INTRODUCTION

Detection of motion is a crucial component of visual processing, and is generally considered to consist of two stages: an early stage in which local motion is detected and a later stage at which global motion signals are combined into object motion or flow. Early motion processing is generally considered to be carried out by first-order (Fourier) and second-order (non-Fourier) mechanisms. Fourier motion mechanisms extract motion when the pairwise spatiotemporal correlation of luminance signals is present. Non-Fourier mechanisms are thought to work via local nonlinear pre-processing, such as flicker detection or extraction of edges.

The red arrows show that, within a glider, the color of a check is illustrated this parity constraint for three placements of the t, and one (blue) is at time t+1. The stimulus is constructed by applying three-element glider (left) is represented by a wireframe cube with odd parity = \( \sum \) luminances.

STIMULUS CONSTRUCTION

Construction of a three-element spatiotemporal glider stimulus. The three-element glider (left) is represented by a wireframe cube with three of its corners colored. The wireframe cube is the three voxels that form the glider. The coloring indicates the time steps occupied by each voxel: two voxels (green) are at time x, and one (blue) is at time y. The stimulus is constructed by applying an odd parity constraint to the number of black checks within all occurrences of the glider. The checks outlined in color in frame 1 and 3 on the right illustrate this parity constraint for three placements of the glider. The red arrows show that, with a glider, the color of a check in frame 1 is determined by the color of other checks in frames 3 and 4.

PSYCHOPHYSICAL EXPERIMENT

For each glider, responses for the even parity rule are on the left; responses for the odd parity rule are on the right, except for the negative control, where only the even parity was tested. Fraction in centroid direction = \( \frac{x - x_{\text{mean}}}{x_{\text{mean}}} \) (in degrees).

STIMULUS PROPERTIES

For other gliders, spatiotemporal correlations do not arise by pairwise correlation of features. The centroid direction is defined as the vector from the centroid of the voxels at time t (open green circle), to the centroid of the voxels at time t+1 (open blue circle).

Motion signals generated by heterogeneous feature correlations

### Modeling

Motion signals generated by opponent mechanisms based on summation followed by a nonlinearity.