Study finds European starlings flocking patterns similar to metals being magnetized

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Image: Wikipedia.

(PhysOrg.com) -- Scientists and amateur enthusiasts alike have long been fascinated by the abilities of some groups of animals to move in lockstep with one another, most specifically with schools of fish and flocks of birds. Now, new research by a team of researchers studying the flocking abilities of European starlings has shown that some of their abilities might be mathematically defined, and that the ability of the birds to change directions almost simultaneously follows the same model as metal when it becomes magnetized. The team is set to publish the results of their study in the *Proceedings of the National Academy of Sciences*.

Prior research by the same team regarding the velocity of the birds in a

flock showed that if just a single bird changed its speed, that change would propagate out to all the other birds in the flock. In this new research, the team focused on orientation. They wanted to know how individual movements of birds in the flock caused changes in the direction of the flock as a whole.

To find out, they set up multiple cameras around Rome, where the huge size of starling flocks is legendary. They took both video and stereometric stills which produce 3D imagery to allow them to capture the positions of birds in a flock as well as to project where they were going and how fast.

In so doing, they discovered two things. The first is that a change in path by one bird impacts exactly seven birds surrounding it, regardless of the size of the flock. The second is that changes in flight path for the flock as a whole happens very similarly to the way single electron spins within a metal line up when a magnetic field is created.

The first finding demonstrates that birds having neighbors is what is important to the flock, not how close they are. The seven birds that are impacted by the movement of one bird, then cause a change in the seven birds around each of them and so on until the entire flock has changed its alignment.

The second finding demonstrates that at least some of the ways birds move in a flock can be defined mathematically, which means other models may be found as well. If so, they may lead to predicting how a flock will respond in various scenarios, which when combined with the way the birds impact their neighbors, may finally solve the age old mystery of how they fly in flocks the way they do.

More information: The study will be published in *PNAS* at DOI:10.1073/pnas.1118633109 (not available at this moment yet).