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16. SOCIAL ASPECTS OF TECHNOLOGY

INTRODUCTION

Technology is most commonly known by its products and their effects on society (Landers, 2003). Many moderns rarely consider the manner in which these products come to be or what they represent beyond their surface features and readily observable effects. Ancient philosophers such as Plato and Aristotle recognised that technological artefacts did not appear by themselves but were the ultimate outcomes of a distinct process whereby human beings conceived, created, refined, and produced objects to achieve human-desired purposes or fulfil human wants and needs (Kaplan, 2004). Even at the level of artefacts produced by a single individual for himself or herself, the stamp of an individual's creativity can be seen, for example, in ancient spears, which reflect a multitude of variations in terms of the manner in which the spearheads were shaped, the distinct wrapping configurations, and the whittled shape, length, width, and weight of the shaft. Such human distinctiveness at the level of the individual craftsman can be seen whether one is inspecting ancient spears, ancient pots, or a variety of other artefacts uncovered by the archaeologist's spade. Similarly, assemblages of stoneware, pottery, writing, brickwork, stonework, waterwheels, or other ancient technologies can be grouped into different 'schools' of creativity and production with clear commonalities between many artefacts within a given locale, region, and/or time period. These commonalities remind us that while ancient technologies could be quite personal they also developed and evolved within a given social context as well as a physical environment that combined to form a series of constraints and possibilities within which human creativity could thrive and manifest itself. The attendant features of the resultant artefacts that survived the ravages of time frequently make it possible for experts to identify distinct ancient cultures on the basis of the physical remains and trace these cultures and their interactions with other ancient cultures over time and space, with or without the additional help of historical records.

ANCIENT AND MEDIEVAL TECHNOLOGIES

Technologies far back in recorded history and prehistory were constrained, focused, shaped, sustained, spread, and evolved within particular social matrices. Clay tablets from ancient Sumer, Babylon, Assyria, and records preserved in the tombs of Egyptian pharaohs as well as within the Hebrew Bible, for example, give witness to the many ways in which ancient rulers and governmental structures shaped the types of technologies that were developed, enhanced, diffused, and imposed. Elaborate systems of barter, monetary exchange, and maintenance of accounts developed using a myriad of technologies working in combination to enable goods to move efficiently throughout the Fertile Crescent along the King's Highway and all the way to the upper cataracts of the Nile River in modern Sudan. Evidence exists for similar but less well-understood trade routes and exchanges with civilisations throughout sub-Saharan Africa, Southeast Asia and China, and the northern Russian steppes. Similarly complex systems evolved independently in other areas of the world. Coterminous

with the formal or informal development of media of exchange, human language (a preeminent technology), record keeping, measurement systems, and other technologies, we also see the development of intricate networks of major and secondary roads that facilitated the movements of rulers and their entourages and armies in annual marches of conquest and tribute collection or punishment for nonpayment of tribute. Of course, these routes also provided a means for merchants to speedily move goods to new and emerging markets. Herodotus writes with admiration of the Persian roads that allowed the Persian kings to move effortlessly between the twin capitals of Susa and Persepolis as well as throughout their kingdom in a manner that reinforced for local residents kingly power, wisdom, and divine presence. The siting of the road and, conversely, those areas that the road did not encompass, exerted a direct influence on the development of particular towns and cities and the consequent diminishment or social/ economic/political marginalisation of other locales. We see here the principle that technologies not only are a product of social creation but they also by their very nature and use favour some users and impose burdens or unintended (or intended) consequences on other users/nonusers (Cheek, 2005).

With the rise of the Roman Empire, systematisation of technologies and technological systems was taken to new heights and evidenced itself throughout the Empire such that many structural remains stand in mute testimony even today to the engineering and technical prowess of multitudes of unknown Roman craftsmen, artisans, and engineers. Roads were carefully and systematically surveyed, prepared, and maintained throughout the Empire with signposts that always indicated one's distance from the Eternal City of the Seven Hills. An advanced postal system, guard towers, inns, markets, and associated secondary roads enabled people, armies, tribute, and commerce to move swiftly throughout the Empire – at least when a major war or uprising was not in effect. Many of these roads were built with such care and attention to engineering matters that modern roads follow the exact same traces and in some instances are even sitting overtop of prepared surfaces first laid by Roman workers centuries earlier. French engineers in the 19th century carefully studied preserved segments of Roman roads as a basis for developing modern highway engineering techniques. These roads, coupled with Roman systematisation of sea routes, linkages to ports, and largely clearing the Mediterranean Sea of pirates, provided the means to keep the masses within Rome itself satiated with foods from around the known world and gladiatorial and other pageants and festivities that seemed to know no bounds. Few today stop to consider the enormous array of technologies both near and far that made such spectacles possible on an unprecedented scale that would not be equalled until well into the Industrial Revolution (Landels, 2000). The various 'needs' or technological problems that the creation and maintenance of such events imposed spawned all kinds of technological solutions, many of which are still utilised today.

Architectural remains and the observable layouts of entire cities within the ancient Roman Empire (e.g., Rome, Ephesus, Corinth, and Caesarea Maritima) witness to the manner in which local customs, mores, and aesthetics shaped the evolution and implementation of various technologies and technological systems as experts can readily distinguish the regional nature of various innovations by the subtle and not so subtle differences in materials, orientation, decoration, etc. evident in these structures. These differences remind us that some technological innovations fail to spread outside of the culture that creates them due not to their technological impotence but because of differences in social values, such as perceptions about the social status or desirability of association with the creators of the technologies in question, aesthetic considerations, compatibility with religious and social mores, and adaptability to differing physical, environmental, and/or socio-political contexts (Cowan, 1997; McClellan & Dorn, 2006).