MULTIVARIATE CORRESPONDENCE ANALYSIS (MCA) FOR NOURISHING SCHOOL

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Research project

It starts from the survey on the response of children to the new consumption situation induced by the Covid-19 emergency.

Research questions (in terms of liking of food, emotional response, waste, and description of meals):

1) how is lunch at the school canteen;
2) compare the perception of the situation during the pandemic between the first and second grades and the third to fifth grades;
3) check whether the perception of meals during the pandemic is related to frequency to eat at the school canteen;
4) compare general liking of eating at home vs eating at the school canteen;
5) investigate the effect of Food Neophobia (only for children of the last three years of the primary school);
6) investigate the perception of variation in meals before and during the pandemic (only for children of the last three year of the primary school)

Data

have been collected from questionnaires administered (from May 2022 to December 2022) to children and their parents involved in the project: 9 schools from north to south of Italy: Cinisello (Lombardia), Firenze (Toscana), Formigine (Emilia Romagna), Ladispoli (Lazio), Legnago (Lombardia), Milano (Lombardia), Perugia (Umbria), Salerno (Campania), San Marcello (Marche).

Three types of questionnaires have been administered:
▪to children of the first two years of the primary school;
▪to children of the last three years of the primary school
▪to their parents.

From each questionnaire we got quantitative and categorical variables, ordinal and dichotomous ones.

Statistical Analysis

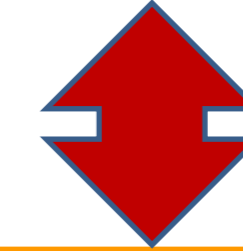*Univariate:* investigates the variables one at time to give informations about the feature under study.
Bivariate: jointly investigates pairs of variables to give informations about their joint behavior.
Multivariate: investigates the joint relationships between more than two variables at a time.

Multiple Correspondence Analysis (MCA) is a multivariate statistical method aimed at detecting groups of individuals with similar profiles, as well as the association between several categorical variables.
It generalizes principal component analysis when the variables are categorical and not quantitative (Abdi and Williams, 2010).

MCA for Nourishing: Why?

The dataset "children of the first two grades of primary school" has 29 categorical variables (dichotomous and not) and 16 ordinal ones.

The dataset "children of the last three grades of primary school": has 53 categorical variable (dichotomous and not) and 30 ordinal ones.

Remember: ordinal variables are categorical too.

...So we have many multivariate categorical data and MCA suits them fine!!!

MCA results: answers to research questions

▪People who like to eat at the school canteen also like to eat the foods while children who do not like eating at the canteen do not like eating different foods.

▪There is a strong association between children who feel angry, sad and annoyed. There is a clear contrast between children who feel enthusiastic, satisfied, full of energy, happy and those who feel disgusted.

▪Children of the first grade "are not disgusted". Children of the second grade are "happy, full of energy and even satisfied". The third and fourth grades do not associate with the other variables. The fifth grade feels above all "neutral".

▪For children of the first grade, lunch at the school canteen is "uncomfortable and blocked". For children in the second grade, the canteen is "fun, comfortable, free"; the third, fourth and fifth grades do not associate with any variable.

▪Fourth and fifth grades children associate themselves with the "so-so" response modes to the questions "do you like eating at the school canteen", "how much do you like vegetables", "how much do you like pasta". Third graders don't associate with anything. Children of the first and second grades really like eating at the school canteen and they really like to eat meat, fruit, vegetables, pasta, rice and legumes.

▪Those who don't like to eat at the school canteen often leave a lot of food on their plate. Those who leave a lot of food on their plate leave the meat, fruit, pasta, and rice.

▪First and second grades have similar behaviors. They don't leave food at the school canteen, they really like to eat there and only in the first grade, when they leave food at the canteen it is because "later they want to play".

▪Enthusiastic children eat everything. Happy and not disgusted children eat everything "so-so". Those who are neutral do not eat new foods and do not even taste them. They also gave a "so-so" answer to the question "when I'm at a friend's party I like to try new foods". Those who are annoyed do not eat new foods. Those who are angry absolutely do not taste new foods and are also afraid to taste new foods. Children who really like vegetables, legumes and fish trust new foods and try them without hesitation. Those who leave a lot of food on their plate do not trust new foods and do not taste them.

▪The food likings before and during the pandemic are similar. The same happens with the emotional response pre-during the pandemic. Whoever left a certain type of food on the plate leaves the same type of food. Who did not leave a certain type of food, does not leave the same type of food. The description of meals at the school canteen does not change in time.

References
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