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UniODA *vs.* Polychoric Correlation: Number of Lambs Born Over Two Years

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This study assesses agreement between number of lambs born to 227 ewes over two consecutive years. Polychoric correlation could not be validly used to assess agreement because underlying distributional assumptions were violated. Requiring no distributional assumptions, UniODA identified moderate, statistically significant agreement.

Used to assess (inter-rater) agreement between ordered-categorical data such as Likert-type ratings, polychoric correlation estimates what the Pearson correlation would be if ratings were made on a continuous scale.[1] Assumptions underlying the validity of this approach include that the latent trait (T) on which ratings are based is continuous and normally distributed; the rating errors are normally distributed; the variance of rating errors is homogeneous across levels of T; and errors are independent between raters and cases. If these assumptions are met then the value of the polychoric correlation is interpreted as a Pearson correlation.[2]

Prior research used the number of lambs born to 227 ewes over two consecutive years to illustrate polychoric correlation, conceptualizing number of lambs born as a continuous, normally distributed indicator of ewe fertility.[2,3] For these data (Table 1) polychoric correlation was 0.42, but because a G^2 statistic indicated underlying assumptions were not satisfied this was not a valid methodology for assessing agreement in this example.[3]

Table 1: Number of Lambs Born to 227 Ewes Over Two Years

	Lambs Born in 1953		
Lambs Born in 1952	Zero	One	Two
Zero	58	52	1
One	26	58	3
Two	8	12	9

UniODA may be used to assess (inter-rater) agreement without requiring distributional assumptions.[4-8] Irrespective of whether a non-directional (exploratory, *post hoc*) or directional (confirmatory, *a priori*) hypothesis was conducted, UniODA identified a linear model that achieved explicitly maximum accuracy relative to chance for the sample: if lambs born in 1952= zero, predict lambs born in 1953=zero; if lambs born in 1952=one, predict lambs born in 1953= one; and if lambs born in 1952=three, predict lambs born in 1953=three.

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This UniODA model was statistically significant ($p<0.0001$) regardless of whether a (non)directional hypothesis was tested, and since the identical model emerged the ESS (Effect Strength for Sensitivity, a normed index of accuracy above chance: for any problem, 0=the accuracy expected by chance, and 100= perfect, errorless classification) was 25.0, reflecting an effect of moderate strength.[4]

References

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