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Orit Peleg* (orit.peleg@colorado.edu), Boulder, CO 80303. *Flow-Mediated Olfactory Communication in Honey Bee Swarms.*

Honey bee swarms are a landmark example of collective behavior. To become a coherent swarm, bees locate their queen by tracking her pheromones, but how can distant individuals exploit these chemical signals which decay rapidly in space and time? We find that bees collectively create a communication network to propagate pheromone signals, by arranging in a specific spatial distribution where there is a characteristic distance between individuals and a characteristic direction in which individuals broadcast the signals. To better understand such a flow-mediated directional communication strategy, we connect our experimental results to an agent-based model where virtual bees with simple, local behavioral rules, exist in a flow environment. Our model shows that increased directional bias leads to a more efficient aggregation process that avoids local equilibrium configurations of isotropic communication, such as small bee clusters that persist throughout the simulation. Our results highlight a novel example of extended classical stigmergy: rather than depositing static information in the environment, individual bees locally sense and globally manipulate the physical fields of chemical concentration and airflow. (Received July 17, 2020)