

# A Comparison between the Effects of Empirical and Theoretical Knockouts on the Structure of Social Networks

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In social networks, specific individuals may establish and maintain the structure of interactions within these networks through various mechanisms such as aggression and affiliative behaviors. Removing these key individuals, a.k.a. knockouts, could restructure the network beyond a theoretical knockout, which simply removes that individual and their interactions, and requires comparison with empirical knockouts. Using a dataset from Lemasson et al. (2005), who were interested in changes in frequency of behaviors of Campbell's monkeys (*Cercopithecus campbelli*), before, immediately after, and seven months after empirical knockouts, we reanalyzed their empirical networks focusing on structural changes, specifically reach (indirect connections), clustering coefficient (tendency of individuals to cluster together), and triangle count (number of triangles per individual). When we compared the results from the empirical networks to a theoretical knockout, immediately after the empirical knockout, reach decreased greater than predicted by the theoretical knockout alone. After seven months, reach in the empirical network increased, but not quite to the level before the empirical knockout. With respect to the clustering coefficient, similar individuals in the network were more connected immediately after the empirical knockout, which was not predicted by the theoretical knockout. After seven months, however, the individuals became less connected than they had previously been. Additionally, there was a decrease in triangle count after seven months, providing further evidence of disconnection in the individuals. Our results may support and complement the changes in behavior observed by Lemasson et al. (2005) and stress the impacts of knockouts beyond the simple theoretical knockout.

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