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(notably, African bushmen and Pygmies) suggests that humans created similar vocal ensembles for the same purpose even before they developed words. The complexity of their rhythmic syntaxes, made ever more complex by the need to keep everyone's interest up, says Richman, produced modern language's multifaceted structure. Without it, human speech might have followed another course: the continuous gradings of voice and meaning found among most primates.

In the wild, such grading has certain advantages. It allows primates to shift quickly among social functions: from threatening to soliciting to submitting. But the range is limited. Choral music, on the other hand, cultivated an appreciation of "discrete oppositions"—"upbeats versus downbeats, iambic versus trochee rhythms, tonic versus dominant tones," which, when words were finally developed, gave human language its sophistication.

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Wind Farms and Windmills

"A Renaissance for Wind Power" by Christopher Flavin, in *Environment* (Oct. 1981), Heldref Publications, 4000 Albenmarle St. N.W., Washington, D.C. 20016.

Along with the Colt revolver, windmills played a big part in taming the arid American West. Some six million wind-powered water pumps dotted the American landscape at the end of the 19th century—before rural electrification cut short the windmill's golden age. Now, windpower may be enlisted again, in the wake of oil price increases and predictions of energy shortages. Flavin, a researcher at Worldwatch Institute, surveys the current technology.

It takes an average wind speed of 12 miles per hour to generate electricity. Although a quarter of the continental United States could theoretically support wind turbines, the Solar Energy Research Institute estimates that 3.8 million rural homes and 370,000 farms are particularly good candidates for private generators. For them, a small three- to five-kilowatt generator should suffice (cost: \$5,000–\$20,000). The investment is eventually recovered, but battery storage can boost the cost per kilowatt-hour to roughly three times the rate charged by utilities for oil-generated electricity. The most sophisticated small turbines permit households to use a utility's electricity on calm days and send wind-generated electricity back through the utility lines as "payment" when use is down or winds are high.

But wind is not just a "backyard" resource. Currently, Alcoa, Boeing, General Electric, Lockheed, and Westinghouse are working with the National Aeronautics and Space Administration to develop centralized

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wind-power systems ("wind farms"). The Bendix Corporation and Hamilton Standard have developed 3,000-kilowatt wind turbines. And in the breezy Columbia River Valley in the Pacific Northwest stand three 2,500-kilowatt turbines. Built under U.S. Energy Department supervision for 14 mph average winds, each consists of two narrow blades almost as long as a jumbo jet's wings. Their electricity is cost-competitive with electricity from more conventional sources.

California has witnessed the "most ambitious wind-farm development effort in the world so far," reports Flavin. He gives three reasons: windy mountain passes, tax incentives for investors, and state-run resource assessments. Southern California Edison expects to have wind turbines producing 120,000 kilowatts by 1990. Meanwhile, Canada, Denmark, Great Britain, the Netherlands, the Soviet Union, Sweden, and West Germany are supporting similar research. "Few countries are completely windless," writes Flavin, "something that cannot be said for coal, oil, or uranium."

*Safe Water:
An Elusive Goal*

"Water for the Third World" by Asit K. Biswas, in *Foreign Affairs* (Fall 1981), Foreign Affairs Readers Services, 58 East 68th St., New York, N.Y. 10021.

Besides food and energy shortages, many Third World countries have little safe water for even the most fundamental needs—drinking, washing, cooking, sanitation. The UN General Assembly has called for "clean water for all by 1990." Biswas, vice president of the International Water Resources Association, takes stock of the cultural, economic, and political obstacles.

Estimates of water scarcity vary, but the general picture is grim. A 1975 UN World Health Organization (WHO) survey found that, on average, 77 percent of the urban populations of 71 developing countries had some water piped to them through house connections or communal standpipes, but among rural folk only 22 percent had access to potable water. Service varies by country. While Egypt reported in 1977 that over 93 percent of its total population was supplied with safe water, Gabon could claim only one percent. Kenya is more typical: There, 97 percent of city dwellers had access to potable water compared with two percent of rural dwellers.

Why is clean water chiefly a rural problem? For one thing, although developing countries are predominantly rural, the people who run governments and man the bureaucracies tend to be city folk. Moreover, investment in public works of any kind seems less economical in thinly populated farm areas.

Assistance from national and international agencies has, often as not, been misguided. WHO, for instance, has set standards for water quality, but they are too ambitious, more appropriate for European cities than tropical countryside. Contributions for equipment have generally not been matched by money for maintenance and trained personnel: 80