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Dynamics of division of labor in the social space using individually tracked ants

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Division of labor among workers is considered one of the important causes of the ecological success of ants. Workers change tasks throughout their life, but a precise quantification of the dynamics of this task change at an individual level remains understudied. Having previously shown that task, spatial structure and social groups are correlated in *Camponotus fellah* (Mersch et al. 2013), we use six colonies of this species where all ants were individually tracked over 11 days to precisely quantify, model and predict the dynamics of division of labor using social group transition dynamics. Our refined network analysis reveals that the network consists of two overlapping groups: nurses and foragers, and that about a third of the workers belong to both groups. To dissect the dynamics, we estimated the foraging membership, i.e. how much an individual belonged to the forager group, for each ant and each day. Using the first seven days of this simplified time series of all workers of each colony, we show that the group transition dynamics of an individual worker can be mapped onto a single colony-specific sigmoidal (slow-fast-slow) curve. To test our model, we compared the observed foraging membership values of the last four days to those predicted by the sigmoidal curve. Our results show that the sigmoidal curve predicts future individual behavioral trajectories better than a model assuming a linear change or no change at all. Together, these results highlight that ants that are intermediaries between nurses and foragers have fast social dynamics suggesting that they might be the first ones to switch tasks if the colonies social structure is disrupted. Ref: Mersch, Crespi, Keller, Science 340: 1090