NEURAL DYNAMICS OF MOTION GROUPING ACROSS APERTURES
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Purpose: A neural network model explores the mechanisms which integrate ambiguous motion signals from line interiors with unambiguous feature tracking signals to generate a global percept.

Methods: Seen through visible apertures, a line’s terminators are extrinsic; their motion tells us nothing about true line motion. Seen through invisible apertures, the line terminators are intrinsic, creating feature tracking signals. The model shows how a small set of feature tracking signals can be amplified sufficiently by directional filtering and competition to greatly influence the global percept. All filtered motion signals feed into directional grouping and priming cells which compete across space to select a winning direction. Feedback from the grouping network boosts consistent long-range filter activities and suppresses inconsistent activities. Grouping feedback can also attentionally prime a movement direction.

Results: The model explains how motion signals from moving lines seen behind multiple visible apertures are integrated into a global percept of a single translating diamond shape and why no integration occurs when apertures are invisible (Shiffrar and Pavel, 1991, *JEP: HPP*, 17(3), 749-761). With visible apertures, feature tracking signals are inhibited by figure-ground processes. The ambiguous signals from line interiors then group across apertures to determine a single global motion direction. Computer simulations of global motion capture include cases in which feature tracking signals do determine the final percept, as well as different ways in which feature tracking signals can be eliminated, thereby freeing the ambiguous motion directions to dominate the emergent percept.

Conclusions: The model suggests how figure-ground processing can determine when feature tracking signals exist and how all motion signals share in motion grouping across apertures.