# Implicit and explicit adaptation just do not add up

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Additivity of implicit and explicit

Measures of implicit and explicit adaptation are often assumed to add up to complete adaptation, such that adaptation minus explicit is used as a measure of implicit adaptation. Three groups (N=24 in each) adapted to a 30° rotation in conditions thought to evoke different levels of explicit adaptation. All groups did strategy inclusion and exclusion no-cursor reaches and one group gave aiming reports. We tested two types of additivity:

$$\textit{strict: } \text{implicit} \sim \text{adaptation} - \text{explicit (slope: -1)}$$
$$\textit{loose: } \text{adaptation} \sim \beta_i \text{ implicit} + \beta_e \text{ explicit (slope: 1)}$$
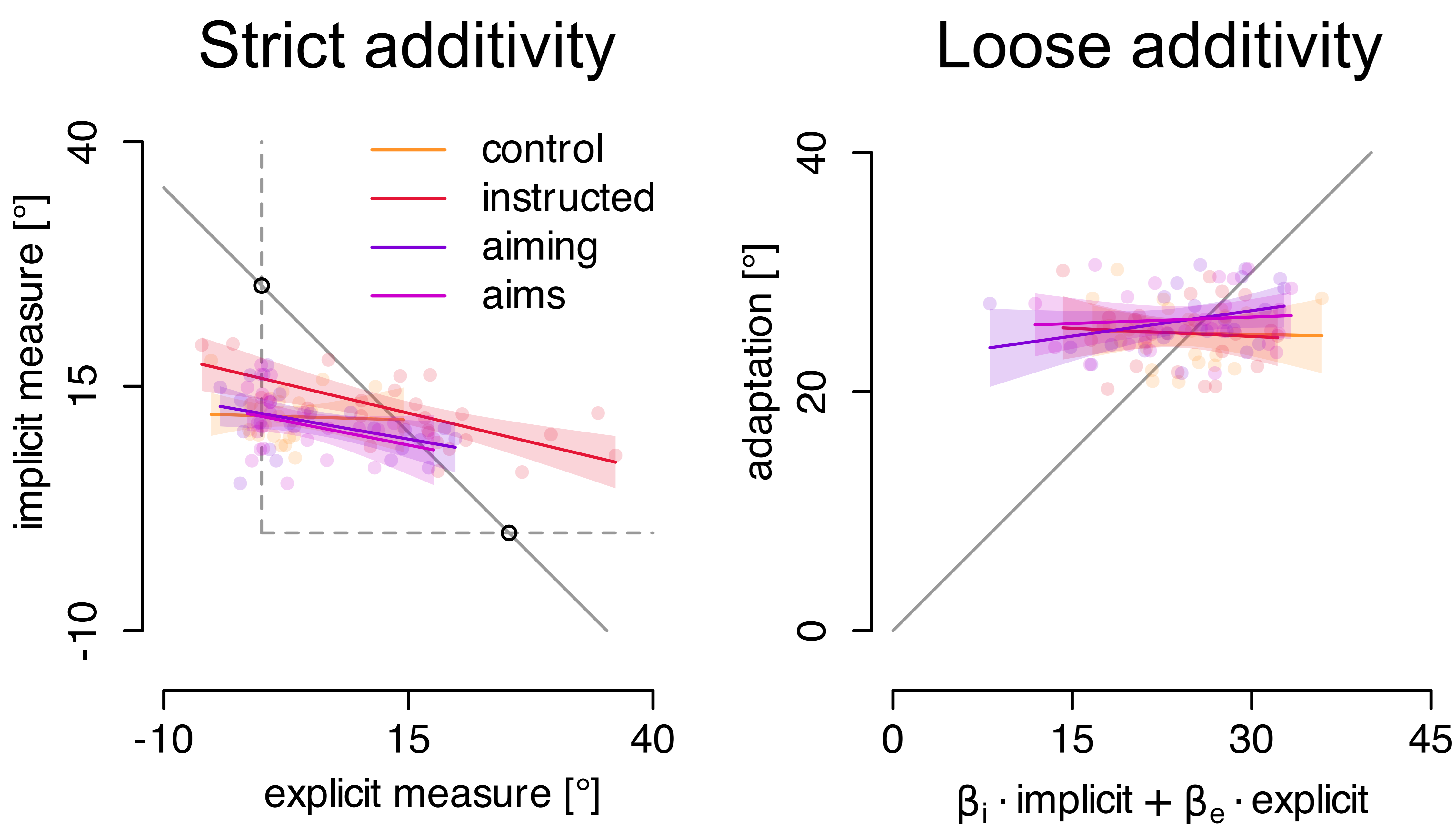
Our data does not show strict or loose additivity.

Additivity of fast and slow processes

A popular state-space model of adaptation [Smith et al., 2006] implements strictly additive fast and slow processes. Since explicit learning is bimodal in the aiming group, we split the participants in two groups.
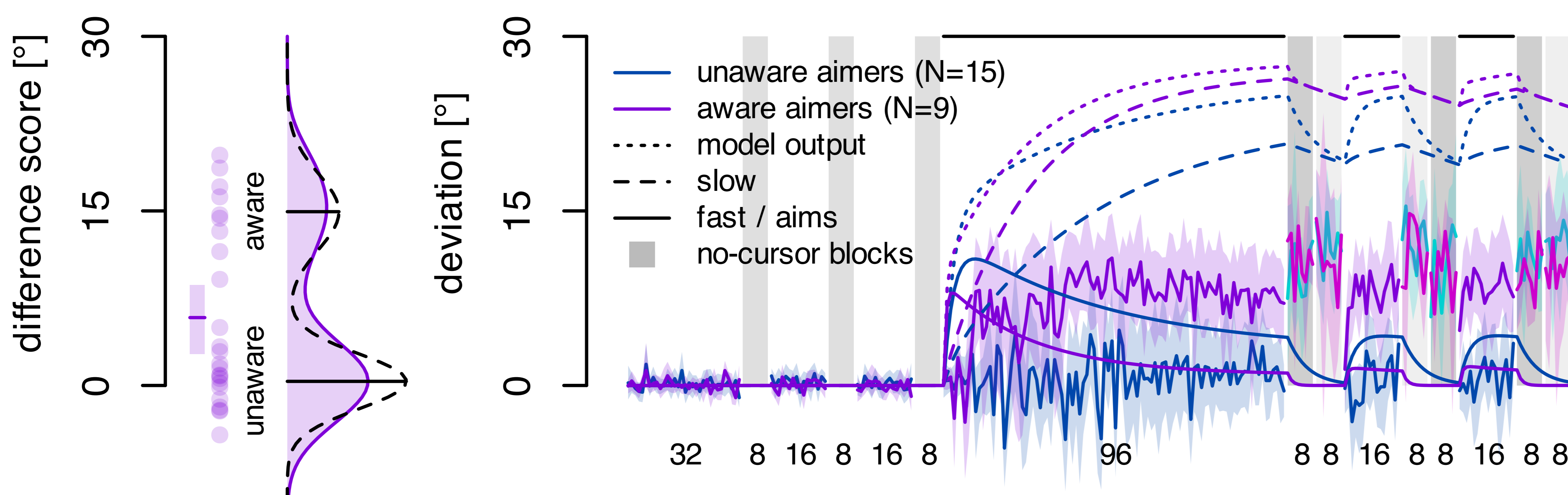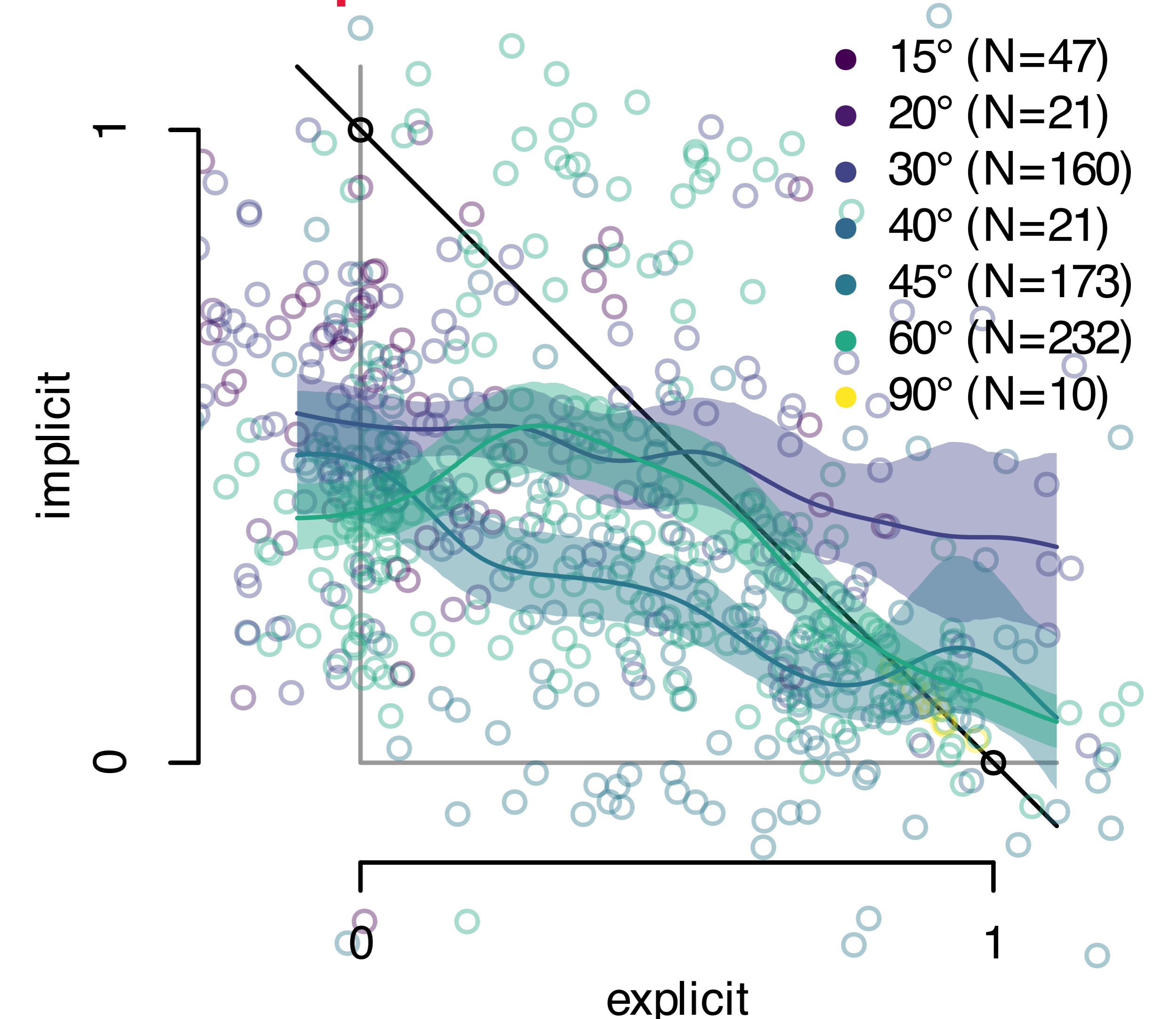

In both sub-groups, the fast process does not align with aiming reports, and the slow process does not align with exclude strategy reaches.

Previous data

We also test if simple additivity holds in other data sets:
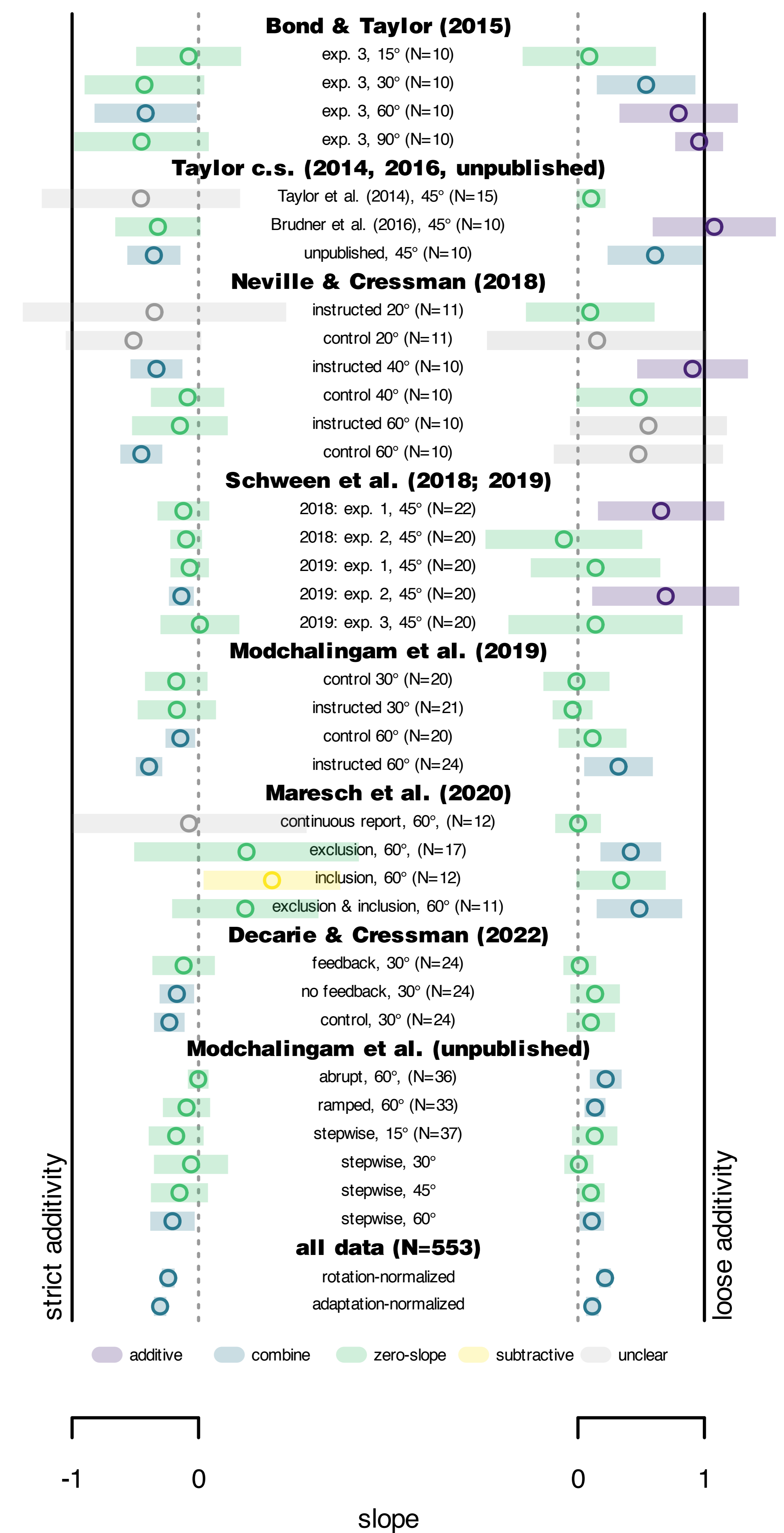
Global pattern

There are some patterns, but there is also a lot of variability.