Social Heuristics: Decision Making and Innovation in a Networked Production Market

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Abstract

In a study of failed innovation in the commercial construction industry we find that *social heuristics*—collectively constructed and maintained interpretive decision making frames—influence economic decision making practices and material outcomes. Social heuristics are widely institutionalized and commonly relied upon to reduce uncertainty in decision making; they provide actors with both *a priori* and *ex post facto* justifications for economic decisions that appear socially rational. In the commercial construction industry, social heuristics sustain market order but also discourage novel technologies and impede innovation. Social heuristics are actor-level constructs that reflect macro-level institutional arrangements and networked production relations. The concept of social heuristics offers the promise of developing a genuinely social theory of individual economic choice and action that is historically informed, contextually situated, and neither psychologically or structurally reductionist.

INTRODUCTION: INNOVATION AND SOCIAL HEURISTICS

Schumpeter (1934), in his classic work on economic systems and technological change, identified three steps in the innovation process. *Invention* and *marketing*, steps one and two, involve the focused efforts of a limited number of entrepreneurial persons or firms who create something new and promote it. Innovation *diffusion*, the third step, is characterized by increases in the number and intensity of use of the innovation until the novel product or process is broadly diffused. Schumpeter was interested, like many contemporary social scientists, in better understanding what it is about capitalist markets that promote or obstruct the innovation process. Schumpeter's answer was simple: invention, marketing, and diffusion reflect the actions of firms and entrepreneurs that invent or adopt new products and technologies that improve their economic competitiveness (Schumpeter 1939). He called this process "creative destruction;" the destruction of existing technologies in favor of more efficient or effective ones.

Contemporary scholars continue Schumpeter's insights and ask why some markets, firms, and individuals are more inclined to pursue creative destruction than others, and furthermore how policy makers can promote more rapid innovation in critical markets and industries, for example, new industrial processes or improved consumer goods that serve either private or public interests (Block 2008; Block and Keller 2008; Collins 2004; Mowery and Nelson 1999; Whitford and Shrank 2009) .

Most research attention has focused on the first step, invention processes, in efforts to stimulate competitive advantages at firm, industry, and national levels. The second and third steps in innovation, marketing and commercialization, continue to rely on assumptions very similar to Schumpeter's; marketing campaigns try to saturate markets with "good" information about superior technologies with the assumption that competitive, efficiency-seeking firms will

adopt them to gain market advantage. While understanding what aids or inhibits novelty is critical to promoting innovation broadly, in many cases the creation of new technologies and distributing good information is not at issue (Blumstein, Goldstone and Lutzenhiser 2000; Hoffman and Henn 2008; Lutzenhiser et al. 2001; Mills 1995). Rather it is the slow, uneven adoption rates of apparently superior existing technologies and practices that are well known that confound advocates and policy makers alike: Why do rational actors ignore more efficient technologies?

In our research we address the third step of Schumpeter's technological change model, *diffusion*. We seek to understand how commercial construction practitioners choose among an array of designs, technologies, production techniques, and participants when considering available options. Substantively our aim is to better understand why energy efficient technologies have been so slow to diffuse in the commercial construction market; policy makers have been perplexed about this market's slow rates of adoption (Blumstein, Goldstone and Lutzenhiser 2000). We argue that in order to understand the slow adoption of energy efficient and other green technologies, one must first discern the role of collective interpretive frames, what we call *social heuristics*, in making economic choices. *A social heuristic is a decision making model and shortcut that embodies collectively held understandings that both reduce cognitive costs and provides a socially justifiable foundation for actors' decisions.* Social heuristics, like cognitive judgmental heuristics (Kahneman and Tversky 2000), limit the information that actors take into consideration when making a decision. Social heuristics are constructs that are collectively created and maintained by knowledgeable actors in market settings. As such, they are micro-level institutional structures that stabilize existing institutional arrangements. We report here our findings of the role social heuristics play in maintaining

market order and conversely influencing the probability of innovation and economic change (c.f., Hargadon and Douglas 2001).

There are three types of social heuristics widely used in the construction industry that aid decision making processes including search, assessment, and selection (Marsh 2002). The *consensus* heuristic reflects a shared understanding of the industry's current market logic, ensuring that market actors are paradigmatically aligned. Consensus provides a broad understanding of the general aims of an industry at a historic moment, for example, a mass production logic or an innovation logic. The *reflexivity* heuristic frames decision choice opportunities in terms of this logic and gives actors simplified bases for assessing, selecting, and rejecting alternatives that are consonant with the reigning industry paradigm. The *reproduction* heuristic provides individuals guidance in assessing how actions can sustain or derail their place in the market over time. Reproduction heuristics often are concerned with maintenance of reputation and position in the market as currently constituted. All three social heuristics reduce decision making effort and promote socially comprehensible and defensible choices; all also work to discourage the diffusion of available innovations in this industry.

The paper is organized into five sections. First, we briefly discuss existing theories of economic decision making in relation to innovation diffusion. Second, we present the case of commercial construction and describe our research approach. Third, we empirically demonstrate how actors use social heuristics to guide and defend their decision making practices (Biggart and Beamish 2003). Fourth, we situate our findings within contemporary scholarship on economic order, with particular attention to production networks that organize various markets and industries.[1] Finally, we discuss how attention to social heuristics can contribute to understanding economic coordination and innovation diffusion.

THEORIES OF ECONOMIC DECISION MAKING

AND DIFFUSION OF INNOVATION

Studies of innovation typically explain innovation diffusion in terms of the supposed objective costs vs. benefits of the innovation, the structure of the environment, or the traits of the adopters. For example, conventional economic accounts share many of Schumpeter's assumptions, typically assuming that price, profit, and performance alone drive the choices of rational adopters who seek to maximize outcomes to gain advantage in competitive environments (Mansfield 1961; Nelson, Petershansl and Sampat 2004; Stoneman and Diederen 1994). Insofar as an innovation fails to diffuse, the presumption is that the market is not allocating resources efficiently for some reason, for example, information is not being shared throughout the market (Stigler 1961). That is, the market has "failed" (Stoneman and Diederen 1994).

Institutional economists and economic sociologists also tend use a cost-benefit approach to innovation diffusion, but do so with greater attention to the "costs" of firm dynamics, environmental conditions, and historical contingency. For instance, institutional economists propose a path dependant view that maintains that historical accident, contingency, and widespread acceptance, referred to as institutional "lock-in," influence the substitutability of a technique or technology (Arthur 1989). With time, technologies achieve lock-in through institutional accretion that lends irreversibility to already adopted technologies (Cowan 1990; David 1985; David 1994; David and Greenstein 1990). As a consequence, while a given technology may be "technically superior" it may simultaneously be "rationally inferior" given a comprehensive accounting of the objective costs-to-benefits of adopting and transitioning away from a known technique or technology.

Economic sociologists also incorporate institutions into their explanations to explain both innovation diffusion and larger market transformations, but are less orthodox in the application of what constitutes a rational decision or what can be considered an "objective cost." Sociologists have found that other factors, in combination with technological attributes, strongly influence the likelihood of innovation diffusion. These include: institutionalized and firm-based organizational competencies (Henderson and Clark 1990; Romanelli and Tushman 1994; Tushman and Anderson 1997; Utterback 1994); organizational networks, dependencies, and competition (Aldrich 1999; Aldrich and Pfeffer 1976; Podolny and Page 1998; Powell 1990; Powell et al. 2005; Smith-Doerr and Powell 2005) and governmental regulations, financial incentives, and tax breaks (Block and Keller 2008). Rural sociologists in the "innovation-diffusion school,"[2] have also been concerned with the adoption of improved agricultural practices for example, but use similar approaches as those noted above (Coleman, Katz and Menzel 1966; Fliegel 1993; Griliches 1960; Rogers 1995 [1st ed. 1962]; Ryan and Gross 1943).

Collectively, these efforts reveal how innovation diffusion is influenced by aggregate conditions. Yet, they also lack a realistic account of actors' *in situ* decision-making practices as they occur within market contexts (c.f., Brown and Eisenhardt 1997; Hargadon and Douglas 2001). Lacking a situated account of choice, conventional treatments typically assume that actors are either agents of change or not; that they act rationally or not; that markets yield efficient relations or market failures; and that structural conditions in firms, industries, or markets are conducive to innovation diffusion or not. Theorists typically fail to directly assess how choice is actually exercised—i.e., *search, assessment, and selection*—by knowledgeable actors embedded in particular economic contexts.

There are, however, examples of empirical and theoretical work that we build on in this paper. For example we agree with economic sociologists who view the assumption of comprehensive rationality in economic contexts as theoretically unjustified and who recognize institutional and social psychological factors as influential in the exercise of choice (c.f., Becker and Murphy 2000; Friedman 2007). We align with those who pay attention to actors' situated behavior noting that decisions are reflective of but not wholly reducible to macro structural or institutional conditions (Boltanski and Thévenot 2006). We examined this orientation in some depth in our review of scholarship that demonstrates how economic decisions are carried out through shared conceptualizations, roles, and conventional practices as well as individual cognitive limits (Biggart and Beamish 2003).

Economic sociologists have established that networks and institutions influence economic conditions and outcomes (DiMaggio and Powell 1983; DiMaggio and Powell 1991; Fligstein 1996; Fligstein 2001; Granovetter 1985; Granovetter 1992; McGuire and Granovetter 1998). For example, Hargadon and Douglas (2001) explain successful innovation through their historical treatment of Thomas Edison's entrepreneurial and design genius as an institutional bricoleur.[3] By cloaking electric lighting in the institutional understandings associated with the established gas lighting industry, Edison created a familiar cover for a novel technology.

For French pragmatists, coordination between buyers and sellers is the critical economic act, and uncertainty around coordination is the primary conundrum (Thévenot 1994; Thévenot 1995; Thévenot 1998). According to them, participants collectively address uncertainty by seeking both *a priori* and retrospective justifications for their actions so that they appear rational, reasonable, and accountable to those with whom they co-participate. Over time, justifications can become "conventionalized;" they become consensus beliefs about why certain acts and practices

are deemed normal and to be expected (Biggart and Beamish 2003). Market-based regimes of justification allow actors to transact without formally calculating and defending every decision while psychologically affirming the "goodness" of those act(s) (Beckert 2002; Boltanski and Chiapello 1999; Favereau 2002; Gomez and Jones 2000; Thévenot 1994; Thévenot 1998; Wilkinson 1997).

Psychologists and cognitive scientists have also worked to understand choice in economic contexts. In contrast to conventional economic conceptions of comprehensive rationality in which individuals are assumed to maximum their utility, Herbert—coined the term "satisficing" to capture how pure rationality is constrained by limited information, cognitive capacities, aspirations and environmental constraints (Simon 1956; Simon 1957). Simon called this condition "bounded rationality;" a concept that has had wide application outside of its originally intended domain. Simon's subsequent work with James March (March and Simon 1958) and March's own work (March 1978) sought to further situate rationality in administrative systems. This work opened research to the influence that context—planned, unintentional, cultural, and otherwise—plays in decision making processes (Feldman and Pentland 2003; Meyer and Rowan 1977; Vaughan 1990).

In the 1970s, *judgmental heuristics* were recognized as an important uncertainty reduction strategy for individuals solving complex problems (Alhakami and Slovic 1994; Heap 1992; Kahneman, Slovic and Tversky 1982; Kahneman and Tversky 1979; Tversky and Kahneman 1973; Tversky and Kahneman 1974). Judgmental heuristics function as "rules of thumb," pragmatic shortcuts based on experience and selective recollection. Cognitive psychologists find that when confronted with complex tasks, such as assessing probabilities, estimating numeric outcomes, and gauging risk through, for example, costs-to-benefit ratios,

people rely on judgmental heuristics including *representativeness*, the degree to which a situational probability resembles an already known quantity; *availability*, the frequency of a class of experiences given the ease by which they are brought to mind; *loss aversion*, the tendency of decision makers to weigh more heavily the potential damage of losses given an exactly equivalent potential gain; and *anchoring*, when problem solving begins with an initial value or estimate that reflects values suggested from previous experience or that emerge via partial computation. Judgmental heuristics such as these are used to simplify and thus enable complex and timely decisions.

While they are "highly economical and unusually effective," according to laboratory research, judgmental heuristics can lead to "systematic and predictable errors in estimation" (Kahneman, Slovic and Tversky 1982; Kahneman and Tversky 1973; Kahneman and Tversky 2000; Tversky and Kahneman 1974). This deficiency has been the primary focus of cognitive psychologists exploring the use of judgmental heuristics (Funder 1987; Gigerenzer and Brighton 2009; Taylor-Gooby and Zinn 2006) as well as for economists in the developing field of behavioral economics (Barber, Heath and Odean 2003).

Recently researchers have argued that rather than biasing cognition because they violate abstract rules of logic, judgmental heuristics can improve accuracy when individuals are confronted with computationally "intractable problems"[4] (Gigerenzer and Brighton 2009; Hutchinson and Gigerenzer 2006). They speculate that heuristics play a role as "social tools" through which individuals search, assess, and select when seeking to "solve different types of real ecological problems" (Marsh 2002: 50; Gigerenzer 2008).

Our study does not contradict the insights of cognitive psychologists who assume methodological individualism (Gigerenzer and Brighton 2009; Kahneman, Slovic and Tversky

1982). Rather we modify their view of cognition by situating it in an institutional context. We found that individuals do use cognitive shortcuts but that these reflect intersubjectively shared models—social heuristics—that strongly influence economic decisions and outcomes. As Kahneman and Tversky (2000) note, individuals attempt to be cognitively consistent when making choices. In line with our findings and with scholarship on social conventions, economic actors also attempt to be *socially* consistent; they seek to make choices that align with collectively held presumptions about how their market operates and what constitutes a socially rational, understandable and defensible decision (Biggart and Beamish 2003; Boltanski and Thévenot 2006; Thévenot 1994; Thévenot 1998).

Finally, we recognize as have others the importance of micro interactional "schemas and scripts" in providing tacit guidance in choices and interactional patterns (Garfinkel 1967; Goffman 1959). We also recognize that taken for granted macro-institutional arrangements structure patterns of meaning and thus organization (DiMaggio and Powell 1983; Fligstein 2001). What we contribute is a demonstration of how the two are connected in an important and revealing way—that loosely held scripts and schemas not only help to organize economic interaction reflective of larger institutional pressures, but that they take form as explicit problem solving models through which technical information is routed and decisions made. Social heuristics are conventionalized solutions that address a routine conundrum wherein actors are judged by others for their choices and thus seek socially defensible options given their institutionalized setting.

THE CASE AND RESEARCH STRATEGY

Commercial construction is not a "spot market," the instantaneous exchange between two strangers assumed by economic theory. The individuals and firms that produce commercial

buildings in any given market are mostly known to one another as they compete and cooperate with a high level of mutual understanding (c.f., White 1981). Furthermore, commercial construction is not organized by authoritative relations or vertically integrated firms. Practitioners typically are not members of the same firm, and single firms usually do not dominate any given region or sector of the construction industry. Specialists are characteristically in quasi-market relation to one another buying, selling, sub-contracting, competing, and regulating the goods, services, and products produced and used by the industry to design, create, sell, and lease their co-produced commercial buildings.

As depicted in FIGURE 1, this market is enacted through a production network that is organized around specific shared projects where participating occupational communities coalesce; each community of practice specializes in specific aspects of each project and must, with limited oversight, coordinate their activities with other crafts, occupations, and professionals (Van Maanen and Barley 1984). Commercial construction is a form of production network that continues to reflect origins in medieval craft work where individuals are expected to carry out their part of a project and to coordinate efforts with overlapping trades and professions (Davis 1999; Eccles 1981; Eccles 1981a; Feagin and Parker 1990; Gann 2000; Krugman and Furlong 1993; Riemer 1976; Stinchcombe 1959). The projects are socio-technically complex and capital intensive requiring great diversity of inputs, including technological inputs such as electrical, heating, ventilation, lighting, transport, plumbing, and a host of other subsystems; technical inputs such as design, planning, and aesthetic considerations; and multiple "outside" parties including investors and regulatory officials. Time and coordination pressures are ubiquitous and always involve tradeoffs between, for example, short- and long-term profitability.

FIGURE 1: COMMERCIAL BUILDING PRODUCTION SEQUENCE HERE

Over a four year period, 1999-2003, we conducted a field study of the economic organization of the commercial building market[5] in Sacramento, the San Francisco Bay Area, Portland, and Seattle. The fieldwork began during a boom time (1999) in an industry characterized by boom-bust cycles (Eccles 1981; Eccles 1981a; Stinchcombe 1959; Stinchcombe 1965).[6] To understand the social, cultural, and cognitive dimensions of participants in commercial construction we pursued an intensive case study, a research method centered on field study that included in-depth interviews, construction site visits, archival document collection, and media analysis (Yin 2003a; 2003b) .[7]

We first held meetings with people regionally prominent in the property development and commercial building marketplace. We also gathered names and other data from both mainstream press and industry journal sources, official policy documents and white papers, and made "cold calls" to representatives from the range of industry groups. We then asked for referrals to other possible respondents who "pursue commercial construction like you do" and also who "pursue commercial construction in a way that is not like you." In this manner, our initial purposively selected sample "snowballed" (Babbie 1998; Singleton, Straits and Straits 1993). Our rationale for this network approach was that industry insiders know better than anyone else who is and is not important, knowledgeable, and part of the production network in their market (Uzzi 1996; Uzzi 1997). The interviews were initially guided by a list of points tailored to the specific role of the informant in the commercial construction industry (Denzin and Lincoln 1998a; Denzin and Lincoln 1998b). As our research progressed, we focused our questions toward emerging patterns in informant responses.

We also made visits to construction sites and attended public forums on buildings, building codes, and energy policy,[8] and informally spoke with many more persons who develop

and design buildings, buy and sell commercial property, negotiate, create, and implement policy, and participate in other facets of the commercial construction marketplace. Informal participant observation included extensive note taking and post participation write-up.

SOCIAL HEURISTICS: CONSENSUS, REFLEXIVITY, REPRODUCTION

Commercial construction practitioners rely on at least three different kinds of social heuristics to aid them in economic decision making. These heuristics not only give guidance to dispersed actors, they promote market order by linking individual actor choices to collective standards. The consensus heuristic helps to resolve ambiguity about "What are we trying to accomplish in this market?" and speaks to the current market logic. The reflexivity heuristic embodies widely accepted performance standards and attends to concerns of "How do I know if I'm acting appropriately in this market?" The reproduction heuristics addresses actors' anxiety about how to succeed in the market over the longer term. It guides behavior in repeated transactions and establishes standards expected to support reputable careers. Each heuristic gives individual actors answers to questions of uncertainty and provides a level of social and technical consistency in the production network.

TABLE 1: SOCIAL HEURISTICS, MARKET ORDER, AND INNOVATION HERE

Practitioners routinely identified market factors such as cost, profits, and technological performance as the bases for their decision making, consistent with the vocabulary of motive of capitalist markets (Mills 1940). We found that market concepts were regularly filtered through social heuristics and in substance often deviated appreciably from the terms as defined in economic theory. Actors used economic language in ways that reflected the market logics of the industry at the historic moment in which they acted, and they framed calculations of best costs, profits, and performance through community standards and not through abstract economic

principles (Beamish and Biggart 2009) . They used the language of economics, but did not always conform to the behavior assumed by economic theory.

Consensus Heuristic: Buildings Are Conservative Investments

Modern buildings, even relatively unadorned offices, are technologically complex products that are unique both in their technical and producer composition; the design is usually customized, and members of the production networks that are created to fund, construct, approve, and lease a given building are likely to have only limited experience with one another and may not participate together again, although subsets of participants will likely recombine for future building projects (Eccles 1981a).

It is a marvel of coordination to produce a commercial office building once, but for an industry to do so routinely depend on widely shared understandings of what a contemporary commercial building means, both as a material object and as an economic product. Over the last 150 years technological and social changes have shifted the meaning of buildings from material utilitarian objects built by owners to house workers, to speculative ventures underwritten by local and regional elites, to hedge investments often owned by pension fund participants unaware of the nature of their investments. Each of these organizing logics supports a distinctive financing and production arrangement (Beamish and Biggart 2009).

Today the dominant industry logic defines commercial buildings primarily as a vehicle for investors seeking long-term predictable income from leases, often as a hedge against other more volatile assets in a portfolio. By the mid-1990s, pension funds, banking conduits or trusts, mutual funds, and real estate investment trusts (REITS) had become the largest source of investment capital in commercial building development. Collectively they financialized the real estate sector and transformed the reigning market order.[9] Partly as an outgrowth, today's

consensus heuristic frames buildings as conservative investments, and guides practitioners to make decisions that will produce nondescript buildings that will return a stable income for 20-30 years by leasing space to a series of tenants. All other considerations, including esthetics, energy efficiency, and tenant desires is subordinated to this current consensus heuristic.

The power of the consensus heuristic to shape a decision is reflected in what we came to refer to as the "default design." The default design reflects shared standards regarding what is and is not a "good" commercial building and simplifies what would otherwise be a bewildering array of potential choices and tradeoffs. By loosely sharing an ideal-typical vision of "best practice and product," practitioners are better able to compare, contrast, and make judgments when planning and constructing real buildings. In this, the primacy of a commercial building as a predictable investment is never questioned and creates a collective basis for rejecting innovations and deviations.

In the regions we studied, a default design for a commercial office building typically was two to three stories, had 50,000 - 65,000 gross square feet, was rectangular with an elongated floor plate and had windowed, premium offices around the outside edges. The interior spaces were open for office cubicles. Parking was located adjacent to the structure. These and still other, more specific expectations—dependant on where in the production process an actor contributed to a building project—were reflected in the presumptions and choices exercised by principal decision makers. For example, a developer reflected on the "standard form":

> *In today's market you [want] about 40 feet from your outside windows to the first [interior weight bearing] columns. It seems to work [for the] spacing of an office grid, whether it's a hard wall [interior] office or a systems office environment [i.e., cubicles]. Believe it or not, it's kind of standardized. Office buildings may all take different*

[external] looks ultimately, but the cores and interiors are pretty much modeled after what works for putting in furniture [and] how many people can you put in...

While such preferences were often attributed to "the market" or "what the market demands" these explanations do not correspond with the character of commercial construction today. This is a production-dominated market where investment and construction interests drive priorities. Much like movie making—another project-driven market with many similarities to commercial construction (Baker and Faulkner 1991; DeFillippi and Arthur 1998; Jones and DeFillippi 1996; Kawin 1992)—demand is less a direct result of consumer preferences, outside of fulfilling basic requirements *i.e., adequate functionality rather than optimal,* and more a reflection of working production models that have proven mostly successful over time. Similar to the re-runs, spin offs, and sequels that characterize movie and television production (Brown 1971; Gitlin 1983; Tuchman 1976) producers in commercial construction employ both explicit development models as well as less formal social heuristics to assess what will return an acceptable profit.[10]

Informants made repeated explicit and implicit references to the very restricted options available to them based on the shared expectations of this market. According to a developer the options are routine enough that he can produce in a page or two a project concept proposal when seeking a multi-million dollar investment:

[Initially] we may not have a design at that point at all; it may still just be a one-page concept of a project that says, "This is what we're trying to build; here are rough order of magnitude costs; here's what rent someone could pay." And, from that amount [of information], an investor can gauge whether they're interested or not. The investor may say, "No, the way you've got it structured, I'm not protected." So we will tweak our

model a bit and we're going to go through [another] iteration a few times until it works. And then we go off and start spending larger dollars to go through the actual design efforts and get to the next levels.

That incredibly complex and inherently risky construction projects can be captured and initiated in a one page proposal is indicative of how much of the conceptualization process is institutionalized; the form is captured in a default concept that structures much of the design, content, and costs. Informants emphasized that relying on the consensus heuristic predicts success while deviating increased risk; a finding similar to those studying another production network, movie making, also found with movie genres and success (Hsu 2006). The developer quoted above added that planning an unconventional building is virtually unthinkable:

It's a huge burden, because it's not in line with history. It creates a huge challenge to us because of it being non-traditional; it costs more than conventional real estate projects would. And, with the added costs, everyone from investors to lenders goes, "Well, what if your idea doesn't work and [your tenants] walk out on you in a year or two, three years, how am I going to get my money out? How are you going to get a return?" Because they're all economically tied to, not a one-year return, but five- or ten- or twenty-year return…investors or the lenders are all terrified of anything different

The charrette method is one way future buildings are conceptualized and formal design plans drawn up.[11] Early in a project, important decisions concerning designs, materials, mechanical systems, and even participants are made by upstream participants such as developers, design architects, contractors and investors. Shared expectations concerning "what works" allow co-participants to truncate discussions and decisions and hence streamline their interactions,

while innovation undermines the fluidity that a default design, as an expression of the consensus heuristic, promotes.

For example, the charrette design process never begins from scratch. The practical constraints of time-to-market alone produce strong pressures to stick with what is already known, despite the potential cost, profit, and performance improvements an innovation could provide. Even commonplace office and industrial buildings typically take eighteen to thirty-six months to build, involve millions of dollars of investor money, and require completion for investors to realize a profit (or tax relief). Chancing one's reputation by not meeting a construction deadline or having cost overruns is a real concern.

Even buildings ostensibly designed from the "ground up" begin the design process very far along. A design architect explained the charrette process this way, using a car analogy to stress the commonplace trade-offs that characterize the default design we observed in his other projects:

> *We typically start off [by] determining those specific things [in a building] the client needs and wants in what we call a charrette process. We sit in a room, the decision-makers, and we'll just start asking questions: "So, what's your vision?"… Do you want four wheels on that truck? You know, do you want brakes on it? Okay, what kind of brakes? Well, do you want brakes that pulse or do you want brakes that stop? Do you need four-wheel drive? … We use our experience to ask questions to have them give us answers…We'll design for four, five, ten hours … The next day for four hours in the morning [and] review all the designs … So after three days, sometimes we can have a building totally designed with their agreement.*

Another development strategy is the "cookie cutter" building where development plans are almost entirely pre-drafted and where design-through-construction is even more scripted than the charrette decision process. In both cases commercial building designs reflect expectations guided by the conservative investment heuristic.

Industry Standards and Local Markets

Regulatory requirements as well as industry sponsored quality measures are also important limits to innovation. Some of these, like building safety codes and environmental standards, are regulated by the state and thus afford little or no latitude for novelty in some areas.[12]

Industry quality standards allow interpretive flexibility, however. For example, the Building Owners and Managers Association (BOMA) is a national association that defines classes of buildings by their "quality." BOMA classes are used across the U.S. to grade commercial buildings and reflect three generic building types—A, B, and C. These distinguish prestigious commercial space (class A) from that which is merely serviceable (class B), to that which rents at rates well below average for an area (class C) (see BOMA 2004). Building classes are intended to objectively reflect building quality in design, materials, and amenities.

However, while BOMA standards are a formal means for comparison, how standards are interpreted and applied reflects both general understanding and local conventions. That is, according to the real estate brokers and developers we spoke with, the formal aspects of building classes reflect regional markets

> *Technically, it should be all the same if you use BOMA's standards… Class A, generally, is steel frame, glass, your typical modern mid- or high-rise building, whether it's suburban, downtown or central business district. Class B building might be concrete tilt-up, at least as those terms are used here [in Sacramento]. Those terms may not fit BOMA's standard.*

[Locally] Class B building will be, say, a one or two story concrete tilt-up, may even be a three story …with the same sort of tenant finish as a Class A building [elsewhere]; it's just that the structure itself is not quite as capable or as expensive [as BOMA standards contend they should be]. Class C is generally going to be wood and stucco or a really debilitated Class B…You know, it's old and in need of maintenance.

The consensus heuristic as expressed in regions we studied reflects a composite of both generic BOMA national standards but also local conventions. Reliance on a shared default conception of "what works in a building," and what does not, is a reason so many of our informants stressed that they stay away from custom, unique or innovative designs and technologies. Novelties violate default design assumptions associated with past successes. As the informant we quoted made clear, "*being out of line with history is a huge burden*" for practitioners in this industry. Green buildings with novel technologies and designs are largely outside the consensus heuristic in commercial building, although as we describe in the conclusion, not in all building sectors.

Reflexive Heuristic: Assessing and Selecting by Adding Value

The consensus heuristic incorporates the current market logic and defines commercial buildings primarily as conservative financial instruments**.** At the actor level and in a general sense, practitioners feel pressure to produce buildings that are long term, stable investments. Reflexive heuristics give actors guidance as to *how* to make the many choices that will produce buildings that best reflect the conservative investment consensus. The choices do not consider beyond a minimum the actual users of the buildings, but consonant with the consensus social heuristic, the expectations of investors.

Again, the buyers and sellers of commercial buildings typically reside on the production side of this market and both benefit from renting, leasing, or selling the properties. Actual users of buildings—lessees—are rarely present when decisions are made and typically treated as analytic abstractions in the planning and construction process. Indeed, the producer-user breakdown is misleading in this market context. Other than providing adequate user amenities—something the occupants of commercial buildings complain about and that if improved could greatly improve worker productivity (Heerwagen 2000; Heerwagen et al. 1995; Leather et al. 1998)—project principals typically view enhancing the performance of a given building as an increase in costs and a decrease in anticipated profit margins, margins they have worked up well in advance of construction as a "target profit." As a Real Estate Broker put it:

> *The main reason for building the project in the first instance is profitability. So you could build a really fabulous building and spend all kinds of money on esthetics … [but] it's difficult to get people to pay more money for a really great building versus an okay building. So, that's one reason that in so many instances you see developers build okay buildings that are highly functional as opposed to the really top end product because the rental increment that you can achieve by going from okay to really amazing in terms of esthetics is generally not enough to pay for the increase in spending. In most cases, the kind of building that you're developing has to be a functional building without a lot of accouterments because you're not going to get substantially more rent if you build a much [more elaborate] building.*

Using "adequate function" for tenants as a cost control strategy does not resolve choice dilemmas: this ideal must be translated into a material end in myriad small decisions. Practitioners seek to, in their words, "add value" to projects that are collectively understood as

financially prudent given prevailing expectations of the local market and the industry in general (e.g., application of BOMA standards).

The centrality of "adding value" as a social heuristic in commercial construction cannot be overstated; it is a universally shared frame of reference that aids participants in assessing "how buildings should be built." A banker, a property developer, a real estate broker, and a construction manager each made reference to this heuristic. A bank loan officer summed up adding value in the commercial building industry simply as, *"the way the developer makes his bucks is that the cost of the building is less than the value of the building [when sold]*." Likewise, a development manager claimed that the *"[Head office] doesn't care if it's Seattle, Sacramento, or the Bay Area; what they care about is where are we going to get the best yield to add the most value to our building projects."* For his part, a real estate broker explained the goal of development and his role this way, "*Our goal in marketing the property is to try to capture as much future upside in the sale price as possible; we don't want to just get paid for what it's worth today because, clearly, where we as a broker add value in the [building] process is to be able to sell to a buyer that there's going to be X% of growth on this property over the next five or ten years."* An independent property developer shared his business strategy saying, *"So, as much as you can, you do your homework and make sure [your plan] works… And you try and get real efficient in your structure and architecture and you put the add-ons, you know, in strategic locations that bring in the value."*

Adding Value: Function and Flexibility

Nested within the adding value frame, an industry-specific reflexive social heuristic, are rules-of-thumb that practitioners routinely use to select among many possible options. The first, *function*, requires that any given project input demonstrate a necessary purpose, in which "purpose" reflects both how short term profit will be realized while adequately fulfilling building performance expectations. The second, *flexibility*, emphasizes the linkage of short-term interests, as noted above with function, with longer term concerns over the construction of buildings that are amenable to multiple uses and tenants over time. Together, function and flexibility are used to ground judgments that must be made during the planning and design phase but also in construction decisions. Function and flexibility, widely shared reflexive heuristics, channel practitioner decision making towards similar and conservative conceptualizations of the material manifestation of buildings. They are market idioms that make financial preferences and motives actionable and keep focus on "what counts." "Adding value" through the application of "function" and "flexibility" highlights the important bridging role that social heuristics serve in linking abstract market motives and assessments—adding value—with actual material practices—selections that lead to real buildings and future profits that meet market expectations.

Function

Even with a default design, commercial buildings require extensive pre-construction conceptualization, planning, and participant vetting. Project principals including developers, short term investors, and long term investors, target their return on investment by calculating in advance both the probable costs and probable profits before making financial commitments and initiating construction. Once determined, cost and profit targets become reified objects and reflect benchmarks given local market practices, project type and location, and developer stake.

A consequence of establishing profit expectations at a project's beginning is that cost reduction then becomes central in making decisions, not profit or performance maximization (Mohamed 2006). This sharply contrasts with the assumption of rationally maximizing costs and benefits operationalized through "demand side" policies meant to promote innovation (Blumstein, Goldstone and Lutzenhiser 2000; Lutzenhiser 1993). By assuming actors seek optimal returns, policymakers and economists have ignored both how and why industry practitioners figure costs as they do and thus why innovations have been slow to diffuse, even with incentive programs promoting efficiency improvements.

Practitioners operationalize function with an eye for controlling "unnecessary" expenditures so that they achieve anticipated profits in the short term, profits they regard as already accounted for. Function focuses attention on immediate and "attributable purpose," an ability to describe and justify what a particular item adds to a project (i.e., its added value) given that all additions subtract from targeted profits. Function, then, is a critical computation that supplies a basis for many decisions regarding both building form and content. For example, a property developer expressed his adherence to a utilitarian model, where adding value reflects a stripped down set of basic defaults he reflexively uses to contrast his choices against excess such as the ego he associates with architectural flair.

> *We have a… sort of a model that we use internally… One of the biggest … [is] architects [who] want to build monuments to themselves. They want something so when you drive by on the outside you say "Isn't that beautiful." But from the inside, they've screwed things up; [they don't] lay things out efficiently. And so that's the architect driving the process or the ego of a developer driving the process. We're sort of utilitarian on the other end; we look at it and we say no, no. I don't give a damn what it looks like on the*

outside right now. Let's make sure on the inside that all of these grids and everything [work] and put your money into the common areas…Once you do that, then you can start to work on the outside… If we win an architectural award, I'm going to get a call from Ned, "Damn it, why did you waste that money!" That's not where you make money.

Likewise, this broker describes the role that functional attributions play in how he calculates the profitability of a project:

Because there are two ways that one makes money in real estate, [one] is to increase income or decrease [building] cost. So if something, let me put it this way, if something saves money and doesn't make a building less functional, if it's either neutral [in] functionality or it makes the property more functional and it saves money, it's probably going to get implemented because it would be silly not to.

Finally, a financier commented on the nature of value in the industry noting that, "tenant improvements" must be justified as contributing a function or they merely add costs and reduce target profits:

The standard for an office out in Folsom right now is about $25 per square foot for tenant improvements, and (if) the borrower is telling us they're going to put $45 worth of tenant improvements into [the building they are constructing], we're not going to pay for that; we'll only lend up to $25 or "X" percentage of that. Then we'll want to know, What's the purpose? Why are they doing it if they're going to make the building functionally obsolete? What use is it to us at that point [as an investment]? Because we do look at if we have to take that property over, how are we going to run it and what type of tenants can we get into it [given what they are proposing]?

Function is a widely shared reflexive heuristic that developers, financiers, designers, and contractors employ to judge their own and the decisions and actions of others when seeking to add investment value to a project. Indeed, if an item or design does not fit *a priori* industry conceptions of function it will tend to be approached skeptically as "unnecessary junk."

Flexibility.

Similar to use of the term "function," the industry term "flexibility" is another heuristic through which practitioners interpret options in order to add investment value to a given project. Flexibility reflects the consensus heuristic of commercial buildings as financial instruments that must remain viable investments for twenty or more years. The focus on long term viability even impacts those seeking a short term stake in building projects, such as developers seeking to be "bought out" by longer term investors because, *"You know, the construction (loan) money is (initially) short-term money, so [we] want to know… is a permanent [long term] lender going to come in and (buy) us out?*." Materially, this translates into an emphasis on a commercial structure's flexibility meaning that buildings must appeal to the widest number of both current and potential future users. By choosing designs and technologies that are interpreted as flexible, uncertainty over future returns on investment is reduced. Because commercial buildings are expected to achieve returns over decades through rents, appreciation, tax depreciation, and eventual sale, and not in a spot market transaction, producing non-specialized buildings reassures investors their money is protected. A developer spoke of flexibility in this way:

> *A lot of times you'll have a…tenant [who] wants to drive the process, "I want my building to look like X, Y, and Z." And then ten years later…your tenant moves out and you look at it and say, "Oh my God, how are we going to re-tenant this?"… There's a lot in the design of a building that allows you to be flexible … We are only going to buy or*

build buildings that are flexible…because the only thing we know is that whatever tenants need today will change in five years.

In a word, flexibility works as a design and construction hedge against future uncertainties. Planning flexibility into a building—for instance choosing an open floor plan, keeping internal systems uncomplicated, and staying away from customized designs—expands the perceived overall investment potential. As a loan officer put it,

"*If you want to build a two-three story office building in a submarket that has a lot of demand and your project is flexible in terms of being able to accommodate a lot of different types of users … [we'll want to know] what kind of product is it and is it worth it? Okay, how flexible can it be in the event things don't go exactly the way you'd expect them to go?*

An ironic result of the emphasis on minimally functional, non-specialized flexible buildings are extremely narrowly conceived projects rather than state of the art building designs and technologies that could improve overall building performance. A leading San Francisco architect who specializes in innovative green design shared his experiences in trying to develop green buildings, using his encounter with a corporate client and commercial developer to typify the market's decision making heuristics.

A very large local corporation was negotiating with a developer for a new building. They wanted to do it by long-term lease: the developer would build the building for them; they would occupy it and pay the developer the lease cost. The client stipulated they wanted a green architect [and building]. The developer said sure. [I proposed] … a lot of the standard energy efficiency things: through-the-floor ventilation, sustainable woods, energy efficient … day lighting, high-efficiency [window] glazing… shading devices on

the outside, all that kind of thing. At one point in these meetings the developer's looking at this and he's realizing that this stuff is not flexible. These things are in the building; they're part of the guts of the building. [He said], "Whoa, wait, wait, wait, wait… You can do anything you guys want….the major stipulation of this is that once you guys are out of the building I have to be able to rip all of this stuff out and put it on the market." And everybody's jaw drops. [We asked] "Don't you see any value in this [green technology]?" He said "No. I lease class A buildings. This is not a class A building. This is a class A building with a lot of junk on it and this junk is going to make my building less marketable because I cannot create a commodity out of it!" The situation is that he [saw] absolutely no value in building performance [or] for occupant comfort, both of which would have a lot of value to his users; the people who are leasing the building.

New designs and technologies that promise to maximize performance and profit margins are presumed to add little value and more complication, and are passed over in favor of those that simply satisfy known cost, profit, and performance parameters. Indeed, in line with Hargadon and Douglas' (2001) findings, when innovations are embraced it is typically because they fit already institutionalized conceptualizations. For example, a real estate services executive spoke of recent innovations that had a high likelihood of diffusion in many commercial office building projects. He held that the new design, a sub-floor configuration different from most conventional U.S. building stock but common in Europe (Ouroussoff 2007), would succeed precisely because it fulfilled industry expectations such as increasing the flexibility of investment buildings even though raised flooring promised to increase the initial costs of construction:

What kind of innovation are we seeing in commercial office buildings? ... Probably the most dramatic one is this idea of raised floors. You know, it used to be just reserved to

computer rooms and things of that nature, but now [it's on the rise]... you can bring your ducting, you can bring your cable… [under the floor]. Adds more costs; certainly [it's] more expensive, but a great value for flexibility to the future tenant.

In the eyes of developers, builders, designers, and investors sticking with a default design adds value to their building's investment potential because it is predictably generic. The use of function and flexibility as reflexive heuristics facilitated actor judgments concerning what would and would not add value in their own projects, to judge the decisions of others, as well as to assess the value of already constructed buildings.

The Reproduction Heuristic: Reputation in Search, Assessment, and Selection

Economic and sociological studies of networks, organizations, and markets have long examined the critical role that reputation plays across these contexts (Ahuja 2000; Burt 2000; Podolny 1994; Raub and Weesie 1990; Uzzi 1997). We observed for individual actors reputational effects similar to those Podolny (Podolny 1993) observed when examining the role of reputation for firms: uncertainty in the market promotes heavy reliance on already known, reliable, and similar others within a network (Elsbach and Kramer 2003). We also observed the interpretive role reputation plays when it serves as a proxy for information and actor reliability in lieu of comprehensive search and assessment of information when making choices.

Because of the intractability of many problems in commercial construction based on the dispersed and time-pressured nature of the market for buildings, practitioners must as a matter of practice resolve social and technical uncertainties endemic to both projects and their own participation: *Who can be relied on? How can good information be distinguished from bad? How can the benefits of market participation be assured now and into an uncertain future?* Reputation as proxy is routinely used to judge potential project participants, but is also used to gauge the

merit of a proposal, and the believability of information such as appraisals and the quality of building plans. Like the other social heuristics, reputation facilitates choice by channeling preferences towards trusted others and industry conventions. Reputational heuristics are an individually and socially defensible shortcut for searching and assessing not only participants but also planning, financing, design and sub-contracting decisions.

Actors are aware that their performance and the ideas they bring to a project will follow them and play a part in their future – which opportunities open and close in the industry. A design architect put the importance of his reputation this way, "Basically in this business you've got to do good work all the time because… it's like the old rotten apple syndrome—one bad job really could cause you a lot of trouble.

For example, whether and how projects are funded often depend on a lender's knowledge of a person's reputation as much as it does on the project concept or formal market assessments outlining a project's market feasibility. While *"lots of numbers [that] look very impressive and on the surface suggest that they are better indicators of value"* there are many market intangibles that reputable insiders interpret because the *"marketplace isn't that precise."* The vice president of an international lender in Sacramento discussed an example. A client had come to him for project financing, but he neither knew her nor had he heard of her by reputation. This was an impediment to his deal making as it complicated his search and assessment of her investment potential:

> *A lady called in today wanted to know if we'd finance a building for her. I've never met her, she's from out of town, I've never heard of her, I've seen the building, it could… it's a decent building, but I really don't want to go through that whole process that I've just described to you only to find out she's got no financial wherewithal.*

In another instance, a loan officer from a prominent national bank claimed that if the bank does not know someone personally, doesn't have "*a big comfort level*," or at least know of their reputation, more money was expected up front, making a project markedly harder to finance and construct. Conversely when lenders do know someone the rigor of formal appraisals and evaluation were truncated, if not skipped altogether. Selection is a foregone conclusion.

> *We've been doing this [in this market] for so long that we typically know who's coming into the deal and who they are. And if [we don't]…we need to get a big comfort level with [them]. In fact, in a deal we were just looking at, we didn't know them that well and we made the borrower [provide] an additional reserve of cash to compensate… because if we don't know them—and we know most of them around here who are really reputable—but if we don't know them, we'll call [others in the firm to check them out] and they'll go, "Hey, no way." If they know we [already have someone on file] then they'll pretend [she checks out]. They'll still… need resumes on her, we need to see what she's done, we [still] need that sort of thing.*

As a social heuristic, reputation reflected three criteria: technical, moral, and personal standards. As a technical criterion, reputation reflects assessments of professional skill necessary to add value to a project. Moral criteria speak to issues of reliability and trustworthiness and reinforce homophily because they truncate search and thus assure greater predictability and accountability in performance. Personal qualities, while harder to define, reflect credit accrued for reputation and network orthodoxy, a track record of sticking with convention.

Successful project development may involve some level of modest innovation based on how well the developer, designer, or investor plays the part of *bricoleur* (Levi-Strauss 1966; Weick 1993). To be successful practitioners must rely on their experience and negotiate both

network relations and performance expectations in a manner that is modestly distinctive so as to distinguish their projects and enhance their reputations. Paradoxically they must do so in ways that conform to established expectations. Again, "distinctiveness" must in some measure reflect what is already known and embraced to successfully diffuse (Hargadon and Douglas 2001).

While the reputational heuristic incorporates conceptually separate dimensions, in practice the dimensions are conflated. For example, a financier expressed the conjoined nature of moral and technical criteria when he enumerated what counts when he chooses subcontractors:

> *Where [you're] building, what you're building, [and] who the players that you've identified as being involved in the project, other than yourself: Who is the contractor and what's their reputation? Who is the architect and what's their reputation? … When we go forward with the relationship, it's like any other relationship… When you get down to it, it's still people doing business, you know? And business relationships are a lot like personal relationships… And some property owners, people are people and their personality traits are going to come through in their work: some people pay a lot of attention to what they do, and a lot of people pay no attention to what they do; some people are very detail-oriented and other people could really care less. The people I try to enter into a business relationship with are those people who I perceive as being conscientious.*

Practitioners who are favorably evaluated accrue reputations that they assiduously protect so as to promote their future prospects. A property developer and banker articulated the mix of criteria that drive the search and assessment of persons and thus their selection for projects:

> *I guess what I'm saying is at the end of the day the proposal's not going to win [gain financing]. It's going to be the individuals and their reputations and their track record.*

Proposals and comps and information are good, but, you know when it comes down to it, it's just like anything else… they want to call in whoever the closer is.

Those who build favorable moral, technical, and personal reputations in their networks are repeatedly brought back to initiate and confer on pending and future deals: investment or participation in design, construction, and sale. Over time, positive evaluations gain their own inertia as they accumulate, promoting repeated exchange that in turn increases trust, which in turn signals reliable future performance (Axelrod 1984). All things being equal, then, a favorable reputation begets yet more favorable reputational assessments (Perrow 1961). This generates a feedback loop that reproduces the production network that founds the industry and with it the status quo (Freidson 1986; c.f., Uzzi 1989; Uzzi 1996; Uzzi 1997).

Our informants cited repeatedly working for the same customers, partnering with the same firms and individuals, going to the same sources for investment money, and contracting with the same practitioners. Reliance on reputation in search processes works to order and reproduce predictable market relations where accountability and trustworthiness are prized even if they cost more. In this regard, reputation helps to assure success over the short and as important longer term.

Like I said, the last thing you want to do is have a bust in the deal and then have to go back to your client and say, "We need more money" because you lose respect and they lose confidence in you. So, through the years… you will establish relationships… The thing is, you're always going to want to work with guys that you've worked with in the past that have always treated you right. You know, I have one general contractor in particular that I use here in town because he's done 95% of my work and I trust him; I trust him with my kids… [By contrast] This particular subcontractor isn't asked to bid

this job because you used him before and you didn't like his work and the guy was a pain in the ass… you just can't afford screw-ups like that in this business.

Whether it was clients, partners, or subcontractors, our informants relied on those with whom they were familiar, or who could be assessed by those with whom they were familiar, even when it increased costs or lowered performance. Inundated with intractable problems that require technical, moral, and personal evaluation, the reputational heuristic provides a socially vetted short cut that provides relatively predictable and socially accountable choices. Without a good reputation loans are not forthcoming or have less-favorable terms, jobs are harder to come by, and opinions and suggestions are scrutinized introducing more uncertainty to already complex and uncertain projects.

We observed that reputational social heuristics work to radically reduce uncertainty associated with inter-personal, inter-professional, and inter-firm interactions and decisions characteristic of commercial constructions production network (c.f., Fligstein 2001; Hannan and Freeman 1984; Podolny and Page 1998; Powell 1990; Powell 1998; Powell et al. 2005; Smith-Doerr and Powell 2005; Zucker 1987). In Williamson's (1975) terms, the reputation heuristic both reduces the transaction costs associated with exchange while also reducing opportunism as actors' project and seek to secure their future success based on reputations made in the present. Repeatedly returning to the same network reproduces the standards and conventions of the market.

While reliance on what we term a reputational heuristic has been criticized in the literature for promoting exclusion and inequality—an "old boy's network" (Acker 1990; Chetkovich 1997; Kanter 1977a; Kanter 1977b)—our research suggests structural reasons why production networks typically resist transformation: they promote interactional predictably,

accountability, and uncertainty reduction (Gomez and Jones 2000; Storper and Salais 1997; Thévenot 1994) and thus lower both the cognitive and social costs of decision making.

DISCUSSION

In researching failed innovation in the commercial building industry, we uncovered the role that shared decision making models, what we have termed social heuristics, play on the one hand, in helping economic actors address psychological, economic, and social uncertainty while, on the other hand, dampening the probability of innovation diffusion. In addition to fulfilling the conventional conceptualization of cognitive heuristics as mental short cuts, we found social heuristics serve as *a priori* guides that intersubjectively align and coordinate a dispersed network of economic actors in commercial construction who must achieve extremely high levels of social, technical, and economic competence. In this high-stakes and networked context where decision makers frequently confront intractable problems, we found that social heuristics offer *ex post* socially defensible justifications for actions planned and already taken. Finally, the interactional stability social heuristics help generate came at the cost of social flexibility and technical change; networked practitioners resisted novelty in exchange for consistency, predictability, and social accountability.

These findings contribute to a number of emerging and established literatures including recent work on conventions in economic decision making (Biggart and Beamish 2003; Boltanski and Thévenot 2006; Thévenot 1994), the dynamics of production networks (Podolny and Page 1998; Smith-Doerr and Powell 2005), and temporary organizations and project organized markets (Baker and Faulkner 1991; Faulkner and Anderson 1987; Zuckerman 2006; Zuckerman et al. 2003). First, our findings add an important dimension to our understanding of economic routines, practices, and conventions. Construction practitioners utilized limited information

heavily filtered by socially-vetted rules of thumb to make time-sensitive and highly technical decisions that were deemed economically warranted and defensible. Social heuristics, then, reflect *a priori* and *ex post facto* consensus regarding the prevailing market logic and meaning of buildings that animates, focuses, and limits practitioner information search in building projects; *reflexive* standards based on market idioms that align assessment and selection of options because they provide specific guidance in choosing among available "right," "best," and "most effective" solutions; and a *reproduction* heuristic that lends the industry's production network the requisite levels of social accountability where direct observation is limited and liabilities pose potentially catastrophic consequences to both projects and personal careers.

These findings also overlap with and extend important and emerging findings concerning network forms of governance, temporary organizations, and project-organized markets. Examining production networks provides economic sociology an alternative view of economic organization to the dichotomous conceptualization of markets and hierarchies. Economic sociologists have mostly focused on inter-firm networks and, furthermore, on the capacity of such networks to foster learning, joint problem solving, innovation, and cost-reductions where change is frequent, episodic, and volatile (Smith-Doerr and Powell 2005). What remains insufficiently understood and studied are the conditions under which production networks falter and fail (Podolny and Page 1998, p. 71; Whitford and Shrank 2009). Again, we found that production network dynamics can resolve some market issues such as uncertainty, complexity, and coordination but often at the expense of other desirable ends such as flexibility and innovation diffusion.

Our findings also overlap with research on temporary organizations and project-organized markets. This research emphasizes the importance that relational understandings and

intersubjectivity have when formal lines of authority are weak but high levels of coordination are required. Coordination in these contexts reflect a number of strategies including career structures (Barley and Kunda 2004; Faulkner and Anderson 1987), role structures (Bechky 2006; Weick 1993; Weick and Roberts 1993), and reputation and typecasting (Jones 1996; Zuckerman et al. 2003). We add to these the role social heuristics play in maintaining order for practitioners in the present and into the future.

There are two further implications of our findings, the first theoretical and the second substantive. First, it is clear that social heuristics are a source of market order much as price in markets, hierarchy in firms (Williamson 1975; Williamson 1994), and role structures in networks (Uzzi 1997; Uzzi 1999; White 2002). We believe social heuristics can play a critical role in economic coordination, especially in economic settings where collective action is located in semiautonomous production networks, not formalized hierarchies, and where the product produced is custom made (c.f., Faulkner and Anderson 1987).

Second, we observed that social heuristics, as currently expressed in commercial construction, dampen the willingness of decision makers in this market to embrace novelty, innovation, and change generally. This empirical finding explains, in part, why innovative "green" technologies have been slow to be adopted and diffuse in this industry.

In commercial construction's highly networked, capital-intensive, time-pressured production setting where intractable problems are the decision making norm new persons, ideas, and technologies challenge and thus are at a serious disadvantage compared to the "tried and true" and thus typically unwelcome. While this is a simple finding, it is an important observation for two reasons. On the one hand, it contrasts with economic orthodoxy which assumes that price and its analogs profit and performance are the critical bases for decision making. We found that

social heuristics and relational networks play a pivotal role in decision making and thus innovation in the industry. Our findings also challenge the network literature's contention that the strength of production networks is rooted in their flexibility, nimbleness, and even innovativeness (Powell 1990; Powell et al. 2005; Smith-Doerr and Powell 2005; c.f., Whitford and Shrank 2009). We found that the benefits of network forms of governance can also hold significant costs.

CONCLUSION: SOCIAL HEURISTICS AS MICRO-INSTITUTIONAL THEORY

The act of deciding whether to buy, sell, invest, employ, sub-contract and spend—or not—has consequences for individuals, and in the aggregate has consequences for economies and thus societies. Economists, relying on individualistic assumptions, have developed and continue to rely on microeconomic theories of individual and firm choice, largely centered on an objectified conceptualization of price as the critical criterion by which an actor makes choices. For the most part, economists assume actors are rational but generic individuals with no social distinctions including cultural, gender, or historical specificity. Behavioral economists, importantly, are exploring the impact of psychological factors in economic choice, but their continued reliance on methodological individualism is problematic; the role of meaning and intersubjectivity continues to stand outside mainstream economic thought today.

Sociologists have long been concerned with the development of economies, too, and most theories have been rooted in macro structural and institutional frameworks in an attempt to retrospectively understand how the social structures of economies come to develop and change (Biggart and Guillen 1999; Block 1977; Dobbin 1994; Dobbin and Dowd 2000; Fligstein 1995; Fligstein 2001; Hamilton and Biggart 1988; Haveman and Rao 1997). This work is typically historically grounded, and is often concerned with the development of structures of meaning and

power (Fligstein 1999; Fligstein 2001). Moreover, very important work has been done to advance our understanding of networks and the role of network structure in promoting particular types of information and action flows (Baker 1981; Burt 1982; Granovetter 1973; Granovetter 1985; Powell 1990; White 1981; White 2002) and in promoting different types of governance systems (Podolny and Page 1998; Powell 1990; Smith-Doerr and Powell 2005). Network theorists have moved far toward a more dynamic understanding of market activity. Yet despite these important developments there have been relatively few attempts to develop a sociological theory that is empirically realistic, that allows for the role of socially knowledgeable actors, and is able to connect logically with institutional and historical theories of the economy (for an important exception see Zelizer 1979; Zelizer 1994; Zelizer 2005).

We argue here for the utility of social heuristics. Our research provides the basis for a genuinely social theory of individual economic search, assessment, and selection that is historically informed, contextually situated, and neither psychologically or structurally reductionist. As a non-reductionist concept for understanding actor choice, social heuristics offers a way of linking structural and macro-social understandings with actor-level meaning, choice, and action. The concept of social heuristics offers the possibility of injecting a non-psychological construct into our understanding of the ways in which economic actors make choices. As shared constructs, social heuristics are historically and culturally informed and therefore logically connected to extant institutional arrangements. Although we do not describe the history of the commercial construction industry here, in the past social heuristics in this industry were quite different and related to the different institutional arrangements that were in place at the time (see Beamish and Biggart 2009). Social heuristics while stable are not static.

Social heuristics are gestalts that are iteratively enacted, subject to ongoing maintenance, and may be contested and changed over time.

In an industry characterized by boom-bust business cycles, dispersed professional communities of practice, and a production network organized through projects, social heuristics are an especially important means of coordination and therefore much in evidence in our research setting. We conjecture, however, that the social heuristics of *consensus*, *reflexivity*, and *reproduction* are features of economies and economic decision making more generally although they may vary substantively in the form they take in different places and times and are more likely to be tacit in authoritatively structured, individuated, or less dynamic markets.

FIGURE 1: COMMERCIAL BUILDING PRODUCTION STREAM

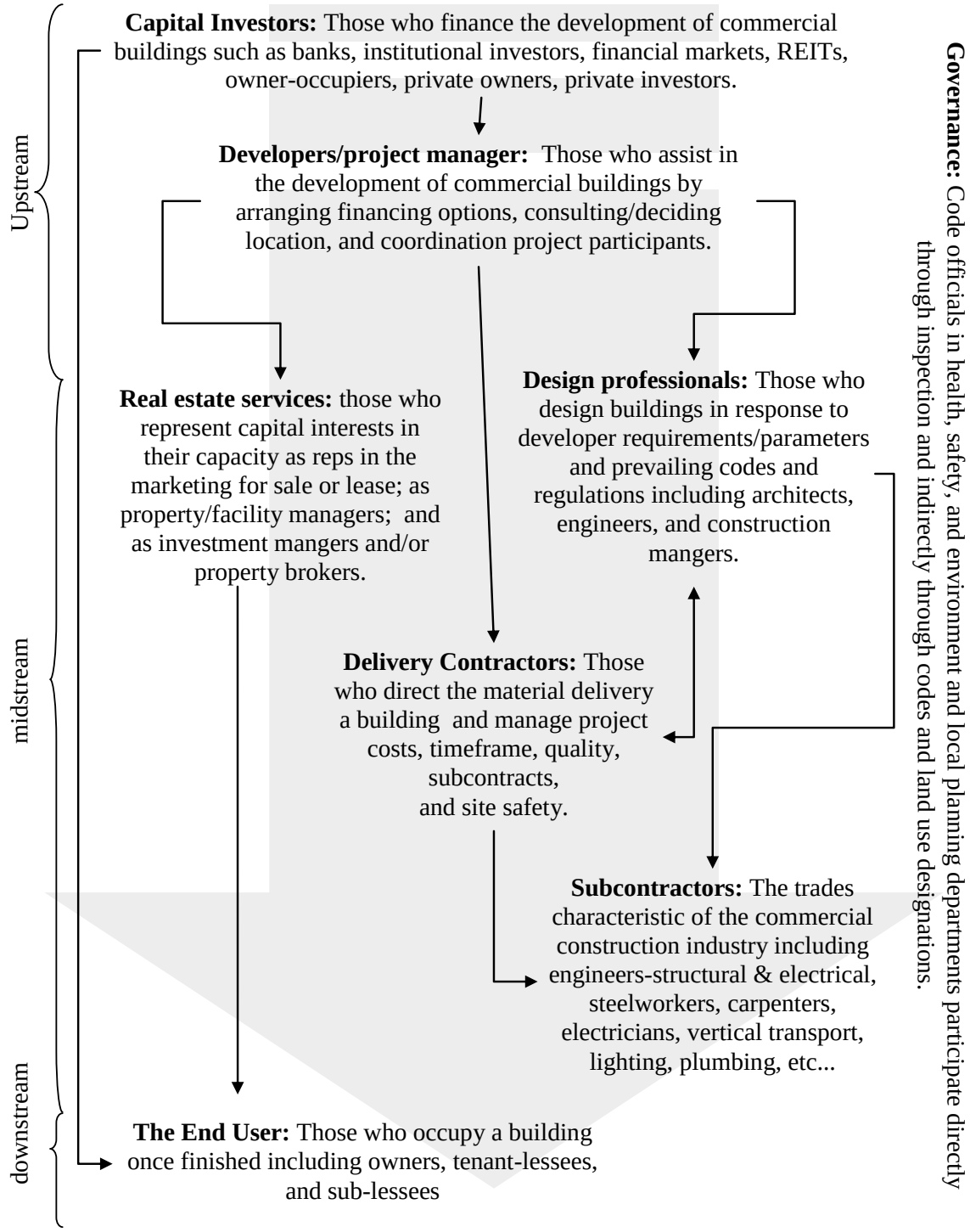

TABLE 1: SOCIAL HEURISTICS, MARKET ORDER, AND INNOVATION

Social Heuristics	Decision dynamics	Practical translation
Consensus heuristic	Limits search via consensus expectations and standards	What are we doing in this market? *We construct investment properties of a conservative kind whose purpose is to provide long-term stable income for investors.*
Reflexive heuristic	A priori decision rules provide a point of reflection and ex post facto justification	How do I know I have done the right thing in this market? *I make choices based on how they contribute to "flexible" and "functional" buildings.*
Reproduction heuristic	Provides a social proxy for search, assessment, and selection that reproduces status quo	How can I secure a successful future in this market? *I rely on socially evaluated others when assessing options and making decisions.*

REFERENCES

Acker, Joan. 1990. "Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations." *Gender and Society* 4:139-158.

Ahuja, Gautam. 2000. "Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study." *Administrative Science Quarterly* 45:425-455.

Aldrich. 1999. *Organizations Evolving*. London: Sage.

Aldrich, Howard E., and Jeffrey Pfeffer. 1976. "Environments of Organizations." *Annual Review of Sociology* 2:79-105.

Alhakami, Ali Siddiq, and Paul Slovic. 1994. "A psychological study of the inverse relationship between perceived risk and perceived benefit." *Risk Analysis* 14:1085-1096.

Arthur, W. Brian. 1989. "Competing Technologies and Lock-In by Historical Events: The Dynamics of Allocation Under Increasing Returns." *Economic Journal* 99:116-131.

Axelrod, Robert. 1984. *The Evolution of Cooperation*. New York: Basic Books.

Babbie, Earl. 1998. *The Practice of Social Research*. Belmont, CA: Wadsworth Press.

Baker, Wayne. 1981. "Markets as Networks: A Multi-method Study of Trading in a Securities Market." in *Sociology*. Evanston: Northwestern University.

Baker, Wayne, and Robert R. Faulkner. 1991. "Role as Resource in Hollywood Film Industry." *American Journal of Sociology* 97.

Barber, Brad M. , Chip Heath, and Terrance Odean. 2003. "Good Reasons Sell: Reason-Based Choice among Group and Individual Investors in the Stock Market." *Management Science* 49:1636-1652.

Barley, Stephen R., and Gideon Kunda. 2004. *Gurus, hired guns, and warm bodies : itinerant experts in a knowlege economy*. Princeton, N.J.: Princeton University Press.

Beamish, Thomas D., and Nicole Woolsey Biggart. 2009. "Business Cycles, Entrepreneurship, and Economic Crisis in the Commercial Building Market: *Toward a Mesoeconomics*." in *Markets on Trial Workshop*. Evanston, Ill: Kellogg School of Management, Northwestern University.

Bechky, Beth A. 2006. "Gaffers, Gofers, and Grips: Role-Based Coordination in Temporary Organizations." *Organization Science* 17:3-21.

Becker, Gary S., and Kevin M. Murphy. 2000. *Social economics: Market Behavior in a Social Environment*. Cambridge, MA: Belknap Press of Harvard University Press.

Beckert, Jens. 2002. *Beyond the Market: The Social Foundations of Economic Efficiency*. Princeton: Princeton University Press.

Biggart, Nicole Woolsey, and Thomas Beamish. 2003. "The Economic Sociology of Conventions: Habit, Custom, Practice and Routine in Market Order." *Annual Review of Sociology* 29:443-464.

Biggart, Nicole Woolsey, and Mauro F. Guillen. 1999. "Developing Difference: Social Organization and the Rise of the Auto Industries of South Korea, Taiwan, Spain, and Argentina." *American Sociological Review* 64:722-747.

Block, Fred. 1977. *The origins of international economic disorder : a study of United States international monetary policy from World War II to the present*. Berkeley, Calif.: University of California Press.

—. 2008. "Swimming Against the Current: the Rise of the Hidden Development State in the United States." *Politics and Society* 36:169-206.
Block, Fred, and Matt Keller. 2008. "Where Do Innovations Come From? Transformations in the U.S. National Innovation System, 1970-2006." Washington, DC.
Blumstein, Carl, Seymour Goldstone, and Loren Lutzenhiser. 2000. "A Theory-Based Approach to Market Transformation." *Energy Policy* 28:137-144.
Boltanski, Luc, and Eve Chiapello. 1999. *Le Nouvel Esprit du Capitalisme*. Paris: Gallimard.
Boltanski, Luc, and Laurent Thévenot. 2006. *On justification : economies of worth*. Princeton: Princeton University Press.
BOMA. 2004. "Building Classification." Building Owners and Managers Association International.
Brown, Les. 1971. *Television; the business behind the box*. New York: Harcourt Brace Jovanovich.
Brown, Shona L., and Kathleen M. Eisenhardt. 1997. "The Art of continuous Change: Linking Complexity Theory and Time-Placed Evolution in Relentlessly Shifting Organizations." *Administration Science Quarterly* 42:1-34.
Burt, Ronald S. 1982. *Towards a Structural Theory of Action: Network Models of Social Structure, Perceptions, and Action*. New York: Academic Press.
—. 2000. "Bandwidth and Echo: trust, information and gossip in social networks." in *Networks and Markets: Contributions from Economics and Sociology*, edited by Alexandra Casella and James E. Rauch: Russell Sage Foundation.
Chetkovich, Carol. 1997. *Real Heat: Gender and Race in the Urban Fire Service*. New Brunswick, NJ: Rutgers University Press.
Coleman, James S, E Katz, and H Menzel. 1966. *Medical Innovations: A Diffusion Study*. Cambridge, MA: Harvard University Press.
Collier, Nathan S., Courtland A. Collier, and Don A. Halperin. 2002. *Construction Funding: The Process of Real Estate Development, Appraisal, and Finance*. New York: John Wiley and Sons.
Collins, Steven W. 2004. *The race to commercialize biotechnology : molecules, markets, and the state in the United States and Japan*. London ; New York: RoutledgeCurzon.
Cowan, Robin. 1990. "Nuclear Power Reactors: A Study of Technological Lock-in." *The Journal of Economic History* 50:541-567.
David, Paul A. 1985. "Clio and the Economics of QWERTY." *The American Economic Review* 75:332-337.
—. 1994. "Why Are Institutions The Carriers of History? Path Dependance and the Evolution of Conventions, Organizations, and Institutions." *Structural Change and Economic Dynamics* 5:205-220.
David, Paul A., and S. Greenstein. 1990. "The Economics of Compatibility Standards: An Introduction to Recent Research." *Economics of Innovation and New Technology* 1:1-32.
Davis, Howard. 1999. *The Culture of Building*. New York: Oxford University Press.
DeFillippi, Robert J., and Michael B. Arthur. 1998. "Paradox in Project-Based Enterprise: The Case of Film Making." *California Management Review* 40:125-139.
Denzin, Norman K., and Yvonna S. Lincoln (Eds.). 1998a. *Collecting and Interpreting Qualitative Materials*. Thousand Oaks: Sage Press.
— (Eds.). 1998b. *Strategies of Qualitative Inquiry*. Thousand Oaks: Sage Press.

Derrida, Jacques. 2007. "Structure, Sign, and Play in the Discourse of the Human Sciences." in *The Structuralist Controversy: The Languages of Criticism and the Sciences of Man*, edited by Richard Macksey. Baltimore, Maryland: The Johns Hopkins University Press.
DiMaggio, Paul J., and Walter W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review* 48:147-160.
—. 1991. "Introduction." Pp. 1-38 in *The New Institutionalism in Organizational Analysis*, edited by Paul J. DiMaggio and Walter W. Powell. Chicago: University of Chicago Publication.
Dobbin, Frank. 1994. *Forging Industrial Policy : The United States, Britain, and France in the Railway Age*. New York: Cambridge University Press.
Dobbin, Frank, and Timothy J. Dowd. 2000. "The Market that Anti-Trust Built." *American Sociological Review* 65:631-657.
Downs, Anthony. 2009. "Real Estate and the Financial Crisis." Washington, DC: Urban Land Institute.
Eccles, Robert G. 1981. "Bureaucratic Versus Craft Administration: the Relationship of Market Structure to Construction Firm." *Administration Science Quarterly* 26:449-469.
—. 1981a. "The Quasifirm in the Construction Industry." *Journal of Economic Behavior and Organization* 2:335-357.
Eccles, Robert G., and David Crane. 1987. "Managing Through Networks In Investment Banking." *California Management Review* 30:176-195.
EIA, Energy Information Administration. 2004. "Official Energy Statistics from the U.S. Government." Department of Energy.
Elsbach, Kimberly D., and Roderick M. Kramer. 2003. "Assessing creativity in Hollywood pitch meetings: Evidence for a dual process model of creativity judgments." *Academy of Management Journal* 46:283-301.
Faulkner, Robert R., and Andy B. Anderson. 1987. "Short-Term Projects and Emergent Careers: Evidence from Hollywood." *American Journal of Sociology* 92:879-909.
Favereau, Olivier. 2002. "Conventions and Régulation." in *Régulation Theory: The State of the Art*, edited by Robert Boyer and Yves Saillard. London, New York: Routledge.
Feagin, Joe R., and Robert Parker. 1990. *Building American cities : the urban real estate game*. Englewood Cliffs, N.J.: Prentice Hall.
Feldman, Martha S. , and Brian T. Pentland. 2003. "Reconceptualizing Organizational Routines as a Source of Flexibility and Change." *Administration Science Quarterly* 48:94-118.
Fliegel, Frederick C. 1993. *Diffusion research in rural sociology : the record and prospects for the future*. Westport, Conn.: Greenwood Press.
Fligstein, Neil. 1995. "Networks of power or the finance conception of control?" *American Sociological Review* 60:500-3.
—. 1996. "Markets as politics: a political-cultural approach to market institutions." *American Sociological Review* 61:656-73.
—. 1999. *Fields, Power, and Social Skill: A Critical Analysis of the New Institutionalism*. Berkeley: University of California Press.
—. 2001. *The Architecture of Markets An Economic Sociology of Twenty-First-Century Capitalist Societies*. Princeton: Princeton University Press.
Freidson, Eliot. 1986. *Professional powers : a study of the institutionalization of formal knowledge*. Chicago: University of Chicago Press.
Friedman, Milton. 2007. *Price theory*. New Brunswick, NJ: Transaction Publishers.

Funder, David C. 1987. "Errors and Mistakes: Evaluating the Accuracy of Social Judgment." *Psychological Bulletin* 101:75-90.
Gann, David M. 2000. *Building Innovation: Complex Constructs in a Changing World*. London: Thomas Telford.
Garfinkel, Howard. 1967. *Studies in Ethnomethodology*. Englewood Cliffs: Prentice-Hall.
Gigerenzer, Gerd. 2008. *Rationality for mortals : how people cope with uncertainty*. Oxford ; New York: Oxford University Press.
Gigerenzer, Gerd, and Henry Brighton. 2009. "Homo Heuristicus: Why Biased Minds Make Better Inferences." *Topics in Cognitive Science* 1:107-143.
Gigerenzer, Gerd, and Reinhard Selten. 2001. *Bounded rationality the adaptive toolbox*. Cambridge, Mass.: MIT Press.
Gitlin, Todd. 1983. *Inside Primetime*. New York: Pantheon Books.
Goffman, Erving. 1959. *The Presentation of Self in Everyday Life*. Garden City, NY: Doubleday.
Gomez, Peirre-Yves, and Brittany C. Jones. 2000. "Conventions: An Interpretation of Deep Structure in Organizatons." *Organizational Science* 11:696-708.
Granovetter, Mark. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78:1360-80.
—. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91:481-510.
—. 1992. "Economic Institutions as Social Constructions: A Framework for Analysis." *Acta Sociology* 35:3-11.
Griliches, Zvi. 1960. "Hybrid Corn and the Economics of Innovation." *Science* 132:275-132.
Hamilton, Gary G., and Nicole Biggart. 1988. "Supplement: Market, culture and authority: a comparative analysis of management and organization in the Far East." *American Journal of Sociology* 94:S52-4.
Hannan, M., and John Freeman. 1984. "Structural Inertia and Organizational Change." *American Sociological Review* 49:149-164.
Hargadon, Andrew B., and Yellowlees Douglas. 2001. "When Innovations Meet Institutions: Edison and the Design of the Electric Light." *Administrative Science Quarterly* 46:476-501.
Haveman, Heather A., and Hayagreeva Rao. 1997. "Structuring a Theory of Moral Sentiments: Institutional and Organizational Coevolution in the Early Thrift Industry." *American Journal of Sociology* 102:1606-1651.
Heap, Shaun Hargreaves. 1992. *The Theory of choice : a critical guide*. Oxford, U.K ; Cambridge, Mass.: Blackwell.
Heerwagen, Judith. 2000. "Green Buildings, Organizational Success, and Occupant Productivity." *Building Research and Information* 28:353-367.
Heerwagen, Judith, J. Heubach, J. Montgomery, and W. Weimer. 1995. "Environmental Design, Work and Well Being: Managing Occupations Stress Through Changes to the Workplace Environment." *American Association of Occupational Health Nurses Journal* 43:458-469.
Henderson, Rebecca M., and Kim B. Clark. 1990. "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms." *Administrative Science Quarterly* 35:9-30.
Hoffman, Andrew J., and Rebecca Henn. 2008. "Overcoming the Social and Psychological Barriers to Green Building." *Organization and Environment* 21.

Hsu, Greta. 2006. "Jacks of All trades and Masters of None: Audiences' Reactions to Spanning Genres in Feature film Production." *Administrative Science Quarterly* 51:420-450.
Hutchinson, J. M. C., and Gerd Gigerenzer. 2006. "Simple Heuristics and Rules of Thumb: Where Psychologists and Behavioral Biologists Might Meet." *Behavioral Processes* 69:97-124.
Jones, Candace. 1996. "Careers in Project Networks: The Case of the Film Industry." Pp. 58-75 in *The Boundaryless Career*, edited by Michael Arthur and Denise Rousseau. New York: Oxford University Press.
Jones, Candace, and Robert J. DeFillippi. 1996. "Back to the Future: Combining Industry- and Self-Knowledge to Meet Career Challenges in the 21st Century." *Academy Management Executive* 10:89-104.
Kahneman, Daniel, Paul Slovic, and Amos Tversky. 1982. *Judgment under uncertainty: heuristics and biases*. Cambridge: Cambridge University Press.
Kahneman, Daniel, and Amos Tversky. 1973. "On the psychology of prediction." *Psychological Review* 80:237-251.
—. 1979. "Prospect Theory: Analysis of Decision Under Risk." *Econometrica* 47:263-291.
— (Eds.). 2000. *Choices, Values, and Frames*. New York US; Cambridge UK: Cambridge University Press.
Kanter, Rosabeth M. 1977a. *Men and Women of the Corporation*. New York: Basic Books.
—. 1977b. "Some Effects of Proportions in Group Life: Skewed Sex Ratios and Responses of Token Women." *American Journal of Sociology* 82:965-990.
Kawin, Bruce. 1992. *How Movies Work*. Berkeley, CA: University of California Press.
Krippner, Greta R. 2005. "The financialization of the American economy." *Socio-Economic Review 2005 3(2):173-208;* 3:173-208.
Krugman, Beth S., and Brian A. Furlong. 1993. "The Structure of the Office Industry." Pp. 59-80 in *The Office Building: From Concept to Investment Reality*, edited by John R. White. Chicago: The Appraisal Institute.
Leather, Phil, Mike Pyrgas, Di Beale, and Claire Lawrence. 1998. "Windows in the Workplace: Sunlight, View, and Occupational Stress." *Environment and Behavior* 30:739-762.
Levi-Strauss, Claude. 1966. *The Savage Mind*. Chicago: University of Chicago Press.
Lowry, Ritchie P. 1984. "Structural Changes in the Market: The Rise of Professional Investing." in *The Social Dynamics of Financial Markets*, edited by Patricia A Adler and Peter Adler. Greenwich, CN: JAI Press.
Lutzenhiser, Loren. 1993. "Social and Behavioral Aspects of Energy Use." *Annual Review of Energy and the Environment* 18:247-289.
Lutzenhiser, Loren, Nicole Woolsey Biggart, Rick Kunkle, Thomas Beamish, and Thomas Burr. 2001. "Market Structure and Energy Efficiency: the Case of New Commercial Buildings." Berkeley,: University of California, California Institute for Energy Efficiency.
Mansfield, Edwin. 1961. "Technical Change and the Rate of Imitation." *Econometrica* 29:741-766.
March, James G. 1978. "Bounded Rationality, Ambiguity, and the Engineering of Choice." *Bell Journal of Economics* 9:587-608.
March, James G., and Herbert Alexander Simon. 1958. *Organizations*. New York,: Wiley.
Marsh, Barnaby. 2002. "Heuristics as Social Tools." *New Ideas in Psychology* 20:49-57.

McCoy, Bowen H. 1988. "The New Financial Markets and Securitized Commercial Real Estate Financing: Real Estate Securitization Relates Real Estate More Closely to Money and Capital Markets." in *America's New Market Geography: Nation, Region, and Metropolis*, edited by George Sternlieb and James W. Hughes.
McGuire, Patrick, and Mark Granovetter. 1998. "The Making of an Industry: Electricity in the United States." in *The Laws of The Markets*, edited by Michael Callon. Oxford: Blackwell.
Meyer, John, and Brian Rowan. 1977. "Institutionalized Organizations: Formal Structure as Myth and Ceremony." *American Journal of Sociology* 83:340-363.
Mills, C. Wright. 1940. "Situated Actions and Vocabularies of Motive." *American Sociological Review* 5:904-913.
Mills, Evan. 1995. "From Lab to the Marketplace: Making America's Buildings More Energy Efficient." Berkeley, CA: U.S. Department of Energy, Lawrence Berkeley Laboratory.
Mohamed, Rayman. 2006. "The Psychology of Residential Developers: Lessons From Behavioral Economics and Additional Explanations for Satisficing." *Journal of Planning Education and Research* 26:28-37.
Mowery, David C., and Richard R. Nelson. 1999. *Sources of industrial leadership : studies of seven industries*. Cambridge, U.K. ; New York: Cambridge University Press.
Muldavin, Scott R. 1999. "The Real Estate Industry Paradox." Pp. 66-68 in *Real Estate Issues*.
Nelson, Richard R., Alexander Petershansl, and Bhaven Sampat. 2004. "Why and How Innovation Get Adopted." *Industrial and Corporate Change* 13:679-699.
Ouroussoff, Nicolai. 2007. "Why Are They Greener Than We Are?" Pp. 62 in *New York Times Magazine*. New York.
Perrow, Charles. 1961. "The Analysis of Goals in Complex Organizations." *American Sociological Review* 26:854-866.
Podolny, Joel M. 1993. "A Status Based Model Market Competition." *American Journal of Sociology* 98:829-872.
—. 1994. "Market Uncertainty and the Social Character of Economic Exchange." *Administrative Science Quarterly* 39:458.
Podolny, Joel M., and Karen L. Page. 1998. "Network Forms of Organization." *Annual Review of Sociology* 24:57-76.
Powell, Walter. 1990. "Neither Market nor Hierarchy: Network Forms of Organization." *Research in Organizational Behavior* 12:295-336.
Powell, Walter W. 1998. "Learning from Collaboration: Knowledge and Networks in the Biotechnology and Pharmaceutical Industries." *California Management Review (Special Issue on Knowledge and the Firm)* 40:228-240.
Powell, Walter, Douglas White, Kenneth Koput, and Jason Owen-Smith. 2005. "Network Dynamics and Field Evolution: The Growth of Interorganizational Collaboration in the Life Sciences." *American Journal of Sociology* 110:1132-1205.
Raub, Werner, and Jeroen Weesie. 1990. "Reputation and Efficiency in Social Interactions: An Example of Network Effects." *American Journal of Sociology* 96:626.
Riemer, Jefferey. 1976. "Mistakes at Work: The Social Organization of Error in Building Construction Work." *Social Problems* 23:255-267.
Rogers, Everett M. 1995 [1st ed. 1962]. *Diffusion of Innovations*. New York: Free Press.

Romanelli, Elaine, and Michael L. Tushman. 1994. "Organizational Transformation as Punctuated Equilibrium: An Empirical Test." *Academy of Management Journal* 37:1141-1166.
Ryan, Bryce, and Neal Gross. 1943. "The Diffusion of Hybrid Seed Corn in Two Iowa Communities." *Rural Sociology* 8.
Schumpeter, Joseph. 1934. *The Theory of Economic Development*. Cambridge: Harvard University Press.
Schumpeter, Joseph Alois. 1939. *Business cycles; a theoretical, historical, and statistical analysis of the capitalist process*. New York, London: McGraw-Hill Book Company inc.
Shrank, Andrew. 2004. "Ready to Wear Development: Foriegn Investment Technology Transfer, adn Learning by Watching in the Apparel Trade." *Social Forces* 83:123-156.
Simon, Herbert A. 1956. "Rational Choice and the Structure of the Environment." *Psychological Review* 63:129-139.
Simon, Herbert Alexander. 1957. *Models of man: social and rational; mathematical essays on rational human behavior in a social setting*. New York: Wiley.
Singleton, Royce A. Jr., Bruce C. Straits, and Margaret Miller Straits. 1993. *Approaches to Social Research*. New York: Oxford University Press.
Smith-Doerr, Laurel , and Walter Powell. 2005. "Networks and Economic Life." in *The Handbook of Economic Sociology, Second Addition*, edited by Neil Smelser and Richard Swedberg. Princeton, NJ: Princeton University Press.
Stigler, George Joseph. 1961. "The Economics of Information." *The Journal of Political Economy* 69:213-225.
Stinchcombe, Arthur. 1959. "Bureaucratic and Craft Administration of Production: A Comparative Study." *Administrative Science Quarterly* 4:168-187.
—. 1965. "Social Structure and Organizations." in *Handbook of Organizations*, edited by James G. March. Chicago: Rand McNally.
Stoneman, Paul, and Paul Diederen. 1994. "Technology Diffussion and Public Policy." *The Economic Journal* 104:918-930.
Storper, Michael, and Robert Salais. 1997. *Worlds of Production: The Action Frameworks of the Economy*. Cambridge, MA: Harvard University Press.
Taylor-Gooby, Peter, and Jens O. Zinn. 2006. "Current Directions In Risk Research: New Developments In Psychology and Sociology." *Risk Analysis* 26:397-411.
Thévenot, Laurent. 1994. "An Approach to the Economics of Conventions: The Plurality of Modes of Coordination." Ecole des Hautes Etudes en Sciences Sociales et Centre d'Etudes de l'Emploi: Unpublished manuscript.
—. 1995. "New Trends in French Social Science." *Culture* 9:1-7.
—. 1998. "Innovating in 'Qualified' Markets: Quality, Norms and Conventions." in *Systems and Trajectories of Agricultural Innovation*. University of California, Berkeley.
Tuchman, Gaye. 1976. "The TV establishment; programming for power and profit." Englewood Cliffs, N.J.,: Prentice Hall
Tushman, Michael, and Philip Anderson. 1997. *Managing strategic innovation and change : a collection of readings*. New York: Oxford University Press.
Tversky, Amos, and Daniel Kahneman. 1973. "Availability: A Heuristic for Judging Frequency and Probability." *Cognitive Psych* 4:207-232.
—. 1974. "Judgement Under Uncertainty: Heuristics and Biases." *Science* 185:1124-1131.

Useem, Michael. 1996. *Investor capitalism : how money managers are changing the face of corporate America*. New York: Basic Books.
Utterback, James M. 1994. *Mastering the dynamics of innovation : how companies can seize opportunities in the face of technological change*. Boston, Mass.: Harvard Business School Press.
Uzzi, Brian. 1989. "Embeddedness in the making of financial capital: how social relations and networks benefit firms seeking financing." *American Sociological Review* 64:481-505.
—. 1996. "The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect." *American Sociological Review* 61:674-698.
—. 1997. "Social Structures and Competition in Interfirm Networks: The Paradox of Embeddedness." *Administrative Science Quarterly* 42:35-67.
—. 1999. "Embeddedness in the Making of Financial Capital: How Social Relations and Networks Benefit Firms Seeking Financing." *American Sociological Review* 64:674-505.
Van Maanen, J.V, and Stephen R. Barley. 1984. "Occupational Communities: Culture and Control in Organizations." *Research in Organizatinal Behavior* 6:287-365.
Vaughan, Diane. 1990. "Rational Choice, Situated Action, and Social Control of Organizations." *Law and Society Review* 32:23-61.
Weick, Karl E. 1993. "The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster." *Administrative Science Quarterly* 38:628-652.
Weick, Karl E., and Karlene H. Roberts. 1993. "Collective Mind in Organizations: Heedful Interrelating on Flight Decks." *Administrative Science Quarterly* 38:357-381.
White, Harrison C. 1981. "Where Do Markets Come From?" *American Journal of Sociology* 87:517-547.
—. 2002. *Markets From Networks: Socioeconomic Models of Production*. Princeton: Princeton University Press.
Whitford, Josh, and Andrew Shrank. 2009. "The Production of Innovation: Industrial Policy, Network Governance, and Political Decentralization." Pp. 1-25 in *Unpublished Manuscript*. New York, NY: Columbia University.
Wilkinson, John. 1997. "A New Paradigm for Economic Analysis?" *Economy and Society* 26:305-339.
Williamson, Oliver. 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press.
—. 1994. "Transaction Cost Economics and Organization Theory." in *The Handbook of Economic Sociology*, edited by N. Smelser and R. Swedberg. Princeton: Princeton University Press.
Yin, Robert K. 2003a. *Applications of case study research*. Thousand Oaks: Sage Publications.
—. 2003b. *Case study research : design and methods*. Thousand Oaks, Calif.: Sage Publications.
Zelizer, Viviana A. 1979. *Morals and Markets: The Development of Life Insurance in the United States*. New York: Columbia University Press.
—. 1994. *Pricing the Priceless Child: The Changing Social Value of Children*. Princeton: Princeton University Press.
—. 2005. *The purchase of intimacy*. Princeton, N.J.: Princeton University Press.
Zucker, Lynne G. 1987. "Institutional Theories of Organization." *Annual Review of Sociology* 13:443-464.
Zuckerman, Ezra. 1999. "The Categorical Imperative: Securities Analysts and the Illegitimacy Discount." *American Journal of Sociology* 104:1390-1438.

—. 2006. "Typecasting and Generalism in Firm and Market: Genre-Based Career Concentration in the Feature Film Industry, 1933-1995." Pp. 173-216 in *Research in the Sociology of Organizations*.

Zuckerman, Ezra, Tai-Young Kim, Kalinda Ukanwa, and James von Rittman. 2003. "Robust Identities or Non-Entities? Typcasting In The Feature Film Labor Market." *American Journal of Sociology* 108:1018-1075.

ENDNOTES

[1] Podolny and Page (1998), for example, define networked forms of organization as "any collection of actors that pursue repeated, enduring exchange relations with one another, and at the same time, lack a legitimate organizational authority to arbitrate and resolve disputes that may arise during exchange" (p. 59). Prototypical examples include apparel and footwear (Shrank 2004) (Shrank 2004; Uzzi 1996), film and publishing (Baker and Faulkner 1991; Jones 1996), information and biotechnology (Powell 1998; Powell, White, Koput, and Owen-Smith 2005; Smith-Doerr and Powell 2005), investment bankers (Eccles and Crane 1987; Zuckerman 1999), and commercial construction (Eccles 1981a; Stinchcombe 1959).

[2] This school of thought is best known through Rogers' encyclopedic review of over 4,000 studies of innovation diffusion (Rogers 1995 [1st ed. 1962])

[3] A bricoleur constructs or creates something from a diverse range of items available to them, but puts them together in a new or novel way. Bricoleur has been variously defined as someone able to create order out of whatever materials are at hand (Weick 1993); ideas, images, and entities generated from pre-existing things in the "imaginer's mind" (Levi-Strauss 1966); and the borrowing of language of the past to construct a discourse of the present (Derrida 2007).

[4] Problems are considered "intractable" when they are formally solvable but not fast enough for the solution to be useful to the decision maker in context (see Gigerenzer 2008; Gigerenzer and Brighton 2009; Gigerenzer and Selten 2001).

[5] The real estate industry roughly segments commercial construction into three sectors by building type. The sectors are: (1) institutional (i.e., government/non-profit), (2) private (i.e., owner-occupied homes), and (3) commercial. Commercial real estate is typically, further broken

down into: (i) office/retail, (ii) industrial/warehouse; and (iii) multifamily residential. Within these categories are further distinctions, such as the class of buildings—A, B, and C—that reflect more local and regional distinctions (Collier, Collier and Halperin 2002; EIA 2004). Our focus in this paper applies to commercial office and retail, industrial facility, and warehouse construction.

[6] A highly capitalized market should be one more amenable to risk taking and innovation than one where capital is tight. We found this was not necessarily the case. "Risk" and risk taking must be qualified given the context within which risks are interpreted, embraced, or rejected i.e., *understood.*

[7] We conducted one to three hour interviews with sixty-eight persons and targeted individuals who held prominent positions in industry decision-making processes at different places in the production process. These included financiers such as bank loan officers and developers; design professionals such as architects and structural engineers; real estate professionals including property managers, operations, and occupancy personnel; construction professionals such as contractors and construction managers; and finally energy experts such as electrical engineers and regulatory officials. Asking informants about their past and present dealings provided a view of individual decision-making criteria. It also provided a view of the collective interdependence that characteristic of this market; because individuals must interact with others over time to succeed in an industry founded in recombinant social relations we assumed decisions and decision making criteria must be at least nominally similar. We thus searched for the overlap, shared outlooks, and sensemaking criteria employed by decision makers and in decision making. See the following on language as a medium for understanding cognition and decision making (Carley and Palmquist 1992; Knorr-Cetina 1981; Knorr-Cetina 1999; Mead 1977; Stryker 2002)

[8] The final months of our research efforts coincided with California's 2001 energy crisis, which gave us many opportunities to attend public forums that explicitly took up energy, efficiency innovations, and the desire for market transformation.

[9] The rise of institutional investors in commercial real estate is a trend observable across investment sectors (Beamish and Biggart 2009; Krippner 2005; Useem 1996). Since World War II, institutional investors—pension funds, banking conduits or trusts, mutual funds and in the case of real estate REITS—have markedly increased their trading presence. By 1986, institutional investors accounted for 90 percent of the total volume traded on the New York Stock Exchange, while individual investors—who in 1976 had accounted for 30 percent of the volume (Lowry 1984)—represented less than less than 10 percent (McCoy 1988). As it related directly to investment in all forms real estate, public securities jumped from $27 billion in 1990 to $360 billion in 1999 (Muldavin 1999) and in the first quarter of 2000, institutional lenders represented fully 89.9 percent of loans given for all commercial construction (Collier, Collier and Halperin 2002). This trend continued until 2005 (Downs 2009). For 2002, the breakdown of public security investment in real estate is as follows: Commercial Mortgage Backed Securities or conduits (where an institution, say a bank, makes hundreds of separate real estate loans, bundles them and sells them on Wall Street as a bond) 3, 248, 282, 000 (29 percent); Life Insurance Co. 2,833,969,000 (25.3 percent); Fannie Mae, Freddie Mac, FHA 2,455,805,000 (21.9 percent); Commercial Banks 1,193,108,000 (10.6 percent); Pension Funds 187,614,000 (1.7 percent); Credit Companies 156,942,000 9 (1.4 percent); Other 1,132,315,000 (10.1 percent). Total 11,208,035,000 (100 percent) (see Collier, Collier and Halperin 2002)

[10] This may vary by locale and would also vary by relation to project and vocation. For our study area at the time we conducted our interviews, expectations on the part of the commercial developers, investors, and bankers to whom we spoke claimed an acceptable rate of return on investment for developing a property was 25-30 percent of gross project costs.

[11] "Charrette" derives from the same word as "chariot" and is an obscure French word for a two-wheeled horse-drawn vehicle. It is used metaphorically to mean a vehicle for bringing people along in agreement and understanding.

[12] The commercial building industry is both highly regulated and involves a plethora of standard producing bodies of various kinds that oversee different aspects of what collectively become a commercial building from design, heating and cooling systems, to cement, steel and wood products. Beyond BOMA, some of the main standard producing bodies that stand behind ideas of "best" practice/performance include the Leadership in Energy and Environmental Design; U.S. Green Business Council; National Council of Architecture Registration Boards; The American Society for Heating, Refrigeration, and Air Conditions Engineers; The Portland Cement Association; and The American Society of Testing and Materials.