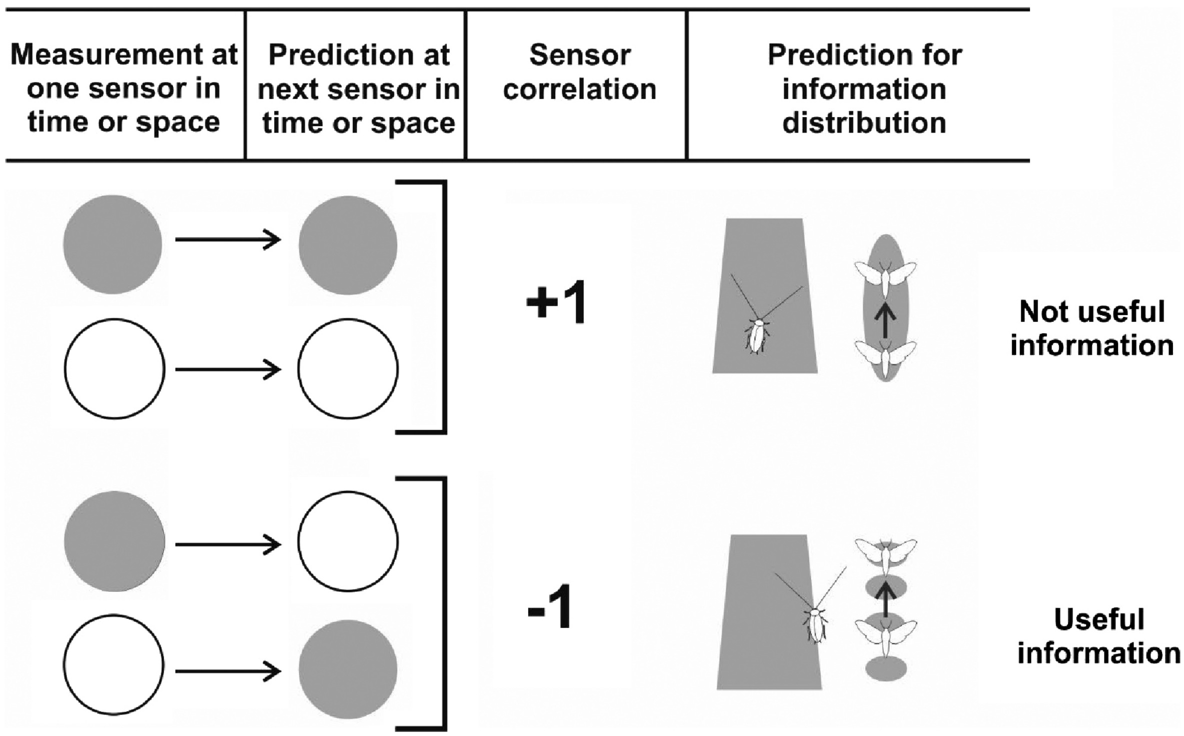

Fig. S1. Usefulness of correlation measurements for animal behavior. Odor distribution can be predicted from flow if they are highly related. For a +/- 1 correlation, the first sensor measurement reliably predicts the next so measurements taken at both does NOT provide new information. However, the positive correlation is not as useful to animals tracking a signal while the negative correlation is potentially very useful for tracking because it could indicate movement away from an attractive resource. For a zero correlation, the measurement at the first sensor cannot predict the next therefore measuring at both provides new information and it is unclear if this is useful for animals tracking an odor signal.

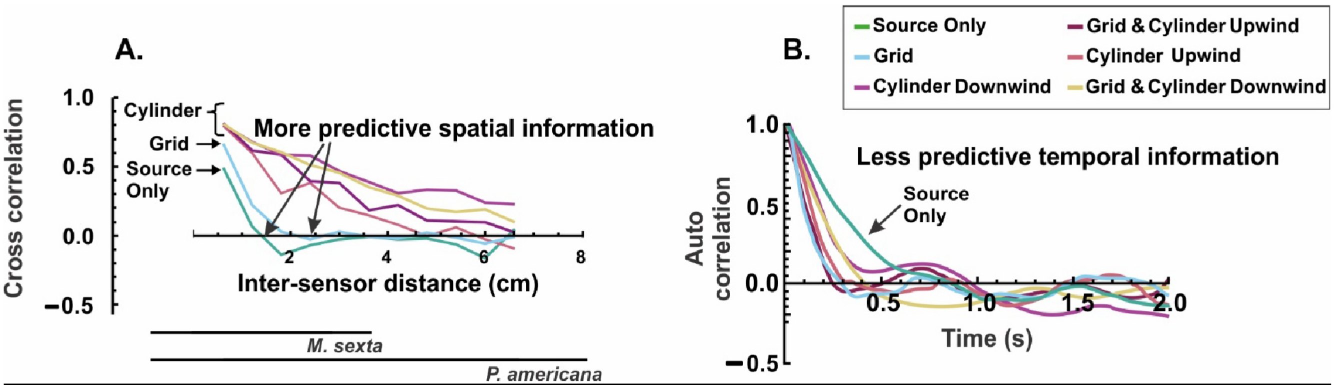

Fig. S2. Cross- and auto-correlation of turbulence using horizontal profiles measured with hotwire anemometer probes. **A**) Cross correlations of wind velocities measured from two hotwire probes held at from 0.6 to 6.6 cm apart on the centerline of the wind tunnel 2 cm above the floor. Each colored trace represents one of the turbulence treatments in our experiment. Mean flow velocity was set to 100 cm/s. Horizontal lines labeled *M. sexta* and *P. americana* illustrate the mean distances between the tips of those respective species antennae during plume tracking behavior. **B**) Auto-correlations of wind velocities measured from a hotwire probe recorded at 1 cm steps at the source height (40.5 cm above the wind tunnel floor) at the center of the cross section of the wind tunnel. Mean flow velocity was set to 100 cm/s.

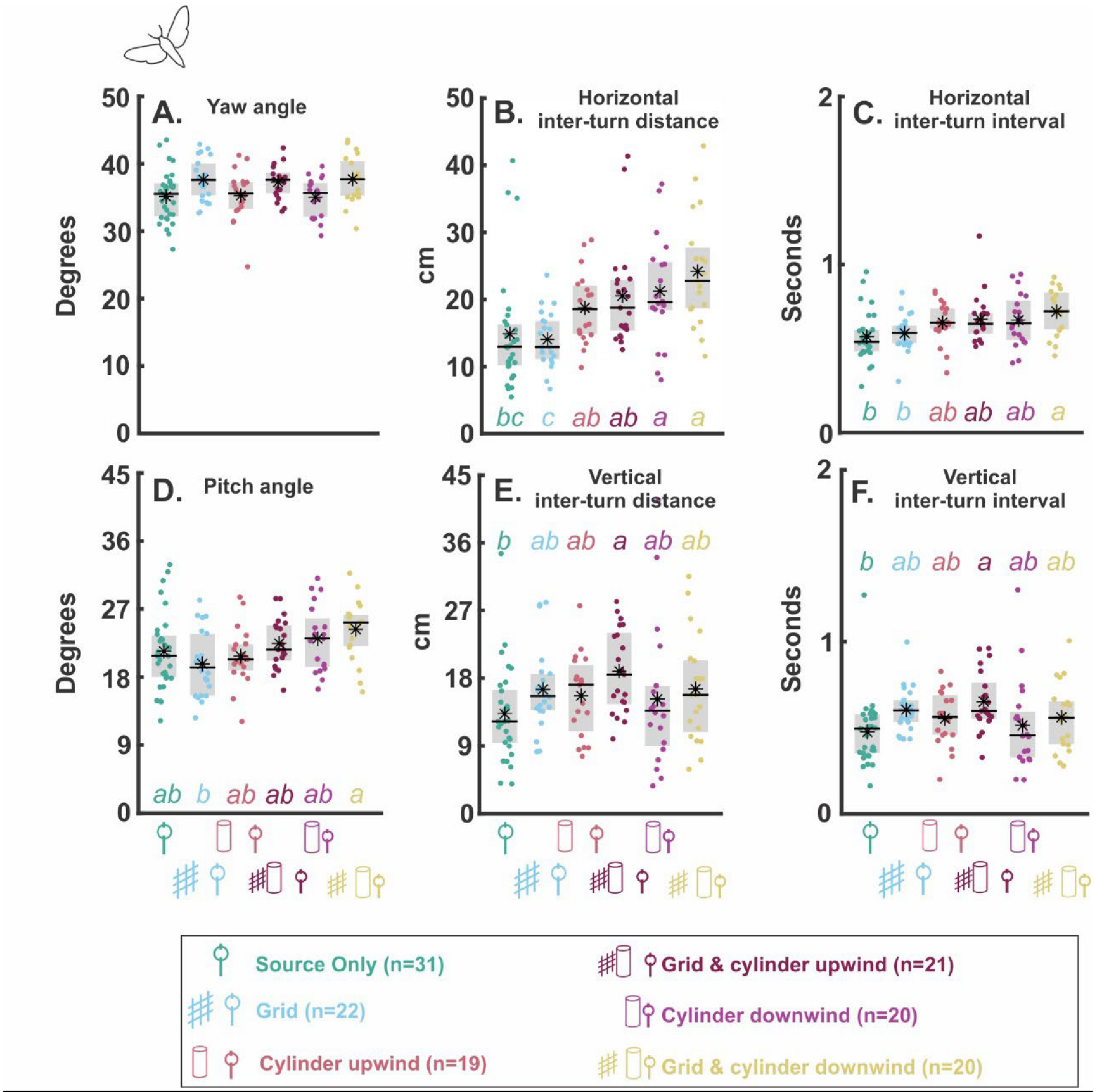

Fig. S3. Means of behavioral variables measured from the body and tracks of moths as they flew upwind and tracked a plume of female pheromone presented in different turbulent environments in 25 cm/s wind. In these plots the grey box is the 25-75% quartile, the horizontal black bar is the median, the asterisk is the mean, and each colored dot is an individual's mean performance plotted with a random jitter along the X-axis. Grand means with letters in common are not significantly different according to a repeated measures ANOVA($P \leqslant 0.05$) and *post-hoc* Tukey's test. Plots of variables without lower case letters had no statistically significant differences. (**A**) Absolute values of yaw angles of *M. sexta* males tracking female pheromone plumes. (**B**) Horizontal inter-turn distances of *M. sexta* males tracking female pheromone plumes. (**C**) Horizontal inter-turn intervals of *M. sexta* males tracking female pheromone plumes. (**D**) Pitch angles of *M. sexta* males tracking female pheromone plumes. (**E**) Vertical inter-turn distances of *M. sexta* males tracking female pheromone plumes, (**F**) Vertical inter-turn intervals of *M. sexta* males tracking female pheromone plumes.

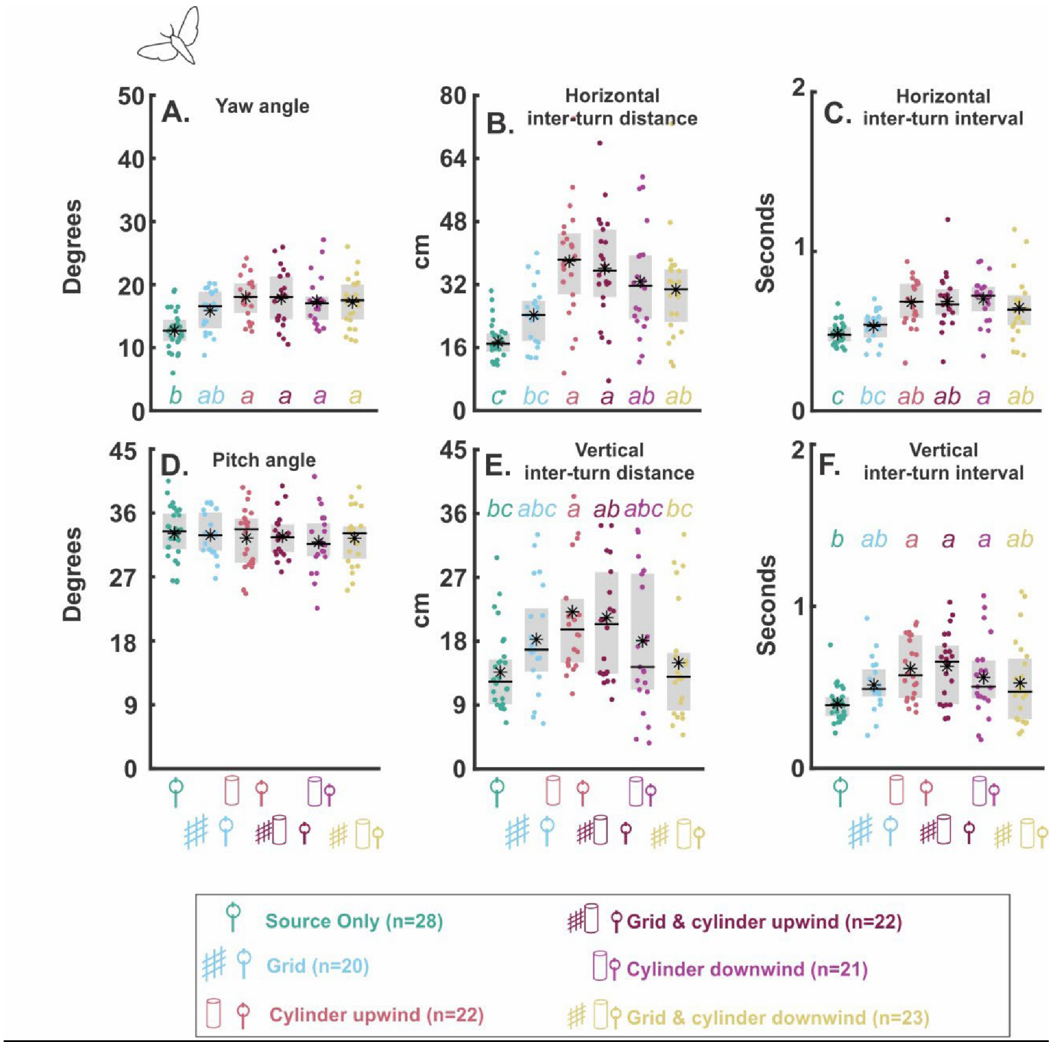

Fig. S4. Means of behavioral variables measured from the body and tracks of moths as they flew upwind and tracked a plume of female pheromone presented in different turbulent environments in 100 cm/s wind. In these plots the grey box is the 25-75% quartile, the horizontal black bar is the median, the asterisk is the mean, and each colored dot is an individual's mean performance plotted with a random jitter along the X-axis. Grand means with letters in common are not significantly different according to a repeated measures ANOVA($P \leqslant 0.05$) and *post-hoc* Tukey's test. Plots of variables without lower case letters had no statistically significant differences. (**A**) Absolute values of yaw angles of *M. sexta* males tracking female pheromone plumes. (**B**) Horizontal inter-turn distances of *M. sexta* males tracking female pheromone plumes. (**C**) Horizontal inter-turn intervals of *M. sexta* males tracking female pheromone plumes. (**D**) Pitch angles of *M. sexta* males tracking female pheromone plumes. (**E**) Vertical inter-turn distances of *M. sexta* males tracking female pheromone plumes, (**F**) Vertical inter-turn intervals of *M. sexta* males tracking female pheromone plumes.