

# Products and Practices: Selected Concepts from Science and Technology Studies and from Social Theories of Consumption and Practice<sup>1</sup>

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2 E. Shove, *Comfort, Cleanliness and Convenience: The Social Organisation of Normality* (Oxford: Berg, 2003); E. Shove and M. Pantzar, "Consumers, Producers and Practices: Understanding the Invention and Reinvention of Nordic Walking," *Journal of Consumer Culture* 5: 1 (2005): 43–64.

## Introduction

Models of the design process tend to be essentially linear, reflecting the time-based pressures of project management and notions of goal-directed problem solving. Most models of new product development end where consumption begins; that is, with the launch of a product in the marketplace (Figure 1).

However, the reverse sequence is equally valid: consumption practices, and their component materials, symbols, and procedures, develop over time, generating new product opportunities.<sup>2</sup> Design activities and design processes frequently are initiated by perceived opportunities of this kind, perhaps more commonly than by definitions of specific design "problems" (Figure 2).

By joining these two sequences together, we arrive at a cyclical model of designing and consuming: one indicating that consumer practices stimulate design; and that new products stimulate new practices (Figure 3).

Traditionally, the training and employment of designers has provided them with only limited understanding of consumption, use, and material culture. Indeed, Margolin goes so far as to

Figure 1



Figure 2

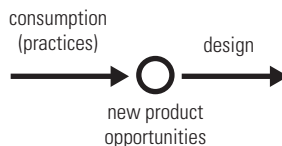
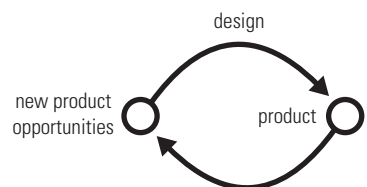


Figure 3



conclude that “We have no theory of social action that incorporates a relation to products, nor do we have many studies of how people acquire and organize the aggregates of products with which they live their lives.”<sup>3</sup> Designers work with tacit as well as explicit ideas about actual and potential users, and it is important to appreciate that not all design “knowledge” is contained in design literature. That said, designers and design theorists rarely examine the circuits of product development in which their work takes place, and to which it contributes. For the most part, processes of consumption and use fall outside the normal frame of reference. In this paper, we review concepts and theoretical resources that bring these issues back into view, and that help in developing a more comprehensive understanding of the design-consumption cycle. We begin by offering a digest of concepts that deal explicitly with the relation between things and people, and that have the potential to bridge between design and social theory.

Design research and practice often have been influenced by concepts and methods borrowed from the social sciences. Developments in psychology and semiotics have, for example, made their mark in human factors research, in applied ergonomics, and in areas such as product semantics and emotional design. Techniques of user-centered design frequently include aspects of anthropological method, and there have been important moments of exchange, particularly in the field of human-computer interaction. In this paper, we explore possibilities for further cross-fertilization, this time between design, science and technology studies (STS), and sociological theories of consumption and practice. We do this on the grounds that, despite their different intellectual roots, these diverse traditions have the potential to contribute to a better understanding of how designed artifacts shape and are shaped by the contexts in which they are used. It probably is true that sociologists have had more to say about moments of consumption than about processes of use,<sup>4</sup> however, this is not the whole story. As demonstrated by the examples to which we refer below, many also have been concerned, sometimes centrally so, with the relation between material objects and social practices. Can design research exploit and appropriate this rich seam of theoretical resources?<sup>5</sup> In addressing this question, we begin with what is a necessarily brutal process of simplification and abstraction. In what follows, we take a selection of concepts out of the sociological and anthropological debates from which they have evolved in order to identify points of connection, difference, and relevance for design.

We focus on six themes—acquisition, scripting, appropriation, assembly, normalization, and practice—all of which offer potentially important insight into the symbolic significance of physical objects and the relation between products and practices. Although presented one after the other, these concepts do not fit together to form a seamless theoretical whole. As we explain, each has its own intellectual

3 V. Margolin, *The Politics of the Artificial* (Chicago: University of Chicago Press, 2002), 52.

4 Ibid.

5 M. Berg, “The Politics of Technology: On Bringing Social Theory into Technological Design,” *Science, Technology, and Human Values* 23 (1998): 456–490; and V. Margolin, *The Politics of the Artificial*.

ancestry. Even so, there is some logic to the sequence in which they are introduced. We start by reviewing a range of sociological explanations as to why people acquire consumer goods. Grouped together under the heading of *acquisition*, these ideas represent different ways of thinking about what things are for, how they fit into, and how they extend existing regimes of meaning and significance.

The concept of *scripting* takes us into conceptual territory in which products and objects are accorded a measure of agency. Depending upon how they are designed, things permit and prevent certain courses of action. To use the sociological jargon, they “configure” their users. In this analysis, objects are addressed as material rather than symbolic entities. What matters is the relation between things, on the one hand, and the actions of their users and consumers on the other. In writing about *appropriation*, we explore the other side of this coin. The literature that we draw together under this heading recognizes the situated nature of consumption, and makes much of the point that attributions of meaning and purpose are culturally and situationally specific.

Terms such as “scripting” and “appropriation” generally are used to describe interactions between people and discrete objects; be they computers, bottle banks, or fridge-freezers. In contrast, the rather less developed notion of *assembly* refers to the ways in which suites or complexes of artifacts relate to each other, sometimes at the design stage, but more commonly when put to use. Under this heading, we think about how systems of material interdependence develop, and we consider the processes involved in “orchestrating” materials in domains or consumption “junctions” including the kitchen or the office.<sup>6</sup>

We then turn our attention to the dynamic nature of products in use. As many scholars have recognized, there is a difference between invention and innovation. We use the term *normalization* to refer to processes through which new objects and arrangements become established, and through which new expectations and forms of competence emerge. The sixth concept, *practice*, embraces aspects of the other five in that it offers a framework within which to analyze the co-constitutive relation between objects, images, and forms of competence.

We do not claim that these ideas can be immediately plugged into design research and practice, nor do we suggest that this is necessarily desirable. As we notice along the way, each has certain limitations. However, we contend that theoretical resources of this kind are required to illuminate the hidden or “dark side” of the cyclical processes of which industrial design is a part. In the concluding section of the paper, we take stock of what already has been achieved, and of the problems and possibilities of developing theories of material culture and consumption that are of relevance and value to design research and practice. We begin, as promised, with a discussion of acquisition.

6 R. S. Cowan, “The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology” in *Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, W. E. Bijker, T. P. Hughes, and T. J. Pinch, eds. (Cambridge, MA: MIT Press, 1987); O. De Wit, J. Ende, J. Schot, and E. van Oost, “Innovative Junctions: Office Technologies in the Netherlands 1880–1980,” *Technology and Culture* 43:1 (2002): 50–72.

## Acquisition

Why do people acquire new consumer goods? This is an important question for product designers for whom achievement is at least partly measured in terms of retail success. Theorists of consumption also are interested in motivations for acquisition, but for different reasons. In this field, the challenge of understanding the “desire for the new”<sup>7</sup> relates to the more general task of analyzing and comprehending escalating patterns of demand in contemporary society. Is consumers’ pursuit of novelty simply driven by producers’ economic requirement for innovation and profit? Design researchers frequently wonder about their role in fueling processes of product variation and specialization, and often are anxious about the part they play in promoting unsustainable patterns of consumption.<sup>8</sup> There are, however, other more sociological accounts of what drives people to acquire novel products and technologies. In reviewing some of this literature, Shove and Warde<sup>9</sup> isolate a number of generic mechanisms believed to be involved. Very briefly, these include:

### Social Comparison

The core proposition here is that lower social classes seek to imitate higher-status groups. By implication, demand will not cease until the lower classes have the same possessions as their superiors. Meanwhile, the higher classes constantly seek new items through which to maintain a measure of social distinction. The popular notion of “keeping up with the Joneses” is one very simple formulation of what has become a much more elaborated set of arguments about the part objects play in signaling status and identity.

### The Creation of Self-identity

In selecting goods and services, people transmit messages to others—they manipulate and manage appearances and thereby create a “self-identity.” Objects, and the meanings associated with them, constitute resources used in the definition of self.

### Mental Stimulation and Novelty

Social-psychological accounts of consumption suggest that the experience of novelty has attractions of its own: trying out new items and learning new tastes are ways of averting boredom; hence there is an infinite demand for novelty.

### Matching or the “Diderot Effect”

Diderot was given a new, red gown as a present. Because it made other items in his study look shabby, he progressively replaced his desk, curtains, and carpet so that they went

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- 7 C. Campbell, “The Desire for the New: Its Nature and Social Location as Presented in Theories of Fashion and Modern Consumption” in *Consuming Technologies*, R. Silverstone and E. Hirsch, eds. (London: Routledge, 1992), 48–66.
- 8 P. Sparke, *Consultant Design: The History and Practice of the Designer in Industry* (London: Pembridge Press, 1983).
- 9 E. Shove and A. Warde “Inconspicuous Consumption: The Sociology of Consumption, Lifestyles and the Environment,” in *Sociological Theory and the Environment: Classical Foundations, Contemporary Insight* R. Dunlap, F. Buttel, P. Dickens, and A. Gijsswijt, eds. (Lanham, MD: Rowman and Littlefield, 2001).

with his new robe. McCracken<sup>10</sup> uses this story to identify a process of ratcheting, in which replacement of one element or item sets off a further round of acquisition.

### Specialization

As the range of activities in which one might participate increases, so does the range of specialized products, each targeted at a specific group of practitioners. The separation of once-similar activities into increasingly specialized fields fosters the production and consumption of ever more precisely differentiated goods and services.

Attempts to design and target products for niche markets are frequently informed by conventional techniques of marketing and lifestyle analysis, many of which tap into apparently similar interpretations, particularly of the significance of social comparison as a driver of consumer demand. There are, however, crucial points of difference. Rather than taking consumer “needs” for granted, or supposing that they reflect some innate feature of human existence, including the need for status and distinction,<sup>11</sup> the sociological literature focuses on how demands for visible items of conspicuous consumption are constructed and reproduced. The design literature has yet to really engage with the social processes involved in *making* need, and this certainly is an avenue for future development. It is, nonetheless, important to recognize that the sociological explanations sketched above are limited and partial. Although they emphasize the social and cultural attribution of symbolic meaning, and the semiotic significance of acquisition and ownership, they have little or nothing to say about how objects actually are used in practice.

We return to the relationship between acquisition and use later in the paper. For now, it is enough to notice that much of the extensive literature on consumption and material culture addresses artifacts as carriers of meaning, distinction, and value. As a consequence, practical questions of action and utility take second place. By contrast, these are central themes for those who work in science and technology studies. Again, this is a huge field. In picking our way through it and in picking out concepts specifically relevant for understanding the relation between practices and products, we begin with the concept of “scripting.”

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10 G. McCracken, *Culture and Consumption: New Approaches to the Symbolic Character of Consumer Goods and Activities* (Bloomington, IN: Indiana University Press, 1988).

11 A. H. Maslow, “A Theory of Human Motivation,” *Psychological Review* 50 (1943): 370–396; L. Tiger, *The Pursuit of Pleasure* (London: Little and Brown, 1992); P. Jordan, *Designing Pleasurable Products* (London: Taylor and Francis, 2000).

## Scripting

Scriptwriters in drama, film, and television define the actions and practices of the human actors who follow their lines. The idea that designers have a similar role in scripting the actions and practices of those who use and consume the products they make has become common currency in social studies of science and technology. As Madeleine Akrich puts it, technical objects “define a framework of action together with the actors and the space in which they are supposed to act.”<sup>12</sup> Scripts can be intentional (on the part of the designer) or not, they can be material or semiotic, and they can be relatively open (flexible) or closed (prescriptive).

Scripting is most obvious when objects are designed to configure the user in specific and practical ways. For example, Latour<sup>13</sup> discusses the design of hotel key fobs which are bulky enough to be an encumbrance. Simply being the size they are is enough to “tell” guests to return them to the desk. In this case, the message “leave me at the desk” is *inscribed* in the structure of the key itself. Another example can be found in the toilets of *Voyager* trains on the UK rail network. Above the toilet fixture is a sign indicating that the flush button is located behind the raised toilet seat. To carry out the thoroughly embedded practice of flushing the toilet, the user is obliged to adopt the less than universal practice of putting the toilet seat down after use.

Given the assumption that most users will flush the toilet, putting the button behind the toilet seat materially disciplines users. If they are to flush at all, they have no option but to lower the seat. However, the degree to which this script is, in fact, “closed” depends not upon the design of the seat, but upon contextually specific cultural norms. Given a user less accustomed to flushing the toilet, or actively resistant to being ordered to do so by a bathroom fixture, the script reopens as the user rejects the action-narrative inscribed in the flush button.

While “scripting” is not in the human factors lexicon, aspects of the concept are arguably central to well-established approaches in industrial design, ergonomics, and in studies of the interface between man and machine.<sup>14</sup> Designers often are faced with the challenge of deliberately constructing objects such that users comply with sometimes elaborate protocols and sequences of action.

Designers also are tacitly familiar with the possibility of what Latour writes about as “delegation” from human to nonhuman actors. In the example referred to above, the hotelkeeper “delegates” the task of disciplining the guest to the key, which then acts on the hotelkeeper’s behalf. At first sight, man-machine systems design takes a similarly symmetrical view of human and nonhuman actors, treating both as elements to be deployed in the construction of complex systems. In systems design, the decision to rely on a human or a nonhuman component is based upon objective measures

12 M. Akrich, “The De-Scripting of Technical Objects” in *Shaping Technology/Building Society: Studies in Sociotechnical Change*, Wiebe Bijker and J. Law, eds. (Cambridge, MA: MIT Press, 1992), 208.

13 B. Latour, “Where Are the Missing Masses? A Sociology of a Few Mundane Artifacts” in *Shaping Technology/Building Society*, W. E. Bijker and J. Law, eds. (Cambridge, MA: MIT Press, 1992), 225–258.

14 W. T. Singleton, *Man-Machine Systems* (Harmondsworth, UK: Penguin, 1974).

of relative performance, such as those encapsulated in “Fitt’s List.”<sup>15</sup> According to these criteria, humans have certain advantages over nonhuman components, including an ability to deal with the unpredictable and to degrade “gracefully” when overloaded. New technologies—for instance, electronic devices for pattern recognition—have encroached upon what previously were uniquely human areas of expertise, but for the purposes of the present discussion, the issue of exactly what humans and nonhumans are “good for” is less important than the point that systems routinely are treated as self-evidently hybrid combinations of human and machine.

In addition, and again without any philosophical fuss, designers have a long history of analyzing and deliberately configuring the human/nonhuman interface. The notion of developing human and nonhuman components in parallel; of constructing more or less passive roles for the human-operator; and of explicitly analyzing points of contact and relations between the two “teams” are central to what used to be called “man-machine interface design.” In this environment, physiological and psychological research, for example, into the direction of motion stereotypes or natural biodynamics is important if designers are to predict performance, minimize error, and increase accuracy on the part of the man-like cogs with which they deal.

As this last comment indicates, similarities between man-machine systems design and social scientific concepts of scripting do not run as deep as might at first appear. For a start, the literature on sociotechnical scripting seeks to develop a much more subtle understanding of the mutually constitutive relation between users and technologies. Humans are not treated as (relatively) predictable components of a hybrid machine, but as social agents capable of resisting, as well as complying with, embodied and materialized inscriptions. Even the most prescribed artifacts remain open to resistance (or “anti-programs”) when exposed to the social realities of use and practice. Second, sociotechnical scripts often are multiple. In the example of the *Voyager* flush button, the possibilities are clear: either the user will comply and put the seat down, or resist and leave it up. More commonly, technologies afford multiple uses, meanings, or practices, and processes of scripting are correspondingly—and simultaneously—diverse. Third, the sociological literature attends to contextual, practical, and semiotic—and not only psychological or physiological—factors involved in description (i.e., in how users and consumers in fact respond).

In short, scripting is a concept born of reflexive sensitivity to the social and cultural specificity of everyday life. Although it might inspire significantly new ways of thinking about designers’ roles in making and shaping the material artifacts with which we share our lives,<sup>16</sup> this concept is of little use in generating universally valid predictions of consumer response, or in designing reliable man-

15 P. Fitts, *Human Engineering for an Effective Air-Navigation and Traffic-Control System* (Washington: National Academy of Sciences, 1951), cited in W. T. Singleton, “Systems Prototype and Design Problems,” *Ergonomics* 10 (1967): 120–128.

16 H. Molotch, *Where Stuff Comes From: How Toasters, Toilets, Cars, Computers, and Many Other Things Come to Be as They Are* (New York: Routledge, 2002).

machine systems. As we explain in the next section, concepts of scripting do not preclude the possibility that consumers will appropriate and configure objects in all manner of situationally-specific ways themselves.

### Appropriation

Although scholars of science and technology studies also have been active in this field, most of the literature on appropriation, customization, and domestication has been developed by people writing within the rather different intellectual traditions of material culture and consumer research. Whatever their lineage, and whatever the subtleties involved in defining each of these terms, such analyses are as one in highlighting the active part that users play in fitting technologies and commodities into existing ways of life, frameworks of meaning, and contexts of practice.

As most commentators recognize, scripting is but one aspect of the process through which objects and users configure each other. Even so, it sometimes is useful to oppose scripting and appropriation, if only as a means of characterizing what is an otherwise seamless process of co-determination. It is in this context that writers including Jelsma<sup>17</sup> have investigated cases in which users actively develop and implement “anti-programs” in response or resistance to those inscribed in the objects themselves. This kind of appropriation may take the form of direct technical intervention, such as when self-closing doors are propped open to provide ventilation or easy access. More commonly, alternative scripts and unnoticed affordances emerge as users and consumers position objects—symbolically and materially—within existing complexes of possession and practice.

In demonstrating how videos and computers are accommodated within the home, Silverstone, Hirsch, and Morley<sup>18</sup> show how prior routines and patterns of life structure the way in which these new technologies are viewed and used. Going further, they suggest that such processes give material artifacts shape and form, determining what they “are” and what they might become in different social and domestic situations. Kaufmann’s wonderful study of couples and their laundry provides another fine illustration of the complexity and density of social and practical arrangements into which a new appliance such as a washing machine is inserted, and through which it is defined and given meaning.<sup>19</sup> Changing scale, anthropological studies of how potentially “imperialistic” global commodities are, in fact, positioned and consumed make use of remarkably similar ideas. This is exemplified by Miller’s<sup>20</sup> work on the appropriation of the archetypal global brand “Coca-Cola,” as an ethnically differentiated national drink of Trinidad.

17 J. Jelsma, “Philosophy Meets Design, or How the Masses Are Missed (and Revealed Again) in Environmental Policy and Ecodesign” in *Consumption, Everyday Life, and Sustainability, Reader for ESF Summer School 1999*, Lancaster University (Lancaster, UK: Centre for Science Studies, 1999).

18 R. Silverstone, E. Hirsch, and D. Morley, “Introduction” in *Consuming Technologies*, R. Silverstone and E. Hirsch, eds. (London: Routledge, 1992).

19 J. C. Kaufmann, *Dirty Linen: Couples and Their Laundry* (Middlesex, UK: Middlesex University Press, 1998).

20 D. Miller, “Coca-Cola: A Black Sweet Drink from Trinidad” in *Material Culture: Why Some Things Matter*, D. Miller, ed. (London: UCL Press, 1998), 169–187.



Such thoroughly social analyses of material objects have yet to find their way into the design literature. This is, perhaps, not surprising. After all, design is of little or no relevance to the *process* of appropriation, and it is this process that is at the heart of the sociological debate. There is, however, evidence of interest in the more basic observation that consumers are ingenious and creative. For example, Fulton-Suri's<sup>21</sup> photographic study "Thoughtless Acts" illustrates the apparently unconscious exploitation of material affordances as people put objects to new and varied uses in different situations. In addition, design researchers have used the concept of domestication as a tool with which to carve out new areas of inquiry, for instance, looking at how designed objects are valued, and at what actually happens to them in the home.<sup>22</sup> As this work demonstrates, it is possible to develop such an agenda within design, and to do so without necessarily challenging foundational ideas about the theoretical status of objects and their role in social life. As befits the idea, concepts of appropriation can be appropriated!

### Assembly

Having established that products and technologies are incorporated into existing regimes and ways of life, the next question is: "How?" What are the conventions and "rules" of appropriation, and what is it that is achieved and maintained as a result. Although relatively little has been written about this as an issue in its own right, a number of authors have made relevant observations about modes of integration, and about the work involved in assembling the material and symbolic ingredients of daily life.<sup>23</sup>

In writing about how households use domestic appliances, Silverstone<sup>24</sup> suggests the existence of a "higher" level temporal order—a time style part public, part private—that families reproduce through the distinctive ways in which they piece together tools, technologies, and practices. The idea here is that things are appropriated in a manner that is consistent with a vision or imaginary template of how family life should be organized. Similar arguments can be made about the ways in which understandings of health, hygiene, and well-being inform many practices at once.<sup>25</sup>

At the macro level, orchestrating concepts of normal practice are important forces for coordination. The notion of a "lifestyle"—though contested—points to other conventions of order. Various commentators have argued that things are, for example, acquired and combined to form complete lifestyle packages. Hence it would be strange if someone rich enough to own a large house and several cars did not also have an adequate heating system. Notions of symbolic coherence are equally important, driving sequences of "upgrading"—as when the acquisition of a new carpet prompts the purchase of a new sofa or a round of redecoration.<sup>26</sup> In addition, what goes with what may be determined by questions of technical

21 J. Fulton-Suri, *Thoughtless Acts?* (San Francisco: Chronicle Books, 2005).

22 I. Koskinen, "Design and Domestication," paper presented at *Design and Consumption: Ideas at the Interface* (Durham University, January 2006).

23 M. Hand and E. Shove, "Orchestrating Concepts: Kitchen Dynamics and Regime Change in *Good Housekeeping* and *Ideal Home 1922–2002*," *Journal of Home Cultures* 1:3 (2004): 235–257.

24 R. Silverstone, "Time, Information, and Communication Technologies in the Household," *Time and Society* 2:3 (1993): 283–311.

25 E. Shove and M. Pantzar, "Consumers, Producers and Practices: Understanding the Invention and Reinvention of Nordic Walking."

26 See the "Diderot Effect" discussed above; and G. McCracken, *Culture and Consumption: New Approaches to the Symbolic Character of Consumer Goods and Activities*.

interoperability. Many products and technologies are designed to be compatible with others, thereby creating systems or networks of interdependence: for example, between computers, printers, and digital cameras; or between textiles, washing machines, and detergents.

Authors such as Cowan<sup>27</sup> and de Wit, et al.<sup>28</sup> remind us that the “work” of integration and assembly is situated, and that locations of conjunction and coordination matter. In writing about consumption junctions, Cowan acknowledges that the kitchen is a place in which streams of material, ideology, and culture converge. De Wit, et al. take up this idea and show how co-location has affected the detailed coevolution of office equipment: the role of the fax, for instance, being redefined in relation to that of the printer and the computer next to it.

Symbolic and material forms of integration obviously coexist. Understanding how these modes operate together, and how socio-technical “regimes” emerge as a result, remains important for social theory.<sup>29</sup> But what does this mean for design and design research?

In some situations, consumers do much of the integrative work themselves, selecting from a repertoire of isolated products (for example, shirts, socks, shoes, jackets, coats, handbags, etc.) in constructing what is for them a coherent whole. In other cases, designers and manufacturers produce what are, in effect, pre-assembled bundles of products and technologies (for instance, offering a complete kit of fishing equipment or coordinated suites of office furniture). In between these two extremes, designers and manufacturers routinely take note of the settings in which “their” products are to be used. This is a somewhat limited response to the substantial theoretical challenge of understanding and intervening in the coevolution of complex product ecologies, and surely there is scope for taking these ideas forward within design research. In so doing, it will be important to consider the temporal aspect of the relation between people, products, and practices. As we go on to show, this is an important and relatively well-documented theme in the social scientific literature.

### Normalization

Sociologists of consumption and of technology have developed different theories and models to explain how novel arrangements become normal. Some concentrate on the “diffusion” of new products, arguing that these percolate through the strata of society and that fashions develop as people and social groups emulate each other. Although Rogers<sup>30</sup> does not relate the propensity for risk-taking to social class or status, his suggestion that the practices of “early adopters” in time are taken up by more cautious members of society, and finally by reluctant “laggards,” invokes a similarly

27 R. S. Cowan, “The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology” in *Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*.

28 O. De Wit, J. Ende, J. Schot, and E. van Oost, “Innovative Junctions: Office Technologies in the Netherlands 1880–1980.”

29 A. Rip and R. Kemp, “Technological Change,” in *Human Choice and Climate Change: Resources and Technology*, S. Rayner and E. Malone, eds. (Columbus, OH: Battelle Press, 1998).

30 E. M. Rogers, *The Diffusion of Innovation* (New York: Free Press, 1983).

infectious theory of social change. These accounts take the status of the new product for granted: all that matters is how it is introduced and disseminated.

In contrast, other writers focus on the changing *relation* between artifacts and their environments. Studies of innovation have, for example, shown that new technologies often develop within protected “niches,” safe from the rigors of established markets. The process of moving from the “nursery” to the wider world is described as one of making alliances and forging new relations between things and people along the way.<sup>31</sup> In this account, artifacts and technological systems are constantly redefined during the course of a “journey” that never really ends. The concept of “innofusion,” a combination of innovation and diffusion, captures the idea that, for all intents and purposes, things change as their status and positioning within the wider environment (or market) evolves, and as they become normal.<sup>32</sup> This is a dynamic enterprise, and one in which new products also have consequences for the environments into which they are introduced. In becoming *normal*, certain “radical” innovations disrupt and challenge previously established skills, institutional arrangements, expectations, and conventions.<sup>33</sup>

In an article explicitly linking analyses of innovation with theories of consumer behavior, Pantzar<sup>34</sup> pays serious attention to the evolving character of meaning as novel technologies and products become normal. Tracking the symbolic trajectories of a range of commodities (including the telephone, the computer, the car, and the television), he suggests that such items go through distinctive phases of redefinition. Starting their collective career as fashionable objects of desire, the next stage is one in which acquisition is legitimized in rational or functional terms. According to Pantzar, this is followed by a period of routinization. By this point, the items in question have become so ordinary that their acquisition needs no justification at all.

This process is perhaps paralleled by transitions in the role and contribution of design. For example, Liddle<sup>35</sup> has suggested that designs are simplified as products move from the “enthusiast” stage to the point where they become normal commercial goods. Once a mass market has been established, new design problems arise, usually having to do with differentiation and competition within a product type.<sup>36</sup>

With hindsight, it is easy to trace product careers as they move from one “stage” to the next. However, it is important to realize that (re)attribution of meaning and the redefinition of practice are both part of a typically unstable dynamic of innovation and of normalization. Many products fail along the way, and many potential practices never take hold. Conversely, some become deeply entrenched. In his classic article “Clio and the Economics of

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- 31 R. Kemp, J. Schot, and R. Hoogma, “Regime Shifts to Sustainability through Processes of Niche Formation: The Approach of Strategic Niche Management,” *Technology Analysis and Strategic Management* 10 (1998): 175–195.
- 32 W. Bijker, “The Social Construction of Fluorescent Lighting or How an Artifact Was Invented in its Diffusion Stage” in *Shaping Technology Building Society*, W. Bijker and J. Law, eds. (Cambridge, MA: MIT Press, 1992).
- 33 W. Abernathy and K. Clark, “Innovation: Mapping the Winds of Creative Destruction,” *Research Policy* 14 (1985): 3–22.
- 34 M. Pantzar, “Domestication of Everyday Life Technology: Dynamic Views of the Social Histories of Artifacts,” *Design Issues* 13:3 (1997): 52–65.
- 35 D. Liddle, “Connecting Value” (Keynote Address presented at 7th International Forum on Design Management Research and Education, Stanford University, 1995).
- 36 H. Petroski, *The Evolution of Useful Things: How Everyday Artifacts—from Forks and Pins to Paper Clips and Zippers—Came to Be as They Are* (London: Pavilion Books, 1993).

QWERTY,” Paul David<sup>37</sup> discusses the social and economic processes that together result in forms of “path dependency,” such that the design of the typewriter keyboard becomes “locked in” and resistant to change. These ideas raise a number of specific questions for design research. How do products and types of product design change (or reinforce) what people do, and what does this mean for trajectories of innovation and for future avenues of product development?

### Practice

The simple observation that consumer goods are important not for their own sake but for the practices they make possible has potentially far-reaching implications for our discussion. Such an observation prompts us to think again about the tools, toys, equipment, and resources required to accomplish what people believe to be normal, ordinary, and acceptable ways of life. This is not a one-way relationship. As indicated above, artifacts and practices coevolve. In this final section, we comment briefly on the conceptual implications of putting the emergent “doing”—that is the practice itself—center stage.

For Reckwitz<sup>38</sup> and for Schatzki,<sup>39</sup> practices emerge from, constitute, and make sense of “forms of bodily activity, forms of mental activity, things and their use, background knowledge in the form of understanding, know-how, states of emotion, and motivational knowledge.”<sup>40</sup> In the view of these authors, practice cannot be reduced to any one of these elements alone. This is in contrast to those who take the individual or the artifact as the unit of analysis and enquiry, or who are concerned with the distribution of competences between objects and operators (as is the case in some of the man-machine systems literature).

From a practice theoretic perspective, the alternative is to conceptualize people and things as the “carriers” of practice (and of many different practices that are not necessarily coordinated with one another), and therefore the carriers of certain routinized ways of doing, understanding, knowing, and desiring. These aspects are necessary attributes of practices in which individuals participate, and which in part are shaped by the material world—but they are *not* qualities of human or of nonhuman actors. Building on these ideas requires a subtle but significant shift of orientation. Among other things, it suggests that we could and should consider how practices are sustained by provisional networks of practical knowledge, including that which is embedded in material objects. In such an analysis, objects—whether designed to do so or not—figure as “knots of socially sanctioned knowledge,”<sup>41</sup> and as entities that “bind human actors and participate in developing specific forms of social order because they allow for common practices to develop.”<sup>42</sup>

37 P. David, “Clio and the Economics of QWERTY,” *American Economic Review Papers and Proceedings* 75 (1985): 332–337.

38 A. Reckwitz, “Towards a Theory of Social Practices: A Development in Culturalist Theorizing,” *European Journal of Social Theory* 5:2 (2002): 243–63.

39 T. Schatzki, *Social Practices: A Wittgensteinian Approach to Human Activity and the Social* (Cambridge: Cambridge University Press, 1996).

40 A. Reckwitz, “Towards a Theory of Social Practices: A Development in Culturalist Theorizing”: 249.

41 A. Preda, “The Turn to Things: Arguments for a Sociological Theory of Things,” *Sociological Quarterly* 40 (1999): 347.

42 Ibid. 351.

There is much more that could be said but, for the time being, it is enough to point out that this literature provides a potentially useful and relevant way of analyzing objects as constituents of practice, and as entities through which knowledge and social order are carried and reproduced.

### Issues for Design and Design Research

The selection of positions outlined above gives an indication of the potential for theoretical exchange and development between science and technology studies, social theories of practice and consumption, and design research. In outlining a range of conceptual resources with which to investigate the half of the design consumption cycle that is routinely missing from design theory, we have sought to identify points of commonality, contention, and challenge.

To start with the commonalities, notions of emotional design, high value added, and the “X factor” evidently resonate with certain theories of acquisition. Questions of how values are invested in products are, in addition, of growing interest to theorists of design and consumption alike. As already discussed, the idea that objects script user action and experience has parallels in the practical ambition of “designing the user experience”<sup>43</sup> and in “interface design.” Notions of appropriation also are apparently consistent with the recognition that not even the most farsighted designer can realistically anticipate how products will be perceived, valued, and utilized by producers, merchants, and ultimate users. At its most basic, the concept of assembly is embedded in the coordinated design of product ranges and families; and concepts of normalization have a certain resemblance to theories of product evolution. There is interest across the board in the temporal dimension, as well as in the ways that products and practices feed each other.

Our review also has identified a number of opportunities and challenges. For example, could the ambition of making things that are “fit for purpose” be elaborated so as to take note of the point that things also make the purposes for which they are fit? Rather than following simplistic interpretations of Maslovian development, design researchers might draw upon the sociology of consumption in constructing more subtle and more convincing theories of demand. Perhaps related to this, we might imagine an extended model of design process that reflects consumer practice as a major source of design opportunity (see Figure 3). This would make it possible to examine the continually evolving relationship between features and values embedded by design and those that subsequently are acquired.

Design practice and design education champion a creationist approach in which the creativity of the designer is promoted as the major driving force in forming new products. Although evolutionary accounts of the development of product types (and of forms within a product type) have yet to be elaborated on any scale, there is much

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43 J. Ingram, “Designing the User Experience—A Design Methodology with Educational and Commercial Applications” (Paper presented at *Design: Science: Method*, the Design Research Society International Conference, Portsmouth Polytechnic, 1981).

anecdotal evidence, even within design, that product development proceeds through meta-level processes of selection and variation. Perhaps less contentiously, professional design organizations are taking notions of consumer-influenced product evolution increasingly seriously. While companies such as Interval Research,<sup>44</sup> IDEO,<sup>45</sup> and Philips<sup>46</sup> have been in the forefront of promoting design methodologies that purport to address the dynamic relation between product and practice, such techniques have, to date, not been adopted within conventional design processes. A more thorough appreciation of the conceptual challenges at stake almost certainly would generate significantly different ways of conceptualizing and managing strategic design policy within manufacturing organizations. For example, discussions about the passive or sovereign status of the consumer appear in a rather different light when we acknowledge that consumers, designers, and producers all are involved in coproducing the practices through which objects and materialized forms of knowledge have meaning.

In conclusion, we might rephrase Latour's observation that "students of technology are never faced with people, on the one hand, and things on the other: they are faced with programs of action, sections of which are endowed to parts of humans, while other sections are entrusted to parts of nonhumans."<sup>47</sup> This statement works just as well if we put "designers" or "design researchers" in place of "students of technology." Although they use different terms, Kelley and Littman propose an apparently similar approach. As they explained, the challenge is to "think of products in terms of verbs, not nouns: not cell phones but cellphoning."<sup>48</sup> Taken seriously, practice-oriented approaches to product development demand that attention be paid to the continually coevolving relation between human and nonhuman actors (objects) jointly implicated in the process of "doing"—whether that be cellphoning, fishing, or whatever.

As these brief examples illustrate, there are more extensive possibilities for cross-fertilization between design and social science than at first might appear. Douglas and Isherwood's famous observation that goods are "needed for making visible and stable the categories of culture"<sup>49</sup> has tended to be interpreted as a statement about the significance of symbolic distinction, taste, and the somewhat abstract role of artifacts as markers and carriers of meaning. It is, however, clear that social science has much to say about the pragmatic and practical role of goods, and about how objects stabilize culture through use, competence, and know-how, as well as through exchange and display. What is required and what we hope to have initiated is a considered interdisciplinary conversation about the relevance of these ideas for design and design research.

44 D. Liddle, "Connecting Value" (Keynote Address presented at *7th International Forum on Design Management Research and Education*).

45 J. Fulton-Suri, *Thoughtless Acts?*

46 P. Jordan, *Designing Pleasurable Products*.

47 B. Latour, "Where Are the Missing Masses? A Sociology of a Few Mundane Artifacts" in *Shaping Technology/Building Society*, 254.

48 T. Kelley and J. Littman, *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm* (New York: Currency/Doubleday, 2001), 47.

49 M. Douglas and B. Isherwood, *The World of Goods: Towards an Anthropology of Consumption* (London: Routledge, 1996), 38.