Game Changer: FIRE

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Fire—the first nonhuman force that was made part of human society—is, according to the simplest definition in modern encyclopedias, a process of combustion, manifested in heat and light. I shall not dwell upon its chemistry, but merely point to four characteristics that are relevant to our theme. First, fire is destructive. It disintegrates highly organized matter, and reduces it to ashes and smoke. Second, it is irreversible. You cannot make the ashes return to their original shapes and colors. The phoenix is a bird of fantasy. Third, fire has no purpose. The combustion process is blind and purposeless. No matter what it touches, if the material is flammable, it will be consumed. Of course, the absence of purpose is not peculiar to fire. The same can be said about other natural forces, such as rain or wind. But—and this is a fourth characteristic—fire is self-generating. Fire causes heat, and heat in turn causes fire.

Destructive, irreversible, purposeless, self-generating—this does not sound like a very attractive list of properties. Why should humans have bothered to incorporate such a natural force into their societies?

For us, in retrospect, the answer is not difficult. Humans could turn the destructive force of fire into productive use, and thus give it a purpose. The fact that fire is self-generating enabled them to preserve and reactivate it, something they could not possibly have done with either rain or wind.

There were many ways of making fire productive for human purposes. The two most elementary, prototypical forms were cooking and clearing land. By cooking, that is, by exposing organic substances to tire without burning them, people could destroy tough fibers and toxic compounds and thus make substances edible and palatable that otherwise would not have been fit for human consumption. Cooking, in other words, extended the range of food.

Clearing land by burning the vegetation may at first sight seem purely destructive. It had many advantages, however. It drove animals out of their shelters, and thus facilitated hunting them. It also made the land more easily accessible for some purposes, for example, gathering nuts and fruits that lay hidden in the undergrowth. And it created a fertile and unshaded soil in which, after a while, there would spring up grasses and shrubs, which in turn would attract game.

There were, of course, other advantages as well. As a source of heat and light, fire gave protection against cold and darkness. It helped to keep predators and other animals at bay. Because of the comfort and security it offered, it could be a focus of group life and enhance communication and solidarity. It was also useful for such practical purposes as sharpening wooden tools or curbing bones and antlers. And it could always serve as a source of other fires when they were needed.

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All these positive effects of the use of fire combined to make human groups stronger as "survival units," to use a concept coined by Elias.[6] Adding the force of fire to their own strength, these groups could make their societies more productive and more formidable. The increases in productivity, achieved by more effective hunting as well as by cooking, may initially not have been great. Yet, in the long run, they could not fail to bring about a rise in the standard of material comfort and an increase in human numbers, or what modern economic historians would call, respectively, *intensive and extensive* growth.[7]

Intensive growth implied a rise in the standard of living (to use another concept from contemporary economics). Just to be able to produce warmth and comfort at will, throughout the year, must indeed have meant a great improvement in living conditions. Even if the possession of a fire was not absolutely necessary to endure the cold and damp winters of northern Eurasia, it certainly made these winters more bearable. In this way the control of fire also facilitated territorial expansion and, along with it, population increase or extensive growth.

In reading the success story of the increased human control of fire, we today are perhaps better prepared than previous generations were to see the reverse side as well, and to acknowledge that each increase in control entailed an increase in dependency. The increases in control were likely to be intended, while the increases in dependency probably were unintended, but they were nonetheless real. And they were inevitable. They formed the costs of domestication.

As fire was incorporated into human societies, so was the need for fuel. The availability of fuel was not just a purely material condition in the sense that humans could only thrive in a setting where plenty of dry firewood happened to be lying around. Such settings were rare, it only because almost every habitat fit for humans would have wet seasons. A natural abundance of wood was not enough for any human group to have fire available throughout the year. Particular social arrangements were needed as well—arrangements providing the group with a "fire regime."

Needless to say, the control of fire was always social: it could only be sustained by a group. And while groups might differ in many respects, if only because ol variations in habitat, they tended to be remarkably similar in their fire regimes. The basic peculiarities of fire apparently left little room for differences in controlling it, leading to more or less the same adaptations all over the world, regardless of climate and geography.[8] It was simply impossible to keep a fire burning for long without at least some social cooperation and division of labor in order to guard and fuel it. The effort of collecting fuel, keeping it dry, and putting it at the proper time onto the

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communal fire always involved some self-restraint, some discipline. There was no instinct specifically directing people to care for fire; it was a cultural mutation, requiring a civilizing process.

As they came to rely increasingly on their fires, people also came to rely more on their fire regimes. They had to subject themselves to the social and psychological constraints the fire regimes imposed upon them. Their living standard and their very survival depended on this. Thus, the need for continued use of fire gave rise to certain "civilizing" constraints, and these then became part of human culture everywhere.

In other words, learning to control fire was, and is, a form of civilization. Because humans tamed fire and incorporated it into their own societies, the societies became more complex (for they now included fire as well as humans), and the people themselves became more civilized.

By modifying their behavior in accordance with a fire regime, humans increased the difference in behavior and power between themselves and all related animals. The differences in behavior became greater as their own behavior was molded increasingly by cultural standards, and the differences in power grew concomitantly.

The control of fire was not the sole *cause* of this grand process, but it was an integral *part* of the process and contributed to its momentum.

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For many thousands of generations, the processes of intensive and extensive growth were almost imperceptibly slow. We can now see that growth began to accelerate toward the end of the last glacial period, some 20,000–30,000 years (i.e., no more than 1,000 generations) ago. I mention just two indications: one, pointing to intensive growth in particular, was the appearance of rock paintings in the interiors of caves; the other, pointing to extensive growth, was the spread of the human population over every continent, including the new worlds of America and Australia.

Both intensive and extensive growth were speeded up even more with the emergence of agriculture and animal husbandry, some 10,000 years (or 300–400 generations) ago. We can truly say that this was the second great ecological transformation brought about by humans, and that once again humanity entered a new stage of its history. Yet there were also remarkable continuities.

The domestication of plants and animals was in several significant ways similar to the domestication of fire. It also involved the transition to a more active and regular use of natural resources. Groups of people "tamed" originally "wild" forces of nature and learned to tend, guard, and further exploit these forces within their own human domain. After incorporating fire, they now incorporated certain selected plants and animals into their own

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