

now-famous story of the role of the stirrup in the development of European feudalism: stirrups made possible mounted shock combat, which led in turn to heavy full-body armor, heraldry, chivalry, stronger horse breeds, more efficient plowing methods, and so forth. In America, railroads helped establish national markets; promoted coal mining, steelmaking, and the widespread adoption of steam power; provided an influential model of geographically dispersed, hierarchically managed corporate organization; contributed to the adoption of standardized timekeeping; and served as a dominant metaphor with which Americans interpreted their entire civilization.

More recently in the United States one role of new technologies has been to provide grounds for the growth of the federal government, through the proliferation of such agencies as the Federal Communications Commission for regulating telecommunications, the Federal Aviation Administration for regulating the airline industry, the Nuclear Regulatory Commission and the Department of Energy for administering aspects of national energy production and nuclear weapons development, and the like.

In each of these instances, technological innovation plays a role in establishing, transforming, or maintaining states or societies at the macrolevel. Langdon Winner has explored the further hypothesis that the entire ensemble of modern technological systems—including the background conditions required to keep them operating—tends to promote centrally coordinated, technocratic social administration.

Hence there are numerous examples in which technologies affect societies or states in ways that have macrostructural implications. However, this formulation—while both true and dramatic—nonetheless misses the force of this chapter's earlier analysis. Technologies function politically and culturally as social structures by coercing physical compliance; prompting subconscious compliance; constituting systems of social relations; establishing opportunities and constraints for action and self-realization; promoting the evolution of background conditions; affecting nonusers; shaping communication, psychological development, and culture generally;

and constituting much of the world within which lives unfold.

Considering all of the preceding functions and effects together, it would be fairer to say that technologies do not merely *affect* society or states, they also *constitute* a substantial portion of societies and states. That, too, is part of what it means to be a social structure. Recognizing the many respects in which technologies contribute to defining who people are, what they can and cannot do, and how they understand themselves and their world should dispel the common myth that technologies are morally or politically neutral.

Influential, Not Determining

Technologies “structure” social relations in that they shape or help constitute—but do not fully determine—social experience. Water pipes and washing machines did not, for example, literally force Ibicans to stop gathering at their village's central fountain and washbasin, but instead altered the system of inducements and interdependencies that formerly made such gathering occur naturally.

Aside from the possibility of rejecting or retiring a particular technology, there is always a margin of flexibility in how existing technological artifacts may be used or operated, or in what activities may occur in conjunction with them. This margin is finite, and its extent varies from one technology to the next and over time, but it nevertheless exists. For example, while a conventional assembly line provides only highly restricted opportunities to vary work routines at each station, it does not materially prevent workers from rotating jobs among work stations.

Context-Dependency

Developing a railroad network helped catapult the United States to global economic preeminence, but Britain developed railroads earlier and yet nonetheless gradually lost its world economic predominance. Thus railroads (or other technologies) are socially consequential, but how and why they matter depends on the precise technologies in question in each particular context of use.