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Michael D. Phillips* (mdphillips@gmail.com), ETSU, Box 15554, Johnson City, TN 37614,
and **Istvan Karsai** and **Jeff Knisley**. *Modeling Division of Labor: Top-down versus Bottom-up*.

Social insect colonies generally develop into parallel processing systems in which the colony conducts most of its operations concurrently instead of sequentially. The emergence of complex patterns in insect societies was first explained by assuming intelligent individuals with access to global information. Recently, theories of self-organization have explained this behavior by using local information to provide a better understanding of the complexity and dynamics present in these systems. We look at two different approaches to modeling nest construction behavior in social wasp colonies.

An ODE mathematical model of the division of labor in wasp colonies was developed by Karsai and Balazsi (2002). We have built on this earlier work by creating an agent-based model that prohibits individual access to global information and ensures that all interactions take place on a local level. The ODE model is an example of the "top-down" approach, while the agent-based is "bottom-up" modeling. Using these two models, we will examine the strengths and weaknesses of the two approaches, along with differences in the main assumptions and how and why these assumptions affect the predictions of these models. (Received August 23, 2005)