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## **How to avoid overestimation of the real variation between objects measured on the ordinal scale**

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One of the quality characteristics characterizing the technological process is the measured degree of variation between produced objects. The probability of certain ordinal response of an object under test depends on its ability, given thresholds, characterizing the specific test item. A class of models borrowed from item response theory were recently adapted to business and industry applications. In order to correctly interpret the measurement results, it is necessary (by association with repeatability in the classical measurement system analysis) to consider the intra-variation. However, unlike the usual measurement repeatability, the ordinal intra-variation is not constant along the scale, and sometimes exhibits a rather bizarre undulating character. It is shown under what circumstances it even becomes multimodal. The total ordinal variation decomposition into intra and inter components, demonstrated by help of a specific real case example, allows to make a correct, free of noisy intra component, assessment of the actual variation between objects.

### **Keywords**

ordinal response, repeatability, measurement system analysis

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