



Figure 4 – figure supplement 3: Alternative models and model selection for Movement Units. Total speed and acceleration provide a better explanation of the Movement Unit responses compared to more complex models with distinct parameters for different movement directions. (A–P) Titles of each panel indicate the parameters of each model. v and a indicate speed and acceleration, respectively. x and y subscripts indicate movement along the horizontal and vertical axes, respectively. $|\cdot|$ indicates Euclidean norm, which equals the absolute value for one-dimensional variables (e.g., v_x) and the vector magnitude for two-dimensional variables (e.g., total speed). The models were trained on time points shared across all lags (grey lines in Fig. 4 – figure supplement 2) and tested on held-out times not included in training (dark lines in Fig. 4 – figure supplement 2). Training and testing R^2 are displayed for each model (R^2_{in} for in-sample, training data; R^2_{out} for out-of-sample, test data). 95% confidence intervals are shown in brackets. Negative R^2 indicate residual variance that exceeds the variance of underlying data, indicating extremely poor model performance for test trials, likely due to overfitting the training data. (Q) The best-fitting time lags for each unit were similar across models. Columns correspond to models in panels A–P. Each row corresponds to a specific Movement Unit with units ordered by time lag of our chosen model (the best-fitting model containing total speed and acceleration, shown in panel A).