

actions and strategies of social groups close to the design process. What is missing in both these accounts is an acknowledgement of how past technologies and practices – our technical heritage, if you will – shapes current design. As a result, the impact of historical and cultural developments on the design of technology has been under-theorized. Critical theory attempts to address this oversight.

3.1 Critical Theory Compared to Existing Approaches

A number of STS scholars have looked at the issue of design. From the many approaches employed, two have emerged to prominence: social construction of technology (SCOT) and actor-network theory (ANT). Briefly, SCOT theorists argue that technologies are contested and contingent, the outcome of battles between various social groups, each with its own vested interests. To understand a design one should trace the history of a specific technology's development and look for the influence of relevant social groups. Similarly, ANT theorists argue that technologies are contingent, the result of strategies and tactics employed by key actors in bringing together a stable network of people and devices in which a new technology will succeed.

Critical theory shifts attention away from the micro-level analysis of constructivist technology studies to the macro-level. We take the fact that technologies are socially constructed to be self-evident. However, whereas SCOT is focused on uncovering *which social groups* were most influential in shaping the design of a particular technology, and ANT is focused on the *strategies employed by various actors* in the design of a particular technology, we are interested in the *broader cultural values and practices* that surround a particular technology. Put another way, our focus is less on specific social groups or the strategies they employ and more on what *cultural resources* were brought into play in the design process (see table 1).

Table 1 Three theoretical perspectives on design

Theoretical perspective	Focus	How is design conceptualized?	Where is power located?
Traditional design studies	Proximate designers	Design as a technical task	Micro-level (<i>negotiations between key actors</i>)
Constructivist studies of technology	Designers and related actors / interest groups	Design as a political task	Micro- and meso-levels (<i>structured interactions between actors within an existing power hierarchy</i>)
Critical theory of technology	Culture, broader society	Design embedded in history and culture	Macro-level (<i>influence of tradition and culture on design practices</i>)

Feenberg (1999; 2002) has developed this approach as “instrumentalization theory.” This is a critical version of constructivism that understands technology as designed to conform not just to the interests or plans of actors, but also to the cultural background of the society. That background provides some of the decision rules under which technically underdetermined design choices are made. This background takes two forms: beliefs and practices of the everyday lifeworld, and culturally biased knowledge sedimented in technical disciplines shaped by a history of technical choices. The cultural study of technology must therefore operate at two levels, the level of the basic technical operations and the level of the current power relations or socio-cultural conditions that specify definite designs.

To give an example, consider a simple technology: the bicycle. Anyone who has spent time in Holland knows that the bicycle is an important mode of transportation in Dutch cities – far more so than in most North American cities. Bike lanes are prominent features in Dutch cities and bicyclists co-exist peacefully with motorists. This contrasts with North American cities, where cyclists must fight with motorists for use of the road. Furthermore, the everyday use of bicycles is a technological practice that is supported by another technology, the “Dutch road,” which extensively incorporates bike lanes and, just as importantly, social expectations about the proper use of bicycles.⁶

What is of interest to us here is the dominant meaning attached to a particular device, in this case a roadway: in Holland, it is accepted that bicycles and bicyclists are “legitimate” users of the road (indeed, cyclists commonly have the right-of-way); in North America, these same devices and people are oddities, either grudgingly accepted or met with hostility by the road’s primary users, motorists. No one doubts that cars dominate the roadways of North American cities. In North America, the word “road” brings to mind cars; in Holland, the same word brings to mind both cars and bicycles.

Our claim is that the “naturalness” of the interpretation of a particular device within a given social context is singularly important. The fact that a person living in Amsterdam is inclined to think of cyclists as natural users of roadways – while a person living in Atlanta does not – matters. It matters because this taken-for-granted understanding – what in essence is “culture” – becomes a background condition to the design of technology. Neither SCOT nor ANT pay much attention to these background conditions, choosing to focus instead on the actions of specific actors or groups of actors.⁷ Yet, to understand the ways in which technological design may be biased one needs to look at this broader context.

⁶Dutch bicycles are typically designed for everyday transportation without many of the bells and whistles of North American bicycles, which often seem more designed for hobbyist use. This illustrates once again the way in which devices are expected and constructed to fit into dominant understandings of what a technology is and how it is supposed to work. In addition, as Pinch and Bijker (1987) show in their study of bicycle development, the variety of styles one sees today reflects differences in opinion among designers and users as to what values are most important in a bicycle (e.g., fashion vs. comfort or speed vs. safety).

⁷In their original formulation of SCOT, Pinch and Bijker (1987) posited an examination of the “wider context” as the third and final step in their analysis. However, few SCOT theorists have followed through with this promise. We would also suggest that it makes a difference whether one begins one’s analysis with the “wider context” or ends with it as an afterthought.