here we deal with the aspect that undoubtedly contributes the most to the richness of MFA results: comparing clouds of individuals each associated with one of the groups of variables.

5.1 Objectives

A row of a data table in which we only consider the data relative to a single group of variables is known as a *partial individual*. Thus, partial individual i corresponding to group j , denoted i^j , is made up of all of the values of $\{x_{ik}; k \in K_j\}$. The set of partial individuals $\{i^j, i \in I\}$ associated with group j makes up partial cloud N_j^j . This cloud of individuals is analysed when conducting a principal component analysis (PCA) of the data of the single group j . It evolves in the space generated by the variables of group j alone: \mathbb{R}^{K_j} . In MFA we therefore have to consider $J + 1$ clouds of individuals: the J partial clouds to which we add cloud N_I , a cloud we can consider 'overall' (as opposed to partial) evoking the fact that it is associated with the whole set of (active) data. In practice, however, we designate it a *mean cloud*, in reference to one of its geometric properties.

The comparison of partial clouds is the geometric translation of the question of whether two individuals i and l which are similar in terms of group j are also similar in terms of group g .

Thus, when considering the groups of sensory and chemical variables in the example of the six orange juices, we might ask ourselves the following questions:

- Overall, do two orange juices which are similar from a chemical point of view also have the same sensory profile?
- Are there any juices which have a 'mean' chemical profile and an unusual sensory profile? Could such a discrepancy arise from, for example, a chemical characteristic which was not measured, an interaction between chemical characteristics (on perception) or some