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A tipping point in the size of human groups for successful cooperation in social-ecological systems

How large should be a human group to succeed in collaborating effectively? From a theoretical standpoint, social sciences teach that the larger is the group the harder is to cooperate. So far there was no convincing evidence about the existence of a "tipping point" in group size beyond which the cooperation between members is doomed to collapse.

The article shed a new light on the issue through the study of hundreds of communities in the Italian Alps, which managed forest and pasture under collective property regimes for centuries. The two researchers show that between the 13th and 19th centuries the average size of communities have remained stable, while in the same period the regional population more than doubled. When demographic growth made community size too large, the group split in two or more autonomous communities.

Fig. 1. Banco de la reson, Cavalese (Trento, Italy). A typical setting for community gatherings ("regole").

This evidence is not simply a historical curiosity about some mountain communities, but is rather a result of more general scientific interest at least for two reasons. First, the size of groups is similar regardless of resource type, forest or pasture. In other words, the specific production technology played a limited role in

determining group size, and this is counterintuitive in some sense. The data show that rather than ecological factors, social factors like the degree of diversity of group members had a predominant role. The case studied therefore can be universally applied to social groups at large, as group size turns out to be related to how humans interact rather than to the specific problem they are trying to solve.

Second, the attraction point in the size of groups is empirically around 150-154 people (with an overall median of 140 and a mean of 176), a size that in the anthropological literature is known to be a reference threshold for many types of human groups, from military units to hunter-gatherer groups. According to the Social Brain Hypothesis the size of 150 members is a threshold value determined by cognitive limits in handling significant social relations. The study completes the explanation based on individual cognitive limits with a discussion of the difficulties related to collective decisions, needed to manage the common resources.

The work is result of more than ten years of historical and archival research in the Italian Alps (Trentino) and is part of a broader research project at the University of Bologna that already led to the publication of related studies in the *Journal of Economic History*, *Economics and Human Biology*, and *Explorations in Economic History.*

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