



Figure 1 | Extremes of Austronesian political organization. The temple of Borobudur, on the Indonesian island of Java, was the product of a highly organized, ancient Javanese state. By contrast, tribesmen of the Iban group of Sarawak, Borneo, epitomize the simplest type of egalitarian, leaderless society.

construct the Austronesian phylogenetic tree on the basis of linguistic data (vocabulary lists in Austronesian languages), mark the political organization of recent Austronesian societies constituting the tips of the tree's branches, and thereby reconstruct ancestral states and evolutionary paths of Austronesian political organization. Their database consists of 84 Austronesian societies for which adequate vocabulary lists and recent political status are both known.

Sociologists, political scientists, archaeologists and anthropologists have debated the paths of political evolution. Does political complexity increase only in small steps, or also in big jumps? Does complexity increase only unidirectionally, or can complex societies revert to simpler ones? If they can revert, is the reversion only in small steps, or can it also occur in big jumps? Currie *et al.* use these various possible paths to construct six competing models of political evolution, which they test against their trees.

The results are clear. First, political evolution increases only in small steps: states and complex chiefdoms don't form directly from leaderless societies. This conclusion fits historical observations of the formation of complex societies (for instance, the Malagasy, Cherokee and Zulu states), when one unit at the next-lower level succeeded in conquering or incorporating its neighbours. Second, political complexity can decrease as well as increase, in agreement with abundant evidence of the disintegration of states and chiefdoms. Finally, unlike increases of complexity, declines can plunge a society politically several stages backwards. This can happen if a small group breaks off from a large society to form a small new society (as in the colonization of the Chatham Islands from New Zealand), or if political institutions disintegrate (as on Mangareva in Polynesia).

Knowledgeable readers of the paper by Currie *et al.*, or of this account, will raise a host of detailed objections. But but but ... why do they call Hawaii a complex chiefdom rather than a proto-state? Why did they characterize political complexity coarsely by those four levels, rather than by some finer scheme? A short response is: read the paper's extensive online supplementary material.

The quantitative modelling techniques described there had previously received little application to the problem of the evolution of political complexity. Almost all of us in this field (myself included) have instead proceeded usually by narrative accounts of individual cases, less often by narrative comparisons of selected cases, and infrequently by comprehensive narrative surveys. My first reaction to Currie and colleagues' paper was one of surprise: why hadn't we used their method before, because it is so obviously superior?

One answer is that attributed to Christopher Columbus, after no one in his audience could solve his challenge to make an egg stand up without falling over: they (and we) never thought of Columbus's solution. (It was to stand the egg on end in a small pile of salt.) The other answer is that implementation of Currie and colleagues' simple idea required huge quantities of data and technical knowledge: lists of 210 vocabulary terms for more than 500 Austronesian languages, ethnographic information on the political complexity of 113 Austronesian societies, and mastery of the notorious difficulties of phylogenetic-tree construction and model evaluation.

What future extensions of this analysis might there be? Other aspects of Austronesian societies, such as canoe design, lend themselves to a similar approach⁷. Other political radiations besides that of Austronesian societies may similarly be mapped onto language-based

phylogenetic trees. A prime target is the African societies speaking Niger–Congo languages, whose political systems were mostly chiefdoms but included a few states and possibly some simpler societies. The Niger–Congo language family shares the advantages of language diversity, tree density and time depth with the Austronesian language family, but reconstructions of its family tree are less advanced⁸. Finally, there's a grand challenge: can this approach ever succeed with the drastically pruned Indo-European language tree and the apparently less varied Indo-European political organization? ■

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CORRECTION

In the News & Views article “Nanoscience: Dark-hot resonances” by Mark I. Stockman (*Nature* **467**, 541–542; 2010), the 130-nm and 20-nm scale bars in Figure 2 should have indicated a distance between the particle rims, not their centres.