Designing kayaks was an applied science

by Carla Helfferich
Geophysical Institute
University of Alaska Fairbanks

FAIRBANKS — People often think of science as a recent activity of humankind, a way of dealing with the world that emerged only a few centuries back. At best, we grant some roots to the Greeks and Romans, but it's mostly taken as a European discovery — nevermind Chinese technology or Arab mathematics.

Yet the truth is that science belongs to no single culture or time. What we now call science, an activity with mathematics at its core, is only one face of the endeavor. Wherever and whenever people have pursued knowledge, they've stumbled on science.

As an example, I offer a wonderful example of indigenous Northern technology: the kayak.

First, consider the nature of the scientific endeavor. A scientist observes, and from the observation generates a hypothesis. The hypothesis is challenged by experiment and further observation; for the hypothesis to be validated, the experiments must be repeatable, yielding the same results when done by others under similar conditions.

With that in mind, return to the subject of kayaks. Envision a hypothetical scene thousands of year back on the stony shores of an Arctic sea. The observant hunter knows there are animals in the water. A shaman's dreams may take him safely far out over the ocean without a boat, but the experiment is not uniformly repeatable.

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A hunter needs another mode of transport to get where the animals are and back safely with the meat. Having observed objects floating on the food-rich sea, the hunter develops a working hypothesis: the right boat will do the job.

Observation will show what materials are available to construct a vessel. Experiment shows what materials work; no careful observer would try carving a functional stone boat, nor plan (in the Arctic) to build one of logs.

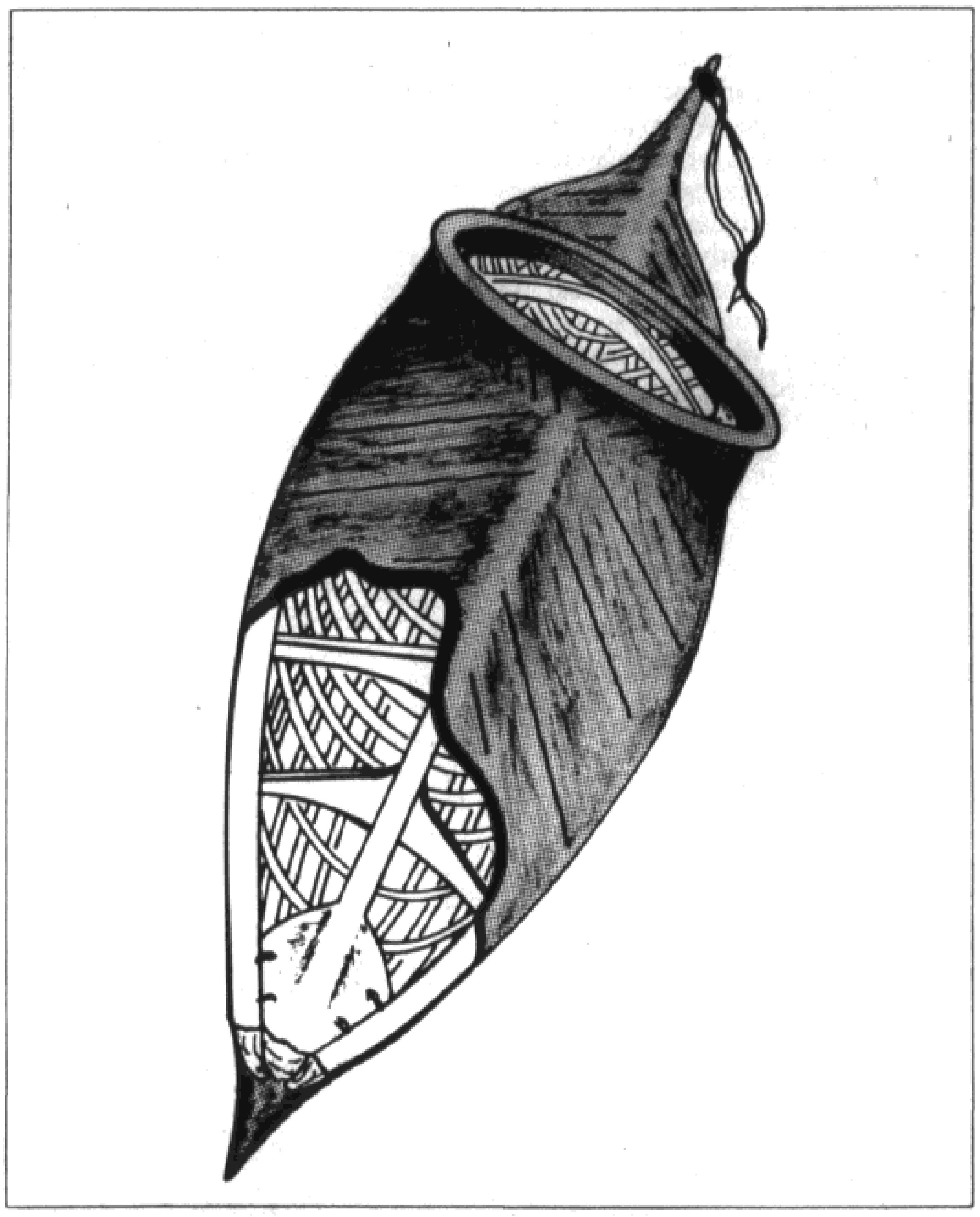
Continued observation and experiment shows what works best. With long enough to work it out, with thought experiments as well as physical ones, the hunters of the Northern seas developed a family of vessels perfectly suited to the complex of available material, physical abilities and local conditions: kayaks.

And they were a family of vessels, not just a unique design copied endlessly. Some 40 different types have been classified, of two basic kinds.

Inland kayaks were used on rivers and lakes to pursue swimming caribou. Speed was a prime consideration; caribou can swim at a rate of 5 nautical miles an hour. That meant the desirable craft was long, because a longer waterline makes for greater speed.

In practice, Caribou Eskimo kayaks were up to 30 feet long. They also had narrow rounded bottoms, to reduce drag and increase maneuverability.

Sea kayaks met different demands. Stealth was more important than speed; an alarmed seal or sea otter dives and vanishes in an instant. Paddles were purposely made long and narrow to decrease potentially noisy dripping. Seaworthiness was vitally important, as was the ability to transport quantities of meat.



Within those functional bounds, the shore-dwelling people from the Russian Far East to Greenland came up with an array of variations. It may have taken many generations to get it right, but the process was essentially thoughtful, logical, and scientific.

The variations prove that. They could only have come about through the processes of observation, hypothesis and experiment. Designing and building kayaks was an applied science, needing no formal mathematics but abundant quantities of everything else that good science demands.

As the elegant minimum in working boats — exactly what was needed to permit a hunter to bring home food, with no wasted materials in extra weight or length — kayaks even exemplify an important scientific premise: other things being equal, the best solution is the simplest one.

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