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Using EO-CTA to Disentangle Sets of Sign-Test-Based Multiple-Comparison Findings

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Prior empirical comparison of the timeline follow-back (TLFB, dummy-coded as 1) *vs*. Drinker Profile (DP, coded as 2) methods of quantifying alcohol consumption in treatment research[1] reported pairwise sign tests comparing these methods separately on four categorical ordinal outcomes: abstinent=1; light=2; moderate=3; heavy=4 (Table 1). It was concluded: "The direction of differences for the abstinent and medium categories approached significance (with unprotected alpha criterion at .05) with the DP more often yielding higher estimates of abstinent days and lower estimates of medium days. The DP significantly more often yielded lower estimates of light days" (p. 27). This example is used to illustrate and compare the use of enumerated optimal (EO) CTA to disentangle such sets of pairwise comparison outcomes.

Table 1: Summary of Pairwise Sign Tests Comparing TFLB vs. DP Drinking Outcomes[1]

Sign Test Finding	Abstinent	Light	Medium	Heavy
DP < TLFB	19	25	20	22
DP > TLFB	32	6	9	22
Exploratory *p*<	0.09	0.001	0.06	0.99

EO-CTA[2,3] was used to compare the two patterns of sign-test-based findings (treated as the class variable, dummy-coded as 1 for "DP< TLFB", and 2 for "DP>TLFB) on the basis of score on the 4-point categorical ordinal drinking outcome attribute. One optimal model emerged: if drinking outcome=abstinent, predict DP is superior to TLFB; otherwise predict that TLFB is superior: relatively weak ESS=24.3, $p<0.007$. The model correctly classified 77.9% (7 in 9) of sign-test-based "DP<TLFB" findings, and 46.4% (4 in 9) of "DP>TLFB" findings.

It would be more straightforward and successful—in terms of identifying an accurate model—to use optimal methods to compare treatment program effectiveness.[2] Nevertheless, in applications involving pairwise comparisons obtained by suboptimal methodologies, novometrics may be used to disentangle omnibus effects otherwise often ignored in the literature.

References

[1]Cervantes EA, Miller WR, Tonigan JS (1994). Comparison of timeline follow-back and aver-

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aging methods for quantifying alcohol consumption in treatment research. *Assessment*, *1*, 23-30.

[2]Yarnold PR, Soltysik RC (2016). *Maximizing predictive accuracy*. Chicago, IL: ODA Books. DOI: 10.13140/RG.2.1.1368.3286

[3]Yarnold PR, Bryant FB (2015). Obtaining an enumerated CTA model via automated CTA software. *Optimal Data Analysis*, *4*, 54-60.

Author Notes

This study analyzed publically available data, and no conflict of interest was reported.