

BEHAVIOURAL PATTERNS IN PROJECTIVE MAPPING: IMPLICATIONS FOR SENSORY MAP INTERPRETATION AND DATA QUALITY

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INTRODUCTION

Projective Mapping (PM) is a flexible, fast-profiling method that captures product similarities through spatial positioning and is rooted in human categorization constructs. However, participants adopt diverse spatial strategies that heavily influence the configuration and interpretability of the resulting sensory maps, suggesting distinct evaluation criteria across consumer groups (Vidal et al. 2016). The present study investigates the classification of screen-based PM behaviours into different operational taxonomies using objective multivariate statistical metrics to monitor data quality and performance in consumer-based product characterisation.

From RV to calibrated consensus

RV calibration removes the effect of sample number, allowing meaningful comparison of consensus across studies (Fig. 5). The procedure involved the following steps:

- 1 Calculate the RV from the original sample configurations
- 2 Shuffle sample labels within assessors (Wakeling et al., 1992)
- 3 Recalculate RV for each randomized set (null distribution)
- 4 Locate the observed RV in the distribution (Is the consensus above chance?)
- 5 Express the observed RV as a percentile of the null distribution and compare



Calibrated RV = percentile rank of the observed RV within a study-specific null distribution generated by label permutation.

MATERIALS AND METHODS

1 COLLECTION AND IDENTIFICATION OF THE POSITIONING DATA

Screen-based (909 x 602px) projective mapping studies were first identified and selected, comprising food and beverage products represented by 4 to 11 samples per study and evaluated by a total of 507 participants.

2 PLACEMENT BEHAVIOUR ANALYSIS & CLASSIFICATION

- I. The sample coordinates were extracted from 12 projective mapping studies.
- II. Coordinates were cross-validated against image recordings of the mappings to ensure data accuracy.
- III. Two trained analysts visually assessed a total of 1172 individual mappings to set a baseline classification into 4 categories, starting with a GPA analysis.

- IV. A machine-learning classifier based on 12 spatial metrics was used to identify the behavioural categories and validated through leave-one-study-out cross-validation. GPA, MFA, resampling, and permutation-based null models were applied to evaluate their effects on individual and panel performance.

RESULTS AND DISCUSSION

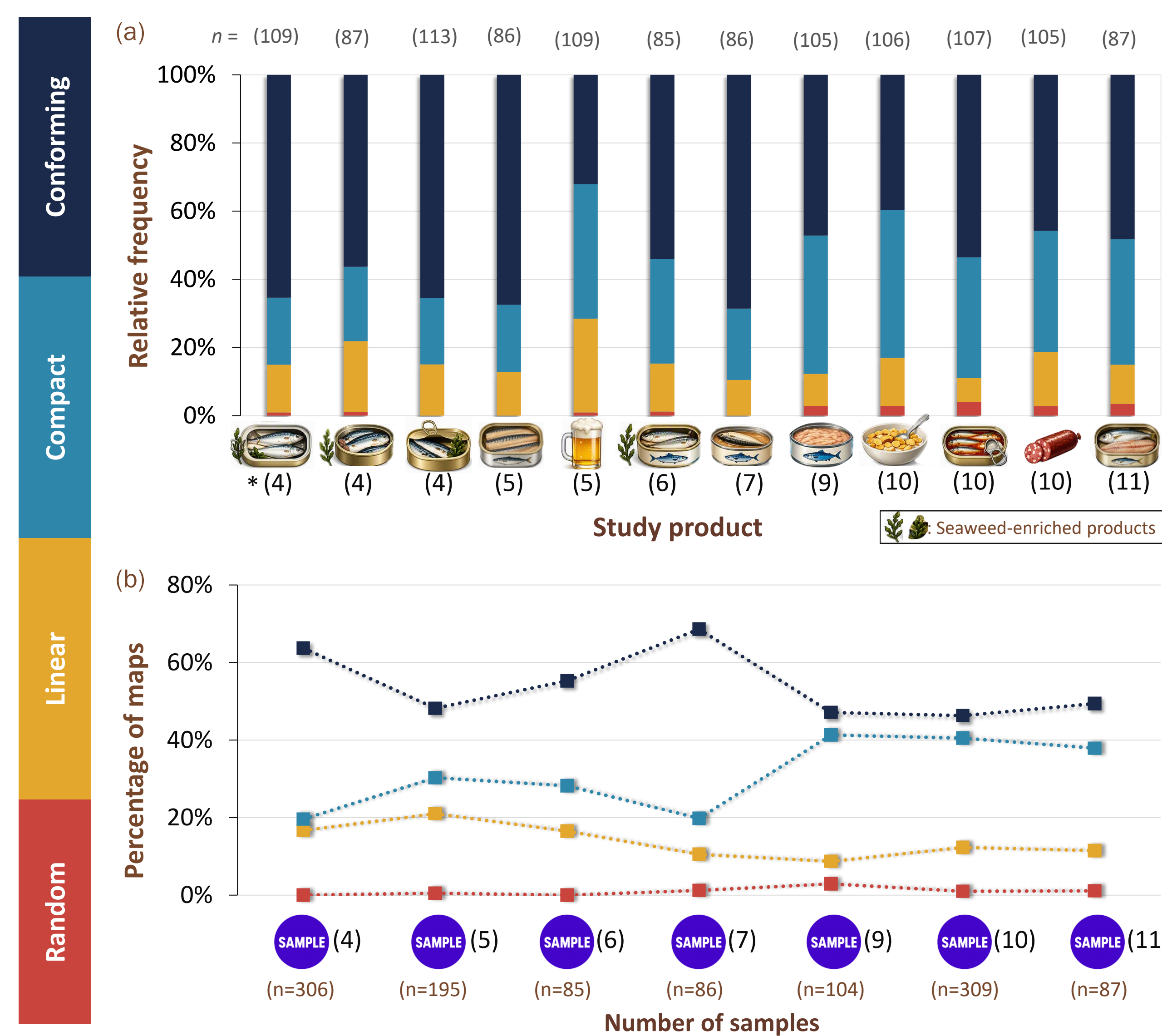


Fig. 2. (a) Relative frequency of taster behaviour in the 12 projective mapping studies. *Number of samples per study (b) Relative frequency of taster behaviour by number of samples

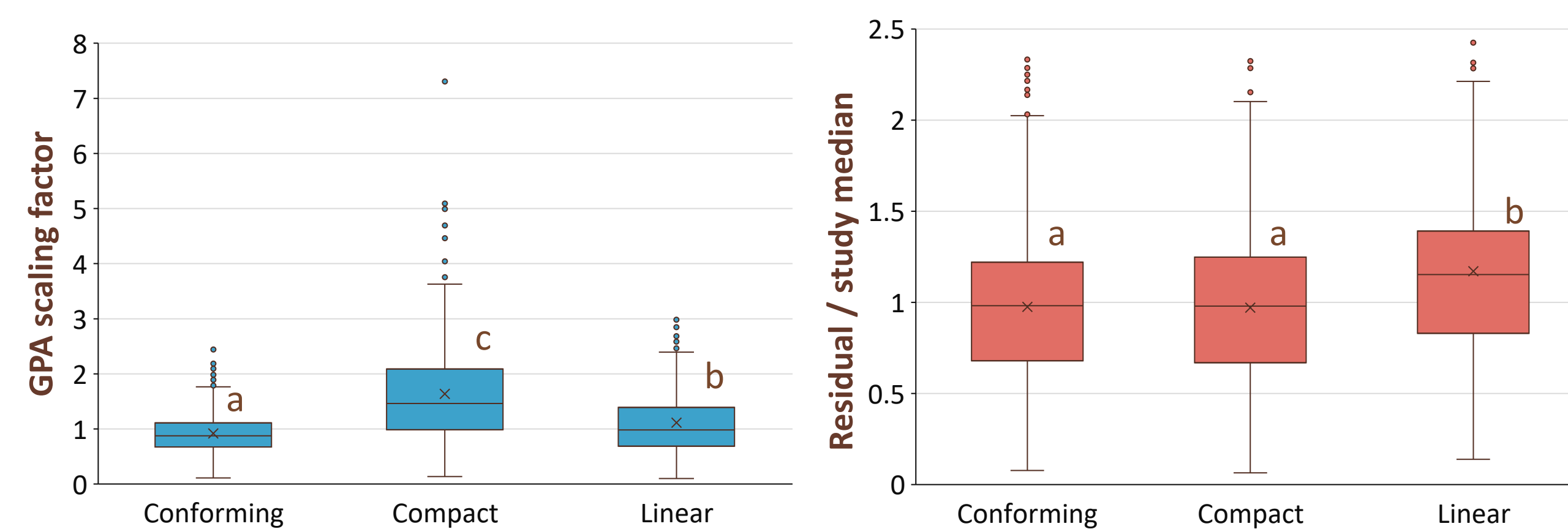


Fig. 3. Individual fit to the consensus by behaviour, all 12 studies and 1172 assessors. (a) GPA scaling factor (b) Procrustes residuals a,b,c – Homogeneous groups according to Welch ANOVA, using the Games-Howell test, with a significance level of 95%

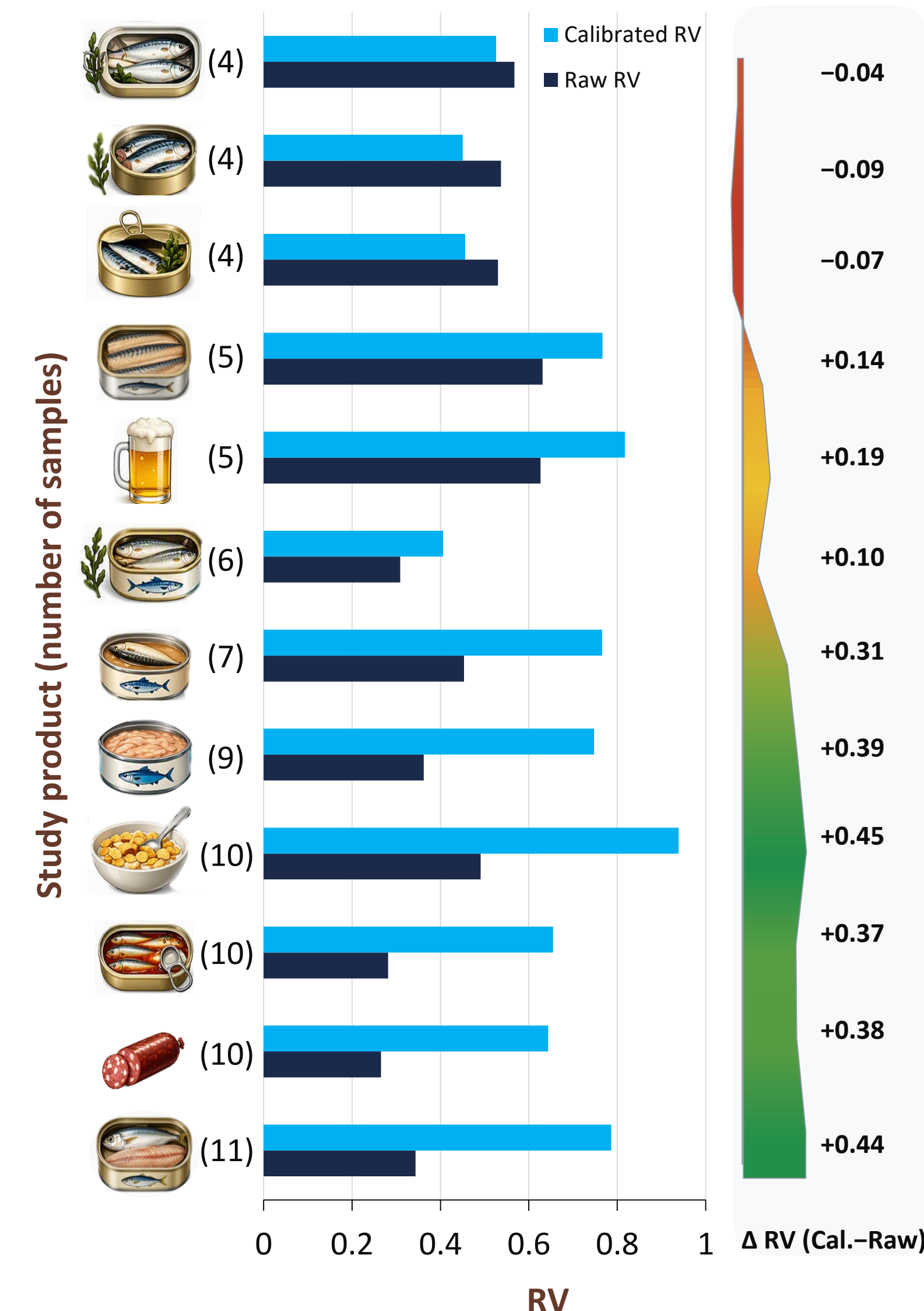


Fig. 5. Raw RV against calibrated RV across the 12 projective mapping studies.

- ✓ The analysis of 1172 screen-based projective mapping configurations showed that assessors adopted different positioning behaviours, classified as **Conforming** (53.75%), **Compact** (30.8%), **Linear** (14.68%), and **Random** (0.77%) (Fig. 1).

- ✓ Compact configurations exhibited higher GPA scaling, but no notable differences were evidenced in Procrustes residuals compared to Conforming maps (Fig. 3a).

- ✓ Raw RV decreased when the number of samples increased. However, permutation-based null models showed that this decrease was strongly influenced by changes in the level of agreement expected by chance as task complexity increased (Fig. 5).

- ✓ The random behaviour was dismissed as a category, given the low number of results and the evidence of participant errors in the PM (Evidenced in the validation), rather than a lack of discernible criteria (Fig. 1).

CONCLUSION

Spatial behaviour in projective mapping should be interpreted as methodological information rather than as direct evidence of poor data quality. Compact configurations should not be excluded, as they mainly represent scale differences and preserve perceptual information relevant to the consensus map. Quality control should focus on task completion, study design and metric calibration. The number of samples should be treated as a quality-related design factor, and RV values should be interpreted relative to a study-specific permutation null before comparing agreement across studies.

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