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Categories and Competition

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ABSTRACT

Research summary:

In this paper, we review, integrate, and extend the literature on markets, competition, and categories as it applies to strategic management theory. Developments in the literatures of economics and organizational theory have shed new light on market categories and category dynamics. These developments highlight the fact that boundary questions are fundamental to the competitive process, and represent a fertile area for research and theory. The objective is to encourage a theoretically grounded rapprochement between current strategic management research and both older and newer research on categories and competition.

Managerial summary:

One of the key problems for business strategists is understanding the competitive environment and interpreting the effects of competition on a business. This paper attempts to integrate various literatures in the study of competition by suggesting that strategists play a crucial role in linking abstract categories of firms and products that have become part of an industry's terminology with real-time competitive processes taking place among firms and buyers. Strategists interpret cues such as cross-elasticities of demand among their own and competing products and connect these cues to taken-for-granted categories demarcating the boundaries of markets. Simultaneously, strategists are introducing new categories by reformulating old nomenclatures and introducing new ones. We also trace the possible effects of this "competitive sensemaking" on firm behaviors.

INTRODUCTION

Categorical distinctions form the core of competitive markets. According to the *Oxford English Dictionary*, to “categorize” is to place a phenomenon into a class or group. In market contexts, categorical nomenclatures emerge among market actors to define organizational forms and establish boundaries between who is a member of a given market and who is not. Such categories can become intrinsic to markets and embedded in the competitive process in multifaceted and theoretically critical ways (e.g., Porac and Rosa, 1996; Peteraf and Shanley, 1997; Hannan, Pólos and Carroll, 2007; Durand and Paoella, 2013). Most importantly, categories help to establish the grounds for assessing competitive advantage. A competitive advantage exists only relative to a set of other firms that are considered comparable in enough ways to make a performance comparison meaningful (e.g., Peteraf and Barney, 2003). But what is comparability, and how should comparability among firms be assessed?

Strategic management scholars have addressed questions of comparability in varying ways. In the late 1970's and early 1980's, strategy scholars incorporated concepts from industrial economics to define essential competitive distinctions among firms at the “industry” level (e.g., Porter, 1980). And yet, very early in these developments, Caves and Porter (1977: 250) argued that industry categories were too inclusive to describe fully the structure of competition among comparable firms, and that “sellers within an industry are likely to differ systematically in traits other than size, so that the industry contains subgroups of firms with differing structural characteristics.” This suggestion spurred much research in the 1980's and 1990's on so-called “strategic groups” as an intermediate level of abstraction between firm-level and industry-level analyses (e.g., McGee and Thomas, 1986). The central research question during this period was the extent to which strategic group membership influenced firm-level profitability. A secondary question was the extent to which such groups reflected patterns of competition among firms. The notion of strategic groups was a genuine theoretical innovation by strategy researchers. It established a plausible level of analysis between a firm and its industry. It also focused strategy researchers on longstanding conceptual and methodological issues entailed in grouping firms into meaningful organizational categories.

Unfortunately, many of these issues remain open questions in the literature, and strategic groups research has waned during the past fifteen years. The profitability and competitive implications of group membership were not decisively identified (e.g., McGee and Thomas, 1986; Thomas and Venkatraman, 1988), and the literature became embroiled in definitional and conceptual issues that are still not fully resolved (e.g., Barney and Hoskisson, 1990; Dranove, Peteraf and Shanley, 1998). In addition, the ascension of the resource-based view of the firm redirected attention away from intra-industry categories as determinants of firm profitability to intra-firm resources and capabilities that provide firms with unique competitive positions (e.g., Barney, 1991; Mahoney and Pandian, 1992; Peteraf, 1993a). The resource-based view has roots in the industrial economics of imperfect competition (e.g., Chamberlin, 1933; Robinson, 1934). Under conditions of imperfect competition, Penrose argued, “it becomes a matter of taste or convenience whether one speaks of the ‘market’ or of the resources of the firm itself as a consideration limiting its expansion” (1959: 13).

However, as Nightengale (1978) recognized many years ago, while imperfectly competitive markets call attention to firm-level heterogeneity, they also beg the question of categorical boundaries because heterogeneity also implies that some firms may be more or less similar to each other, and thus are stronger or weaker competitive threats to each other. Indeed, the same characteristics that underlie firm distinctiveness also establish the conditions for classifying firms into market-based clusters of similar firms: asymmetrically available and immobile resources and capabilities (Barney, 1991). As Peteraf and Barney (2003: 312) suggested, the resource-based view “is not a substitute for strategic group analysis or for analysis of the macro environment. Rather, it is a complement to these tools.” The implications of this complementarity, however, have not gained much traction in the strategic management literature.

Just as strategic management researchers began to deemphasize the study of strategic groups in the late 1990’s, developments in both industrial economics and organizational theory opened up new insights into the problem of market categorizations. On the one hand, the “new empirical industrial economics” (e.g., Einav and Levin, 2010) has driven deeply into imperfectly competitive markets to identify relationships between competitive interdependencies across product attributes and value capture by firms and buyers (e.g., Berry, Levinsohn, and Pakes, 1995; 2004; Petrin, 2002; Nevo, 2001). Organizational theorists, on the other

hand, have embraced social constructionist accounts of markets to establish relationships between the socio-cognitive category structure of organizational fields and outcomes such as firm revenues (e.g., Hsu, 2006), costs (Ody-Brasier and Vermeulen, 2014), capital inflows (e.g., Pontikes, 2012; Smith, 2011), and stock prices (e.g., Zuckerman, 1999). Together, these two literatures address longstanding issues in the study of imperfect competition. As we will argue in this paper, however, both are limited in important respects, suggesting the need for additional theorizing and, most importantly, interdisciplinary research.

We believe that strategic management researchers are in an excellent position to address this need, and also that the time is ripe to re-invigorate the study of categories and competition in strategic management research. In the pages that follow, we first discuss what we label the “infinite dimensionalization” problem in clustering similarities and differences among firms and suggest that its intractability has deep socio-cognitive roots. We then briefly review the three literatures that have historically grappled with the problem of connecting categorization processes with competition in markets: a) active efforts in economics to develop defensible criteria for measuring competitive interdependence in imperfectly competitive markets, b) the literature in strategic management focused on identifying and theorizing strategic groups, and c) the literature in organizational theory that has coalesced around the argument that organizational forms can be considered socially constructed cognitive categories that are revealed in discourse and shape market dynamics. As part of our review, we evaluate the strengths and weaknesses of these literatures by comparing and contrasting a representative study from each literature, using the global automotive industry as the empirical context. Drawing from our evaluation, we finish the paper by outlining what we believe to be fruitful areas of future research for strategy scholars.

THREE APPROACHES TO CATEGORIES AND COMPETITION

The problem of categorization with infinitely dimensionable firms

Underlying most definitions of competition is the assumption that similar firms producing similar outputs compete for similar buyers and suppliers. Andrews (1949: 168) summarized this view in noting that,

“an individual business must be conceived as operating within an ‘industry’ which consists of all businesses which operate processes of a sufficiently similar kind (which implies the possession of substantially similar technical resources) and possessing sufficiently similar backgrounds of

experience and knowledge so that each of them could produce the particular commodity under consideration, and would do so if it were sufficiently attractive.”

Similarity among firms implies that the firms are substitutable for one another, and thus are competitively interdependent. It is this substitutability that scholars have traditionally viewed as a proximal criterion for defining competition and industry boundaries. As Bain (1952: 24-25) suggested, “The general criterion for inclusion of products in an industry becomes close substitutability, of which perfect substitutability is a special and extreme case.”

Although conceptually reasonable, similarity and substitutability have proven in practice to be slippery and contentious competitive criteria. One well-known difficulty in using similarity and substitutability to categorize firms into competitive groups is the fact that both imply a continuous and graded structure of competitive relationships. While this is consistent with both intuition and theoretical models of imperfect competition (e.g., Robinson, 1934; Chamberlin, 1933; Lancaster, 1966), graded similarities raise the possibility that any exogenously defined competitive boundary is subject to interpretation. As Day, Shocker and Srivastava (1979: 9) noted, “Ultimately all product-market boundaries are arbitrary. They exist because of recurring needs to comprehend market structures and impose some order on complex market environments.” The arbitrariness of graded competitive boundaries, however, is a tractable problem, one that can be addressed by measuring organizational similarities and substitutabilities empirically to evaluate how well any categorization corresponds to empirically derived patterns (e.g., Berry, Levinsohn, and Pakes, 1995; Hannan, Pólos, and Carroll, 2007).

More problematic for studying categories and competition, however, is the issue recognized many years ago by McKelvey (1975: 509) that organizational classification is difficult because “Given the large number of potential classificatory variables, there is no escaping the need for a theory which suggests a much smaller set to be used in classification.” In fact, the overabundance of classificatory dimensions, and the need to select a tractable subset for similarity comparisons, is a well-known problem in both organizational research (e.g., Durand and Paoletta, 2013) and cognitive science (e.g., Goldstone, 1994). Awareness of the issue dates as far back as Durkheim’s (1982: 110) comment that the classification of social entities will always be an imperfect science because every entity “is an infinity, and infinity cannot be exhausted.” Murphy and

Medin (1985) made the same point in their well-known critique of categorization research in psychology. They noted that there are potentially infinite similarities and differences between any two entities, and suggested that, “any two entities can be arbitrarily similar or dissimilar by changing the criterion of what counts as a relevant attribute” (p. 292). Like McKelvey, Murphy and Medin argued that similarity is a reasonable basis for categorization only when there is a strong exogenous justification for including some entity characteristics in the comparison while excluding others.

In our view, the “infinite dimensionality” of organizations and their products is the backdrop for most of the debates concerning how to define competitive boundaries in imperfectly competitive markets. What attributes to include in competitive definitions, when to include them, and how to compare them are key issues that have shaped the evolution of research on organizational comparability in several different literatures. In the remainder of this section, we briefly review the three major approaches to categories and competition that have developed over the years. We discuss each literature separately, noting for the reader useful comprehensive reviews that have already been published. We then compare the relative strengths and weaknesses of the three approaches by examining a representative study from each. In doing so, we will suggest that each approach only partially resolves the infinite dimensionality problem.

Competition and categorization in economics

Theorizing competitive boundaries by economists can be traced at least as far back as Cournot’s (1838/1960: 51) suggestion that a market is “the entire territory of which the parts are so united by the relations of unrestricted commerce that prices there take the same level throughout with ease and rapidity.” Cournot’s insight was that markets are arenas where arbitrage involving interchangeable goods or services undercuts price differences, and thus prices for these goods tend to move together. Nightengale (1978) provided a good discussion of the historical issues surrounding so-called “market” and “industry” definition in economics, and Werden (1992; 1998) and Baker and Bresnahan (2008) reviewed these issues as they pertain to antitrust deliberations. Nightengale (1978) noted that neoclassical microeconomics historically theorized “markets” and “industries” at the extremes of either perfect competition or perfect monopoly. Both of these stylized extremes eliminate entirely the need for grouping firms into categories of competing firms. Complications

emerged with the acknowledgement in the 1930's that most markets are neither perfectly competitive nor perfectly monopolistic, but somewhere in between (Chamberlin, 1933; Robinson, 1934). Under conditions of imperfect competition, producers sell differentiated products, and each producer is at least a partial monopolist. Such "monopolistic competition" cuts in two theoretical directions with respect to categorizing competing firms, depending on whether one emphasizes monopoly or competition. Chamberlin (1950: 86-87) emphasized monopoly, and thus viewed any competitive boundary as "a snare and a delusion." Robinson (1934), on the other hand, recognized that monopolistic competition could create gaps among potential substitutes, but also that some firms are closer substitutes than others. Robinson argued that the gradient of substitutability across products is what segments industrial fields into categories of competing firms.

Many economists took up Robinson's insight and attempted to develop defensible criteria for defining competitive boundaries under conditions of imperfect competition. Mason (1939) provided an early argument. Building on Robinson's suggestion that gaps in the chain of substitute products could be used to demarcate competitive boundaries, Mason argued that even within a given boundary "the position of individual sellers and buyers may be very different with respect to the influences affecting business policy" (p. 69). In Mason's view, the "careful study" of data on both seller and buyer characteristics "should permit of an illuminating grouping of firms into classes exhibiting roughly the same type of market conditions" (p. 69).

The "careful study" of empirically grounded competitive boundaries has resulted in many efforts over the years to sharpen the criteria for operationalizing the gradient of substitutability among products. Most of these efforts are elaborations of the idea that competition among producers selling similar products is revealed in the interdependence of their prices and demand. Indeed, Triffin (1940) proposed a conceptualization of producer interdependence that has come to be known as the "cross-elasticity" of demand. Triffin suggested that two firms i and j can be considered competitors if a change in the price of i 's product, holding j 's price constant, is associated with a change in the demand for j 's product, and vice versa. Many subsequent papers have debated the validity of specific cross-elasticity measures in the delineation of competitive boundaries (e.g., Weintraub, 1942; Triffin, 1940; Chamberlin, 1950; Bishop, 1952; Pfouts and Ferguson, 1959; Boyer, 1984; 1985; Klein, 1985). This discussion continues even today (e.g., Pleatsikas and

Teece, 2001). The notion of price/demand interdependence across firms has also formed the basis for an extensive stream of research that has attempted to delineate competitive boundaries, and market power within these boundaries, empirically (Elzinga and Hogarty, 1973; Horowitz, 1981; Slade, 1986; Baker and Bresnahan, 1985; Bresnahan, 1987; Froeb and Werden, 1991; Scheffman and Spiller, 1996; Berry *et al.*, 1995; 2004; Petrin, 2002).

Empirical research on cross-elasticities has been particularly important for applied work on “market definition” in antitrust theory and practice. Werden (1992) noted that since the 1940’s, the core of antitrust considerations in U.S. courts has been an implied “relevant market” that is characterized by greater or lesser degrees of market power by one or more firms. Many antitrust cases have essentially been contests over the “definition” of how broadly or narrowly competitive boundaries should be drawn (Harris and Jorde, 1984; Macher and Mayo, 2010). In the benchmark 1953 *Cellophane* case involving DuPont, for example, the point of debate was whether the relevant market was the “cellophane market,” in which DuPont held a 75 percent share of sales, or the broader “flexible packaging materials” market, in which DuPont’s share was considerably less. The courts ruled in favor of the latter, a decision that was based on evidence that DuPont’s customers would shift their purchases toward other flexible packaging products if DuPont raised its cellophane prices above what it was already charging.

The *Cellophane* case was one of the first antitrust decisions to invoke cross-elasticity of demand as an empirical criterion for the demarcation of competitive boundaries. Doing so, however, led to strong criticism (e.g., Stocking and Mueller, 1955), and the case demonstrates the difficulties inherent in using empirical data to support theoretical criteria for defining categories and competition when competing interests are at stake. Indeed, Werden (1992) reviewed the many complexities of using cross-elasticities to define competitive boundaries, such as setting a reference price, establishing a relevant time frame for analysis, accessing sufficient data, and the fact that non-price product dimensions are sometimes critically important in market definition. The development of econometric techniques for measuring cross-elasticities at the product attribute level have helped to address some of these issues (e.g., Berry *et al.*, 1995; 2004), and advances in antitrust theory have introduced counterfactual analysis and the computation of hypothetical cross-elasticities

into market power deliberations (e.g., Werden, 1998). This has led some antitrust scholars to debate whether defining relevant markets still is a necessary component in anti-trust deliberations (Kaplow, 2010; Werden, 2014). Regardless, there is a general consensus among scholars that rigorous antitrust determinations require discriminating information about organizational comparabilities from multiple sources and at multiple levels of analysis. Slade (1986: 291-292), for example, recommended that product similarity must be supplemented with “a thorough understanding of an industry and the economic, legal, and technical institutions that govern it.” Baker and Bresnahan (2008: 15) concluded their review of the antitrust econometrics literature by suggesting that the inherent complexity of markets and market power “makes the use of multiple sources of evidence particularly valuable.”

Another economics literature of relevance to categories and competition is work on the classification of industries. The U.S. Census Bureau initiated the Standard Industrial Classification (SIC) in 1938 as a comprehensive coding system that classified each business establishment in the U.S. economy (Economic Classification Policy Committee, 1994). The ubiquity of the SIC coding scheme, and its successor the NAICS, has made it a *de facto* system of industrial classification for both private (e.g., Compustat, CRSP, PIMS, etc.) and public (U.S. Census of Manufactures) databases. This ubiquity has also generated controversy over the validity of SIC codes (e.g., Fertuck, 1975; Clarke, 1989; Bhojraj, Lee and Oler, 2003). Clarke (1989) expressed considerable skepticism that the SIC system provides a valid description of competitive markets, suggesting that “empirical industrial organizational research should be carefully evaluated to determine its sensitivity to the use of a possibly spurious classification system” (p. 29). Some studies have found differences in SIC codes for the same firms across different databases such as Compustat and CRSP, differences that appear to matter for predicting the performance and valuation of firms (e.g., Guenther and Rosman, 1994; Kahle and Walkling, 1996). These ambiguities have led some researchers to develop and test the utility of alternative industrial classification systems according to their particular research purposes (e.g., Fama and French, 1992; Dalziel, 2007; Hoberg and Phillips, 2010).

Competition and categorization in strategic management

Imperfectly competitive markets create a fundamental categorization tension between viewing all firms as

essentially unique and viewing firms as competing with all other firms in the same industry. Hunt's (1972) observation of persistent firm-level heterogeneity in the home appliance industry provided early empirical motivation for what developed into the concept of "strategic groups." Such heterogeneity is clearly inconsistent with broadly defined industry categories of competing firms. By combining structural and strategic variables, Caves and Porter (1977) and Porter (1976, 1979) extended Hunt's insights and moved to disaggregate competitive boundaries. Porter (1980: 129) defined a strategic group as "the group of firms in an industry following a same or similar strategy along strategic dimensions." He also suggested that factors operating at the strategic group level partially explain differences in firm conduct and performance. The concept of strategic groups breaks down the theoretical opposition between uniqueness and sameness by disaggregating competitive groupings into an intermediate level of abstraction between individual firms and broad industry or market categorizations. When viewed in this way, the concept of strategic groups was a very useful, even critical, theoretical development as a conceptual bridge straddling the two extremes of pure monopoly and perfect competition.

Since early conceptions of strategic groups drew a causal line between group membership and firm performance, assessing the strength of the group membership -> firm performance relationship was a dominant concern in the early empirical strategic groups literature. McGee and Thomas' (1986) review of the literature pointed to the complexities involved in this relationship, and over the years the evidence for an association between strategic group membership and firm performance has been quite mixed. By the mid-1990's, the inconclusive evidence led to questions about the appropriate methods for mapping similarities and differences among firms (e.g., Ketchen and Shook, 1996; Nath and Gruca, 1997), whether strategic groups actually reflect the structure of competition and cooperation in an industry (e.g., Porac *et al.*, 1995; Smith, Grimm and Wally, 1997; Más-Ruiz, Nicolau-Gonzálbez, and Ruiz-Moreno, 2005), whether groups are supply-side or demand-side phenomena (e.g., Nayyar, 1989), and, indeed, whether strategic groups exist at all or are merely artifacts of statistical clustering methods (e.g., Barney and Hoskisson, 1990).

Some scholars confronted these criticisms by theorizing strategic groups more explicitly and connecting the concept to more fundamental economic, social, and cognitive processes. Nohria and Garcia-

Pont (1991), for example, identified strategic groups based on similarities in firm capabilities, and suggested that configurations of capabilities set the stage for various strategic relationships both within and across strategic groups. Dranove, Peteraf and Shanley (1998) focused on within group relationships and argued that any true group effect on firm performance required the mutual recognition of member firms sharing similar strategic interests. Given this proviso, these authors suggested that strategic groups could have three possible performance effects: market power based profits generated by implicit collusion or coordination among group members, efficiency gains due to the sharing of information and collective learning, and positive reputational effects garnered through joint advertising, branding, and promotions that differentiate member firms from firms in other groups. Peteraf and Shanley (1997) took these arguments further by suggesting that, under certain conditions such as geographic proximity and strong network ties, strategic groups evolve into socio-cognitive formations with strong collective identifications that, in turn, amplify group level performance effects. In fact, the socio-cognitive bases of strategic groups have been explored in several empirical studies to good effect (e.g., Reger and Huff, 1993; Porac *et al.*, 1995; Osborne, Stubbart and Ramaprasad, 2001; McNamara, Luce and Tompson, 2002; McNamara, Deephouse and Luce, 2003; Wry, Deephouse and McNamara, 2007; Ng, Westgren and Sonka, 2009).

Research on strategic groups still occasionally appears in strategic management journals, as scholars continue to flesh out the implications of “middle-level” categories straddling firm level distinctiveness and market-based competitive forces (e.g., Más-Ruiz *et al.*, 2005; Lee, Lee and Rho, 2002; Short *et al.*, 2007; DeSarbo and Grewal, 2008). However, as the resource-based view of competitive advantage took hold of the field in the middle 1990’s, strategy scholars moved deeper into firms in their search for the roots of profit heterogeneity. This firm-level focus has paid dividends for the field’s understanding of topics like innovation, dynamic capabilities, change, learning, and growth, but at the expense of continued research and theory development on the middle-level organizational categories that emerge from interdependencies among firms.

Competition and categorization in organizational theory and economic sociology

Organizational categories and categorization processes have been longstanding concerns for organization theorists. McKelvey (1975: 509) reviewed early research and theory on the topic and expressed dismay that,

“The study of organizational classification is at such a primitive stage that there is not even agreement about terms, let alone agreement about a theory of classification.” A few years later, McKelvey and Aldrich (1983) chastised organizational theorists for being overly simplistic in their approach to understanding organizational variation, a critique that was eerily similar to the critique of perfect monopoly and perfect competition in economics. In their words, “We think that investigators are using two broad approaches to describe organizations: (1) organizations are all alike, or (2) organizations are all unique” (p. 104). McKelvey and Aldrich went on to support constructing middle-level categorizations of organizational forms as a way of advancing the field.

The two research traditions that have been most prominent in taking up this challenge are neo-institutional organizational sociology (e.g., DiMaggio and Powell, 1991) and organizational ecology (e.g., Hannan and Freeman, 1977). Institutional and ecological researchers initially took very different paths for defining middle-level forms. Many ecologists side-stepped the issue of categories and competition by developing working heuristics for identifying “populations” of organizations in particular empirical contexts for particular purposes. Hannan and Freeman (1977: 934), for example, argued that “we can identify classes of organizations which are relatively homogenous in terms of environmental vulnerability,” but went on to suggest that populations of organizations “referred to are not immutable objects in nature but are abstractions useful for theoretical purposes.” Institutionalists, on the other hand, followed the “cognitive turn” taking place in the social sciences and conceptualized organizational forms as collective cognitive representations that coalesce around consensual categories and identities (e.g., DiMaggio and Powell, 1991). This constructionist perspective implies not only that categories of organizations are collective representations held to be valid by relevant actors, but also that *systems* of organizational classification are representations as well and worthy of study in their own right. An early example of such work is DiMaggio’s (1982; 1987; 1991) research on the emergence of the category “art museums” in the U.S. during the late nineteenth century. A direct line can be drawn from the early work in this genre to more recent efforts to flesh out systems of cognitive categories and “institutional logics” (e.g., Thornton, Ocasio and Lounsbury, 2012).

Although beginning from different places, institutionalists and ecologists have converged around a broad constructionist agenda in organizational categorization research. A general theoretical approach has begun to take hold (see Vergne and Wry, 2014 for a comprehensive review of these developments). Drawing from research in cognitive psychology, categories are considered key elements in classification systems that impose coherence and create shared understandings of the organizational world (Rosch, 1978; Osherson and Smith, 1982; Porac and Thomas, 1994; Bowker and Star, 1999; Murphy, 2004). They do so by establishing semantic boundaries around similar kinds of entities such as products, technologies, genres, people or organizational forms (DiMaggio, 1987; Rosa *et al.*, 1999; Lamont and Molnár, 2002; Lounsbury and Rao, 2004). For instance, movies can be categorized into genres (Hsu, 2006), patents into technology classes (Wry and Lounsbury, 2013), organizations into generalists and specialists (Hannan and Freeman, 1977; Carroll, 1985; Ruef, 2000), and listed corporations into industries (Zuckerman, 1999). In recent years, researchers have focused on the disciplining functions of categories. From this perspective, the logic for categories has less to do with product substitutability or mobility barriers than with the need to impose coherence on the world by partitioning similar entities into groups. What has come to be known as the “categorical imperative” perspective is predicated on the assumption that category boundaries help to identify the list of attributes that a firm or its offerings must possess to be included in a category (e.g., Zuckerman, 1999; Rao *et al.*, 2005). Category boundaries can be more or less stable, more or less clearly defined, and more or less contested (i.e., subject to disagreement among category members and audiences). Yet they must exhibit some degree of resilience to make categories and categorization meaningful.

Staying true to the socio-cognitive underpinnings of constructionism has allowed organizational theorists to move beyond viewing industry and market boundaries from a single perspective (buyers or the firms themselves) to viewing categories as being constructed by multiple audiences, each with their own interpretive frame. Categories are theorized as components of an enacted environment that embody the expectations that suppliers, media critics, regulators, equity analysts, competitors, and consumers impose on organizations. In this sense, categories represent a specific kind of collective typification, where audiences have abstracted from the uniqueness of individual organizations to form a type of similar organizations. As a

result, membership in a category both enables and constrains firms because it establishes the features and behaviors that audiences expect of them. Just as importantly, different audiences may have different expectations and categorical definitions, implying that no single categorical system is sufficient to describe markets and industries (e.g., Durand and Paoella, 2013). Thus, unlike economics and strategic management, organizational theory emphasizes how categorical boundaries are contingent upon the specific audience constructing them.

Constructionist convergence has also called attention to balancing both similarities and differences in the categorization of firms and markets. On the one hand, audience acceptance requires conformity with the minimal criteria defining a particular organizational category. On the other hand, standing out from others within the same category requires differentiation from others within the category. Porac, Thomas and Baden-Fuller (1989) called this the “competitive cusp” on which firms must strike a balance between similarity and difference with other organizations in the market or industry. The competitive cusp can be considered the socio-cognitive underside of the inherent tension in imperfectly competitive markets between monopoly and competition. A literature has evolved exploring how firms strike this balance. Deephouse (1999) introduced the notion of “strategic balance” in suggesting that firms seek profitable positions at moderate levels of similarity with others in a given industry. Porac *et al.* (1995) suggested that firms attempt to conform on the small subset of particularly “diagnostic” attributes that define categories while also attempting to differentiate themselves from other category members on non-diagnostic attributes. Zuckerman (1999) took this argument one step further and proposed a two-stage process of first conforming on category attributes to gain attention and legitimacy in the eyes of an audience. Once attaining legitimacy, firms then differentiate from other category members in an effort to be distinctive and unique.

Empirical comparisons and contrasts: Three studies of the global vehicle industry

To illustrate the strengths and weaknesses of the above three approaches to categories and competition we selected a representative study from each perspective for more detailed examination. All three studies were conducted within the global vehicle industry. Vehicle markets are imperfectly competitive at the product level, with producer outputs differentiated along multiple dimensions. Heterogeneous buyer preferences for vehicle

models take into consideration many tangible and intangible attributes. Because of its scope, importance, and data availability, economists (e.g., Griliches, 1971; Berkovec and Rust, 1985; Bresnahan, 1987; Petrin, 2002; Berry, Levinsohn and Pakes, 1995; 2004) strategy researchers (e.g., Martin, Mitchell and Swaminathan, 1995; 1998; Schulze, MacDuffie and Taube, 2015; Nohria and Garcia-Pont, 1991), and organizational theorists (e.g., Bigelow *et al.*, 1997; Dobrev, Kim and Carroll, 2002; Rosa *et al.*, 1999) have studied the industry extensively. We selected studies that were explicitly focused on assessing competitive boundaries within the industry, as well as unquestionably focused on the theoretical aspects of cross-elasticities (economics), strategic groups (strategy), and category sensemaking (organizational theory). The three studies utilized data from overlapping time periods.

From economics, we examine the Berry, Levinsohn and Pakes (BLP, 2004) study of competition and demand elasticities in the U.S. vehicle market in a 1993 cross-section of vehicle purchases. Our choice from the strategy literature is Nohria and Garcia-Pont (NG, 1991). NG contrasted strategic groups and “strategic blocks” in the global automotive industry using 1981-1987 firm level data on size and capabilities. Finally, we selected the paper by Rosa, Porac, Runser-Spanjol, and Saxon (RPRS, 1999) as an example from organizational theory that was an early effort to trace market sensemaking. Rosa *et al.* explored the 1983-1988 cognitive convergence around the category “minivan” by tracking market conversations in U.S. based producer and consumer media publications. We discuss each of the papers sequentially, and then summarize their strengths and weaknesses in Table 1.

Berry, Levinsohn, and Pakes (2004)

While some of the criticism of cross-elasticities of demand touch on the concept itself (e.g., Weintraub, 1942; Boyer, 1985), much of the skepticism has focused on the difficulties inherent in operationalizing cross-elasticities empirically and using them to infer market structures in applied settings such as antitrust courts (e.g., Werden, 1992; 1998; 2014). In imperfectly competitive markets, demand is a function of product characteristics and product characteristics are a function of demand. The larger the number of differentiated products, the greater the identification challenge because many possible product characteristics may simultaneously affect prices and demand, including hard to observe characteristics such as quality and prestige

and their interactions with buyer characteristics. These complications have hampered empirical estimations of cross-elasticities (Werden, 1992).

In an earlier paper, Berry, Levinsohn and Pakes' (1995) refined previous methods for mapping cross-elasticities and buyer preferences within a single industry with endogenous supply and demand using aggregated data on product and consumer characteristics. Their insights spurred much subsequent research (e.g., Einav and Levin, 2010), and have also been quite influential in antitrust econometrics (e.g., Baker and Bresnahan, 2008). BLP (2004) extended their earlier piece by including consumer-level purchase data to estimate the strength of dyadic competitive relationships among 218 different models of cars, pickup trucks, vans, and SUVs in the U.S. market using a random sample of 37,500 observations from all new vehicle registrations in 1993. The consumer household data came from a survey conducted by General Motors (GM). The survey asked about income, age of the household head, family size, and place of residence. The survey also asked buyers to note their "second choice" of vehicle if they had not purchased their first choice. The GM data included selected characteristics of the cars actually purchased such as price, passenger capacity, horsepower, acceleration, and drivetrain.

BLP assumed that buyer utilities were a function of both observed and unobserved vehicle characteristics as well as both observed and unobserved buyer characteristics. Their estimated models of vehicle choice allowed for interactions between buyer and product characteristics. On the basis of the resulting coefficients and assumed vehicle price elasticities, BLP then estimated dyadic cross-elasticities at the vehicle model level. In one analysis, they estimated the effect of a small price increase in one model on the likely selection of another model. In a second analysis, they estimated the effect of removing one vehicle from the market on the selection of other vehicles. In both analyses, they compared their predictions with the actual second choice data and found good correspondence. Thus, for example, they observed that their base model predicted that sales of the Toyota Tercel or Honda Civic would benefit from a price increase for the Geo Metro. Similarly, they observed that sales of the Toyota Camry would benefit if Honda Accords were removed from the market.

NG focused on understanding the network structure of strategic linkages in the global vehicle industry. NG argued that the industry structure should be understood in terms of firm membership in both strategic groups and what they labeled “strategic blocks” (NG, 1991: 107). Strategic groups were defined based on similarities in firm-level capabilities on the premise that supply-side capabilities are the fundamental source of a firm’s competitive advantage. The capabilities considered important in the automobile industry were relative size, relative market share, breadth of product line, technological sophistication in manufacturing, managerial capability and human resources effectiveness, and labor costs. The data used to measure these capabilities were obtained from both archival sources and ratings by an expert panel. For each measure, the authors used the average value over the period 1981-87. In order to identify strategic groups, the variables were entered as attributes in a hierarchical clustering algorithm. The clustering procedure revealed eleven strategic groups, each defined by firms with similar strategic capabilities. For example, NG found that Ford and GM constituted one strategic group, while Chrysler and American Motors formed another. Major European producers, Korean firms, and luxury car manufacturers constituted separate groups as well.

Strategic blocks, in contrast, were defined on the basis of “strategic linkages” among the firms in the industry. NG considered such linkages to vary in their resource commitments, and included mergers and acquisitions, joint ventures, R&D agreements, second source agreements, component sourcing agreements, licensing, distribution, and equity ownership. The data on strategic linkages were obtained from industry and general media sources. Strategic blocks were defined as groups of firms that were densely tied to each other through strategic linkages. Using network analytics, the authors identified two types of strategic blocks. Complementary blocks consisted of firms with different capabilities from different strategic groups. For example, a major strategic block centered around Ford, with Jaguar, KIA, Lio Ho, Mazda, and Nissan all having at least one linkage with the company. Each of these firms belonged to a different strategic group, but their connections with Ford tied them together in complementary ways that were coordinated primarily by Ford. The Ford Festiva, for instance, was designed by Mazda and manufactured by KIA. Pooling blocks were composed mostly of firms with similar capabilities from the same strategic group. For example, Fiat,

PSA, and Renault were members of the European strategic group but also the most central members of a strategic block of firms who were pooling component manufacturing and technology development.

Rosa, Porac, Runser-Spanjol and Saxon (1999)

RPRS defined product markets as socially constructed conceptual systems that are shared among producers and consumers and that guide the exchange of goods and services. It is the sharing of these conceptual systems that ultimately enables consumers and producers to interact in the market. Thus, for a market to exist, the cognitive structures underlying the market must be stable across time, extended across space, and shared by many actors on both sides of the market. The authors suggested that such stability, extension, and sharing is achieved by means of market stories. Market stories establish and explain the connections among products, benefits, and usage conditions. Because market stories are constantly active in product markets, the volume and content of stories in any one market are indicators of a category's stability.

RPRS explored these arguments by examining the early development of the minivan product category. Industry experts (e.g., Yates, 1996; Petrin, 2002) consider the minivan to be one of the most important category innovations in U.S. automotive history. Chrysler's development of a line of small front-wheel-drive vans in the early 1980s prompted the J.D. Power and Associates market research firm to introduce the minivan category label in 1982. RPRS suggested that the minivan category stabilized over the next six years. To support this argument they examined stories published in leading consumer and industry publications between 1982 and 1988 in which the word 'minivan' appeared. The authors observed that category stabilization resulted in greater mentions of the word "minivan" in producer texts over time and fewer mentions in consumer texts. They also found that mentions of alternative vehicle categories ("car," "van," "station wagon") generally declined as minivans were compared to each other rather than to alternative vehicles in other categories. An exception to this was the finding that producer texts on minivans actually mentioned the "car" category with increasing frequency over time. RPRS argued that producers grew concerned that minivan sales were crossing over and cannibalizing car sales.

One of the important outcomes of product market stabilization is agreement on a set of attributes that define the core category. Accordingly, the authors also compared the acceptability of minivan models in

the market by tracking the net proportion of positive or negative comments in the text (aggregated by month) for each model and its attributes. RPRS observed that despite wide variation in product attributes, early vehicles associated with the minivan category were all generally evaluated positively. As the category stabilized, however, the product attributes associated with Chrysler minivans (e.g., front wheel drive, low step in height, abundant cupholders, two box design, etc.) increasingly were evaluated more favorably, leading Chrysler vehicles to dominate the market by 1990. Importantly, this conceptual convergence occurred two years before Chrysler's actual minivan sales pulled ahead of the other producers.

Summary Comparisons and Evaluations

These three studies make it clear that different literatures have viewed categories and competition through alternative conceptual lenses, using a range of variables and methodologies to operationalize competitive boundaries. Each of the approaches represented in these studies addressed the infinite dimensionalization problem in different ways, and each approach has strengths and weaknesses (see Table 1 for a summary).

-- insert Tables 1a and 1b about here --

The BLP method produced granular estimates of competitive interdependence at the product or firm dyad level. Categories and competition were constructed in “bottom-up” fashion by estimating the consequences of a change in the presence, price, or characteristics of one existing product on buyer demand for another. These estimates were then used to evaluate the value created and captured in near term competitive moves such as changes in product prices and the entry and exit of vehicle alternatives. Although vehicles and firms may be infinitely dimensionable, the BLP approach addressed the infinite dimensionalization problem by being neutral about critical product and firm attributes. Their methods allow competitive boundaries to be defined on the basis of alternative counterfactual sets of attributes that might be suggested by any number of relevant considerations. At the same time, however, the BLP boundaries are open to many of the same criticisms that have been leveled over the years against demand cross-elasticities as a general method for defining competitive relationships. Cross-elasticities are inherently backward looking because they are generated from past or existing pricing and buying behaviors. Their utility in understanding future competitive interdependencies depends on the stability of buyer preferences and product

characteristics over time. Moreover, although the BLP tools are neutral with respect to product and buyer characteristics, the tools do not provide guidance concerning what characteristics to include in the estimations of competitive interdependence. Thus, the method doesn't inherently overcome infinite dimensionalization and must depend on exogenous criteria (e.g., industry norms, commonsense, data availability, producer/buyer surveys) for attribute selection. Cross-elasticity calculations provide no theory of product attributes, why they exist, and why they change. Just as importantly, without exogenous criteria for narrowing the scope of such calculations -- for example, by using broad consensual categories such as "automobiles" or "minivans" -- dyadic cross-elasticity estimations across the entirety of the industry or the economy become overly cumbersome. Finally, cross-elasticities do not easily predict or explain the existence of disruptive innovations that are based on radically new product architectures (such as the minivan). Such disruptions are outside the scope of the BLP methods, as are the strategic and cognitive considerations that led firms to introduce them.

In many ways, the limitations of cross-elasticities are strengths of the constructionist approach represented by the RPRS minivan study, and the limitations of the latter are the strengths of the former. RPRS's methods are based on an inherently dynamic view of markets in which producers and buyers are involved in an endogenous learning process over time. Whereas BLP viewed supply-demand endogeneity as an identification confound to be eliminated via instrumental regression and simulation, RPRS embraced endogeneity as inherent to market sensemaking and enactment. Indeed, endogeneity is required for a market to exist. Early in the learning process, product attribute evaluations are unstable and in flux. Cross-elasticities at this stage of category evolution would be misleading indicators of future category membership. RPRS found that a stable "product ontology" (Porac, Ventresca and Mishina, 2002; Kahl, 2015) eventually emerged that defined the category and set the criteria for determining what a minivan should be. RPRS indexed this stabilization by coding market-focused stories in producer and buyer oriented audience texts. By careful attention to story content, the authors were able to identify which attributes stabilized into the minivan product ontology two years before this stabilization was reflected in sales data.

While products and firms may be infinitely dimensionable, RPRS showed that not all dimensions formed the basis for the minivan category. One strength of the RPRS approach is a better understanding of

how this cognitive reduction occurs. A second strength of this approach is the recognition that audience stories reflect contemporaneous producer and consumer concerns, and thus are important mediators in market evolution. On the other hand, RPRS' constructionist account did not include a micro-theory of value creation and capture, and thus the dyadic pricing and demand relationships that are indexed by cross-elasticities were not estimated nor used to measure minivan profitability.

Neither economic nor constructionist approaches to competitive boundaries are particularly useful in understanding the strategic intent of firms attempting to shape the competitive landscape of markets. The varied strategies that firms deploy to manage their portfolios of products, their competitive and cooperative relationships with other firms, and their ongoing efforts to build new capabilities to refresh their product lines are generally background considerations. This is the gap that is filled by the strategic management literature on strategic groups. The NG study goes beyond merely mapping strategic groups by showing that automotive firms were actively managing their relationships with other firms both within and across groups for various strategic purposes. NG's results hint at managerial agency, foresight, and cognitive representations of the competitive landscape. As such, they point to strategic choices that remain unaccounted for in economic and constructionist accounts of categories and competition. This strategic level of analysis is important because it is through the strategies of firms that the micro pricing and demand relationships controlling value capture are linked over time with macro category-based expectations.

Figure 1 captures the key differences among the above three approaches to categories and competition. As a common ground we use what has variously been called the "value-based" view of strategy (e.g., Brandenburger and Stuart, 1996) or the Value-Price-Cost approach (e.g., Hoopes, Madsen, and Walker, 2003) to illustrate the different emphases in the three literatures. Research estimating cross-elasticities of demand (Figure 1a) has mapped the attribute-by-attribute discriminations that buyers make in comparing dyads of firms or products. While these buyer discriminations may be informed by category constructions, competitively relevant categories have been treated as exogenously determined and left unexplained. Moreover, the active buyer-firm bargaining process has generally been de-emphasized, with cross-elasticities modeled as a passive matching of buyer preferences with product attributes. Strategic groups researchers have

focused on mapping the supply-side similarities among firms, attempting to estimate the effects of these similarities on firm performance (Figure 1b). However, research on strategic groups has generally not incorporated cross-elasticity estimations, and the few studies that have mapped the relationship between group membership and competition suggest that the relationship between strategic group membership and other measures of competition is complex (e.g., Smith, Grimm, and Wally, 1997; Más-Ruiz *et al.*, 2005). This may explain why the group \rightarrow profitability relationship has not been decisively established. Organizational research on categorization in market contexts (Figure 1c) has largely focused on identifying and measuring the effects of third party categorizations on firm outcomes. The effect of such categorizations on the micro-processes of value creation and capture has been acknowledged, but has not been systematically theorized. Instead, organizational theorists have focused on category “legitimacy” as an abstract intermediate outcome rather than value creation and capture per se. This focus is partly a function of the fact that organizational theorists have assumed that the market interfaces among buyers, firms, and suppliers are informationally opaque (the green dotted lines in Figure 1c) and that the identities of actors in markets are constructions rather than *ex ante* givens (the dashed boxes in Figure 1c).

-- insert Figure 1 about here --

Figure 1 makes it clear that strategies for defining competitive boundaries have historically been literature-based, and there has been a surprising lack of cross-literature interaction on a problem that is so fundamental to understanding imperfectly competitive markets. No single current approach to categories and competition seems adequate, despite the fact that interesting and important complementarities exist among them that can be exploited via interdisciplinary research. We explore this possibility in the next section.

THE COGNITIVE EMBEDDEDNESS OF COMPETITION IN MARKETS: FUTURE RESEARCH DIRECTIONS

The multi-level cognitive embedding of categories and competition

The complementarity of the above three approaches in understanding categories and competition supports the clear conclusion that competitive relationships are cognitively “embedded” (Porac and Rosa, 1996; Kennedy, 2008) in a sensemaking system through which market categories and competitive relationships are defined and redefined at multiple levels of analysis. Figure 2 summarizes this embedding schematically. First,

markets bind firms, buyers, and suppliers together in transactional relationships that define competitive interdependencies in real time. The structure and dynamics of bargaining over the value created by these relationships is the focus of value-based models of competition in strategy research (e.g., Brandenburger and Stuart, 1996; Hoopes, Madsen, and Walker, 2003). The key variables in such models are buyer willingness-to-pay, supplier opportunity costs, prices, costs, and quantities (q). When measured across firms, buyers, suppliers, and time, these variables form the basis for elasticity and cross-elasticity metrics indexing the strength of competitive relationships among market actors (e.g., Chatain, 2010; Grennan, 2014). Such metrics are snapshots of bargaining interdependencies in a particular period, and they reflect not only bargaining outcomes (e.g., prices, costs, and quantities), but also the judgments of market actors about who is in the bargaining coalition and who is not.

-- insert Figure 2 about here --

The real-time demands of market competition are attentionally coopting. However, Ghemawat (1991) observed that resource investments are sometimes sticky and irreversible. Because of this stickiness, strategists must expand their temporal focus from immediate transactions and imagine future market dynamics that are associated with possible new entrants, competitive moves by existing rivals, technological disruptions from “distant” substitutes, and evolving buyer and supplier preferences. Making sense of these future possibilities is an “offline” process (e.g., Gavetti and Levinthal, 2000), and firm level “competitive sensemaking” (see Figure 2) occurs when strategists interpret market cues and stories about cross-elasticities, competitor behaviors, and buyer/supplier preferences to construct cognitive representations of the competitive landscape. Competitive sensemaking coheres around a strategist’s “industry model,” what Porac *et al.* (1995) suggested is the strategist’s understanding of the competitive structure of the market. Industry models summarize and label the similarities and differences among firms in the market and are organized by cognitive prototypes, causal rules, or even a strategist’s short-term or long-term business objectives (Durand and Paoletta, 2013).

To the extent that industry models are discussed and shared among firms, buyers, and suppliers, a collective “categorical nomenclature” (see Figure 2) can emerge within the value chain that parses market

behavior and bargaining dynamics into category-based groups (e.g., Peteraf and Shanley, 1997). The relationship between firm level and collective level categorical nomenclatures is reciprocal. As strategists make sense of competitive interdependencies, they can draw from common understandings within their own or other markets to parse and label similarities and differences among actors within their value chain. Reciprocally, the categorical nomenclatures that emerge within firms can diffuse to other value chain actors, introducing new categorical understandings or contesting old ones.

Figure 2 also summarizes the various paths of influence through which third-party audiences such as analysts, critics, and regulators help to shape the structure and dynamics of competitive markets and embed competitive dynamics within the collective sensemaking process. Third parties are not contractually involved in market bargaining, but they influence such bargaining in each of three ways (see Figure 2). First, third parties can shape real time value chain activity by assisting value chain actors in making sense of bargaining opportunities and constraints. Third-party ratings, rankings, and categorizations help to penetrate opaque buyer-seller interfaces, create commensurabilities among actors, and stabilize perceptions of who is in the market and who is not (e.g., Kennedy, 2008). Second, third-party categorizations influence firm level competitive sensemaking by sanctioning and promoting certain market categories, and strategic choices based on them, while contesting and delegitimizing others (e.g., Rao, Monin, and Durand, 2005; Werden, 1992). Finally, third parties participate in collective market nomenclatures by labeling, codifying, and diffusing category-relevant market conversations (e.g., Rosa *et al.*, 1999; Kennedy, 2008; Lounsbury and Glynn, 2001; Navis and Glynn, 2010) and by continually aligning such nomenclatures with new competitive developments (e.g., Lounsbury and Rao, 2004; Werden, 1992).

To illustrate and concretize the cognitive embedding schematized in Figure 2, consider the minivan study by RPRS (1999) that we reviewed earlier, Petrin's (2002) econometric modeling of the competitive effect of early minivans on other vehicle types in the U.S. automotive market, and Engler's (2015) case study of the strategies and beliefs of Detroit auto producers who were involved in the introduction of the first minivan in 1984. Comparing RPRS' (1999) and Petrin's (2002) findings highlights the relationship between collective market nomenclatures and real-time bargaining interdependencies, as well as the role of third-party

media critics in aligning the two. Petrin estimated cross-vehicle elasticities by combining 1981-1993 data on vehicle attributes such as fuel economy, size, air conditioning, horsepower-to-weight ratio, front-wheel drive, and price for 2,407 vehicle models with data on buyer characteristics such as family size, income, and new vehicle purchases obtained from a 1987-1992 panel of the Consumer Expenditure Survey. Petrin showed that the introduction of the Chrysler minivan in 1984 led to significant price declines for a number of large sedans and station wagons produced by General Motors. These transactional cross-elasticities are consistent with RPRS's observations that references to other vehicle categories in consumer automotive magazines declined over time as buyers defected from station wagons. Indeed, critical reviews of minivan models helped to highlight and stabilize the constellation of attributes that eventually distinguished a "minivan" from other vehicles. Petrin selected product attributes for inclusion in his structural specifications on the basis of data availability. However, some attributes, such as size and air conditioning, were not significant covariates in his final models. This reinforces RPRS's observations that other vehicle attributes were more important in stimulating minivan demand. From RPRS's results, one might expect that the coefficients of some attribute variables would have changed over the time of Petrin's sample, and also that other characteristics such as cargo space and the presence of cup holders would have enhanced the model's predictive power in later years.

Neither Petrin nor RPRS directly assessed firm level competitive sensemaking to uncover the industry models of producer strategists at the time. In this regard, Engler (2015) retrospectively interviewed many of the senior executives of the "Big Three" Detroit vehicle producers who were involved in product planning during the early period of the minivan market. Engler reported that General Motors had concurrently developed a minivan prototype that was very similar to Chrysler's vehicle and yet decided not to commercialize their version of the minivan before Chrysler. Engler concluded that the industry model of General Motors' executives led them to believe that being the first mover with their small van would cannibalize the profitable sales of the company's station wagons. Petrin's data retrospectively corroborate this belief by showing that General Motors eventually had to discount their station wagons as a result of Chrysler's minivan entry. Moreover, Petrin estimated that price markups for Chrysler's minivans were consistently higher than for General Motors station wagons, and that by 1987 Chrysler had made incremental

profits of over \$700 million from minivan sales. Engler reported that GM executives were aware of these interdependencies, but were also concerned that any incremental sales from their minivan would push their overall U.S. vehicle market share above fifty percent, thus encouraging antitrust scrutiny. They therefore decided to assess the sales of Chrysler's minivan before introducing a small van of their own. GM eventually introduced a differentiated rear-wheel truck-based minivan in 1985 that was successful enough to transition the company away from station wagons and toward the emerging new vehicle category of truck-based "sport utility vehicles." Chrysler executives, on the other hand, strategically positioned their minivan as a "car" rather than as a "truck," going so far as to refuse the *Motor Trend* Truck of the Year award for their vehicle in the early 1980's but accepting the magazine's Car of the Year award for their minivan in 1996 (Yates, 1996).

Studies of single markets like the above using varied sources of data and empirical tools hold promise for uncovering how competitive relationships become embedded in categorical representations across value chains and multiple levels of analysis. In the remainder of this paper, we would like to summarize a few key questions for additional research at each level. These are listed on the right side of Figure 2.

Collective categorical nomenclatures, infinite dimensionalization, and the problem of consensus

Our review makes it clear that one contribution of organizational theory and economic sociology to the study of market competition is the recognition that collective categorical nomenclatures exist at the field level and help to label, organize, stabilize, and evaluate market transactions that are occurring in real-time. Indeed, some have suggested that consensual, or "dominant," categorical meanings are a pre-condition for a stable product ordering (Suarez, Grodal, and Gotsopoulos, 2014). And yet, empirical data from a variety of fields call into question exactly how much categorical consensus actually exists even in established markets, and, indeed, how the construct of categorical consensus should even be conceptualized and measured. At the firm level, for example, Hodgkinson and Johnson (1994) extracted the "food retailing" industry models of several executives working for a British grocery store chain and found considerable variation in the categories that individual managers articulated to describe competition within their industry. Granqvist, Grodal, and Woolley (2013) interviewed fifty-nine executives from fifty-one companies generally doing business in the field of nanotechnology to discern how they used the label "nanotechnology" to describe the activities of

their firm. These authors observed that only 46 percent of executives from firms with clear capabilities in nanotechnology used the term to describe their company. Another 20 percent, in fact, actually dissociated their company from the nanotechnology label. At the value chain level, Ng, Westgren and Sonka (2009) surveyed swine genetics producers, their hog farmer buyers, and veterinarians who advise hog farmers on genetic products and identified sixteen attributes that captured perceived similarities and differences among producers within these three sets of actors. Their results suggested that different value chain actors emphasized different producer attributes and thus constructed different identities for describing producer variation.

At the industry level, we have already reviewed the evidence for inconsistencies in, and differences of opinion about, the fidelity of various formal industrial classification systems such as SIC and NAICS codes (e.g., Clarke, 1989; Bhojraj, Lee and Oler, 2003; Fama and French, 1992; Hoberg and Phillips, 2010). Such differences have been found in other codified systems of market classification as well. Pachet and Cazaly (2000), for example, compared music metadata genre categories from three different digital databases available on the internet (AllMusic, Amazon, and MP3). They concluded, “clearly there is not much consensus in these classifications, either from a lexical viewpoint (names used) and the structure (depth and structure of the hierarchies)” (p. 3). Just as importantly, Pachet and Cazaly noted that, in some cases, the same genre labels were associated with different constellations of attributes across databases. Aucouturier and Pachet (2003) followed up by comparing various methods of music genre construction, both automated and human-based, and found little correspondence in the resulting category systems. Hsu (2006) studied the effects of genre labels on the box office success of films and observed that only about 20 percent of the films in her sample were categorized in the same way in the three film databases that she used for sample construction.

Given the infinite dimensionalization problem in categorization, the dissensus that has been observed in both formal and informal systems of market classification is not surprising. It does suggest, however, that there is an upper limit to how coherently and specifically collective nomenclatures can dimensionalize and parse market competition into consensual market categories. In this regard, Bennardo

and De Munck (2014) reviewed some sixty years of research on culture and consensus suggesting that collective “cultural models” consist of “core” components that are trans-situational and “peripheral” components that are initialized by “default values” until they are instantiated with specific and distinctive meanings in particular contexts. Bennardo and De Munck argued that the core-peripheral structure allows for “recognizing and categorizing events as representative of the same cultural model even if they slightly differ in each of their specific occurrences” (p. 281). Thus, collective category nomenclatures may best be viewed as semi-flexible market “vocabularies” that provide a pool of distinctions and labels to be used within markets by various actors for different strategic and procedural purposes (Lowenstein, Ocasio, and Jones, 2012). An important implication of this conclusion, however, is that categories are at least partially endogenous to competitive relationships, an endogeneity that must be accounted for in research on competition and competitive advantage.

One way of recognizing this endogeneity is to refrain from using industry level category nomenclatures in competition research until one has assessed the degree of categorical consensus existing within an industry, as well as how such nomenclatures may be used differently by different actors. Indeed, given the above considerations, the comparability and consistency of collective category nomenclatures should become a focus of study in and of themselves (e.g., DiMaggio, 1987). Good examples of assessing the comparability of codified market classification systems exist in the literature (e.g., Bhojraj, Lee and Oler, 2003; Fama and French, 1992; Hoberg and Phillips, 2010). Although not concerned with market classification per se, Chatterji, Durand, Levine, and Touboul (2015) provided a particularly compelling model for consensus assessment of an important field level construct: “corporate social responsibility.” Chatterji *et al.* (2015) assessed the convergence of six different sources of corporate social responsibility ratings and found that the six rating sources theorized the construct differently. These differences were reflected in low correlations across their formal ratings of the same firms. Assessing the degree of consensus in more informal and less codified category systems is more difficult, but the logic of comparing different category terms and relationships is the same. In this regard, DiMaggio, Nag and Blei (2013) commented on the use of computational topic modeling to extract coherent and consensual field level constructs from unstructured

text and noted that an important component of the modeling exercise is to validate any extracted constructs with alternative types of data and alternative modeling parameters. Bennardo and De Munck (2014) made essentially the same point in inventorying a multi-method approach to identifying cultural categories and concepts.

Porter (1979; Caves and Porter, 1977) suggested that categorizing firms at middle levels of aggregation based on their strategic similarities and differences would account for some of the heterogeneity in firm performance left unexplained by cross-industry comparisons. Strategic groups researchers, even those who eventually concluded that strategic groups are essentially cognitive categories (e.g., Reger and Huff, 1993), took up this suggestion and attempted to identify a single set of groups that best fit an observed pattern of statistical or perceptual firm similarities and differences. The problem of parsing firms into sub-industry categories is still salient in the literature, but the considerations discussed here extend the issue of competition and categorization in a very different direction. Stable and consensual categories might exist in some industries and markets, but this stability cannot be taken for granted. Moreover, category stability and consensus themselves become interesting theoretical variables. One can ask questions about the logic or theorization used to construct categories in particular markets (e.g., Durand and Paoella, 2013), the dynamics of category emergence, stabilization, evolution, and change (Kennedy and Fiss, 2013), the distribution of category agreements and disagreements (DiMaggio, 1987), and the nature and operation of the social and technical infrastructures that produce category systems (Bowker and Star, 1999). The relationship between these category processes and real-time competitive interdependencies is what we turn to next.

Categories and real-time competitive interdependencies

At the core of markets are real-time transactions reflecting assessments of quality and comparability during bargaining processes. A fundamental theoretical question is the extent to which categories of firms and products reflect, and are reflected in, these real-time competitive interdependencies. With respect to the middle level categories typically mapped in strategic groups research, Caves and Porter (1977: 251) argued that “Because of their structural similarity, group members are likely to respond in the same way to disturbances from inside or outside the group, recognizing their interdependence closely and anticipating

their reactions to one another's moves quite accurately." And, indeed, the assumption that middle-level categories reflect patterns of interdependent market behaviors has been implicit in much of strategic groups research (e.g., McGee and Thomas, 1986). However, the concept of "interdependence" is complex and multidimensional. At the most basic level, two strategically similar firms may be linked together via high cross-elasticities of both demand and supply. One might expect that rivalry between the firms will ensue if strategists in the two firms recognize these covariations, as each attempts to increase their prices and keep their costs in check. On the other hand, there are good reasons to believe that within category price/cost interdependence would also promote tacit collusion and even explicit cooperation such as joint advertising between the two firms (e.g., Dranove, Peteraf, and Shanley, 1998). These complexities beg the question of the relationship between categories summarizing and labeling similarities among firms and the underlying transactional processes inherent in markets.

Unfortunately, the available empirical evidence relevant to this question provides no clear answers, leaving the question very generative for future research. Studies estimating cross-price elasticities among products in an industry have sometimes revealed interdependencies that seem to reflect consensual categories (e.g., Berry *et al.*, 1995; 2004; Nevo, 2001) while other studies are less clear (e.g., Petrin, 2002). For example, Berry, Levinsohn and Pakes (2004) uncovered clusters of covariation among automobiles that paralleled accepted product categories in the industry such as "mid-size" and "luxury" sedans. Petrin (2002), on the other hand, observed that the prices of "minivans" and "station wagons," two different vehicle categories, were inversely correlated and clearly competitively interdependent. At the same time, Petrin anecdotally included both of these vehicle types in the superordinate "family vehicle" category, perhaps implying that the relevant definition of competitive boundaries should be at this higher level of abstraction. Strategic groups researchers studying the relationship between group categories and market interdependencies have reported equally mixed results. Smith *et al.* (1997) identified both intra- and inter-group rivalrous behaviors, Más-Ruiz *et al.* (2005) observed asymmetric rivalrous behaviors between strategic groups defined by size differences, and Peteraf (1993b) found that competitive reactions were stronger against firms from other strategic groups.

On the other hand, Porac and Thomas (1994) and Porac *et al.* (1995) found clear correspondences between accepted industry categories and the other firms that a focal firm defined as its competitors.

Dranove, Peteraf, and Shanley (1998) argued that the linkages between category membership, market behavior, and firm outcomes are complicated by a variety of structural and historical factors such as the stability and size of an industry, its geographical concentration, and network or communicative ties within the population of firms. Moreover, it seems clear from empirical IO research that including demand-side preference parameters is necessary when attempting to identify any category-based patterns in cross-elasticities. These qualifications aside, however, it seems useful to distinguish between the *attentional* and *bargaining* effects of market categories. Accepted market categories can affect the attentional interlocks among firms by making it more likely that one firm defines another firm in the same category as a competitor. As well, market categories can influence bargaining by determining who is participating in the market bargaining process and who is not. In theory, attentional and bargaining effects should be commingled, but there are many reasons why they can be decoupled in practice. Defining and tracking competitors in imperfectly competitive markets is a non-trivial activity (e.g., Peteraf and Bergen, 2003), market categories are fuzzy sets with graded boundaries (e.g., Hannan *et al.*, 2007), and there are many firm-level routines that complicate the coordination of key market behaviors such as pricing with competitor definitions and categorizations (e.g., Zbaracki and Bergen, 2010; 2015).

These considerations suggest that tracing the conjunctions and disjunctions between the attentional and bargaining effects of market categories might reveal important features of market dynamics. To elaborate, consider the stylized case of a market with four firms and many buyers using market categories to guide their behavior. One scenario is where all buyers and all four firms focus on the same attributes such that they all agree on who is bargaining and who is not. This is the situation assumed in value-based models (e.g., Brandenburger and Stuart, 1996; Hoopes, Madsen, and Walker, 2003) and might be typical of markets with repeated interactions among relevant actors and strong institutions forcing categorical consensus. Just as interesting, however, are situations where buyers and firms are categorizing on the basis of different attributes. This was the situation studied by Ng, Westgren, and Sonka (2009), but seems to extend to many

markets where inconsistent competitive inferences and “blind spots” (Zajac and Bazerman, 1991) within a value chain have characterized product design, pricing, acquisition, and market entry decisions. For example, Engler’s (2015) account of the early entry decisions in the minivan market suggested that Ford and GM executives defined their rear-wheel drive small vans as competitors to Chrysler’s front-wheel drive van in the new minivan market, although buyers and Chrysler did not. While GM was eventually able to successfully reposition its small Astro van within different market categories (i.e., commercial and towing vehicles), Ford’s Aerostar never captured much value for the company as a minivan, and was eventually replaced by the company’s front-wheel drive Windstar. Conjunctions and disjunctions between the attentional and bargaining structure of markets open up underexplored opportunities for investigating the sources of performance heterogeneity in markets.

Distinguishing between the attentional and bargaining effects of categories also raises interesting questions for future research on the role that non-contractual third-parties can play in influencing value creation and capture in product markets. In general, third parties help to “define the nature and boundaries of cultural categories” (Blank, 2007: 13). At the level of an entire value chain, third-party definitions can increase or decrease buyer willingness to pay, supplier opportunity costs, and aggregate demand by legitimizing or delegitimizing a particular market category. They can do so as well at the level of individual firms by certifying a firm’s commensurability and comparability with others, thereby sanctioning the firm as a credible category member with a legitimate claim on value. Third-parties can also help to clarify similarities and differences among firms already defined within a market by certifying or not certifying specific category claims, and claims of added value. This certification has direct implications for the prices and costs that firms, buyers, and suppliers bargain among themselves.

Unfortunately, with the exception of the antitrust literature (e.g., Werden, 1992; 1998), most of the existing research on third parties utilizes some form of sales or revenues as the key dependent variable indexing third-party effects on market outcomes (e.g., Pontikes, 2012; Hsu, 2006; Paoella and Durand, 2016; Smith, 2011; Archak, Ghose, and Ipeiritos, 2011; Chevalier and Mayzlin, 2006; Luca, 2011). Sales data, however, are not specific enough to distinguish between value creation and competitive value capture, and

thus confound attentional and bargaining effects. A pure attentional effect, for example, was reported by Tung (2015), a Yelp engineer, who provided data suggesting that simply placing a category label on a business being reviewed on the Yelp website doubles the number of readers' "click-throughs" to that business' website. Whether this increased attention then translates into increased profitability or market share (i.e., competitive bargaining effects) is another question. Here is where good analytical traction might be obtained by incorporating recent economics research that has provided econometric techniques for teasing apart competitive bargaining effects. For example, Petrin (2002) estimated the profitability of different market categories subsumed within the "family vehicle" category, Nevo (2001) estimated market shares in the ready-to-eat cereal market, and Grennan (2014) empirically distinguished willingness-to-pay, profits, and what he called "bargaining ability" in the medical stent product market. Utilizing the structural estimation methods illustrated in papers such as these would go a long way toward clarifying the influence of typical non-contractual third-parties on value creation and value capture in real-time market transactions.

This discussion raises significant questions about the assessment of competitive advantage. The problem of defining and measuring competitive advantage relative to some comparable set of other firms is still very much an open issue in the literature (e.g., Peteraf and Barney, 2003). In this regard, Chatain (2010: 97) observed that a very small number of UK law firms were bargaining with the same clients, leading him to conclude that, "An important implication is that returns to resources and capabilities might differ within the same market" and that, "returns from similar resources and capabilities might be quite different in the face of different sets of competitors." If competitive advantage is defined relative to a small set of comparable rivals, and the set itself is quite focused and situationally specific, the measurement and conceptualization of advantage must be established for each firm separately through careful empirics. The key problem here is defining what firms are in the same bargaining set and what firms are "outside" the set. Chatain (2010), for example, made this discrimination based on similarities in firm capabilities, but Berry, Levinsohn and Pakes (1995) provided more general methods for constructing counterfactual sets of insiders and outsiders that address the same problem by combining simulations and regression estimations.

Competition and categorization in strategic sensemaking: Firm level considerations

One goal of this paper is to establish the role of firm strategists in mediating and enacting the relationship between field level categorical nomenclatures and real-time market transactions. NG's (1991) data, for example, are clearly consistent with our argument that strategists are actively enacting the competitive landscape by engaging in strategic moves both within and across groups of similar firms. It is this active engagement with the categorical environment that is largely missing from both IO structural modeling of competitive interdependencies and sociological accounts of field level categories. NG did not, however, explicitly assess the cognitive representations of firm strategists. This is an important omission because the key mediational process between field level and market level categorical effects is the firm level sensemaking that coheres around managerial representations of the competitive landscape, what we have termed a strategist's "industry model" (see Figure 2). These firm level representations are influenced by cues emanating from market transactions as well as the existing pools of categorical labels and classification frameworks that might be shared at the field level. In turn, firm level representations influence strategic choices, and thus firm level behaviors in markets, but can also contribute novel categorical material to field level nomenclatures. In our view, this mediational role is an underexplored research area, and several issues are still very much open questions in the literature.

First, there is the question of the formation, structure, and use of strategists' industry models, and how such models should be empirically assessed and tracked. Over the years, cognitive strategy researchers have developed a robust toolkit for studying the mental models of strategic decision-makers (e.g., Huff and Jenkins, 2003), but only a subset of these tools are useful for uncovering industry models. Moreover, researchers who have attempted to map firm level categorical knowledge have used a variety of tools, and there really is not a consensus about which measures are best able to capture such knowledge in various circumstances. For example, researchers have used interviews (e.g., Hodgkinson and Johnson, 1994; Porac and Thomas, 1994; Reger and Huff, 1993), questionnaires (e.g., McNamara, Deephouse, and Luce, 2002; Porac *et al.*, 1995), text analyses (e.g., Pontikes, 2012; Kennedy, 2008), archival data (e.g., Rao, Monin, and Durand, 2005), semiotic analysis (e.g., Jones *et al.*, 2012), and various combinations of these (e.g., DiMaggio,

1987; Negro *et al.*, 2011). This lack of consensus inhibits generalizations across studies and raises questions about the convergent validity of the methods. Even within a given method, studies have suggested that substantial variability exists in categorical representations within firms (Hodgkinson and Johnson, 1994). There has been an explosion of interest in categories and markets in the last ten years (Vergne and Wry, 2014). At this point, a useful addition to the literature would be to evaluate various measures of categorical knowledge in strategy and organizations research, map the strengths and weaknesses of each method, and establish rules of evidence and standards of empirical validation for uncovering industry models at the firm level. A side benefit of getting clear about how to study categorical knowledge at the firm level would be to clarify more aggregate measures at the field level as well.

A second set of issues that are open for more investigation pertains to the question of how firm level industry models shape strategic choices in domains such as mergers, acquisitions, entry and exit, and interfirm relationships. There are hints in the literature about interesting research directions, but not very much empirical data has been generated so far. For example, Suarez, Grodal, and Gotsopoulos (2014) have argued that category dynamics should be incorporated into market life cycle models to bolster theories of entry timing and entry success. At the firm level, this argument implies that strategists' industry models might facilitate or inhibit their willingness to enter new markets. With respect to interfirm relationships, although they did not measure industry models, NG's (1991) study suggests that automobile producers were using their knowledge of firm similarities and differences to estimate resource complementarities both within and across strategic groupings. The firms then entered into formal agreements on the basis of these estimations. A similar and more recent example from the automotive industry is the Daimler Chrysler merger (e.g., Vlasic and Stertz, 2001). Retrospective accounts of the merger suggest that executives from both companies perceived the two firms as highly compatible because they operated in different market subcategories (e.g., Meyer *et al.*, 2005). Daimler was perceived as a producer of luxury compact, mid-size, and full-size vehicles. Chrysler was perceived as a producer of the same categories of vehicles but for the lower-priced mass market. The merger ultimately failed, however, and post-mortem accounts suggest that a major reason for the failure was categorical confusion within the executive ranks about how to combine luxury and mass-market category

expectations (e.g., Vlasic and Stertz, 2001). Comparing the Daimler Chrysler episode with NG's (1991) data raises the question of when crossing categorical boundaries in interfirm relationships will be complementary and when it will be conflictual. Indeed, one might speculate that many so-called "synergies" in mergers and acquisitions are rooted in category-based expectations and their active management by the firms involved.

A third set of issues concerns the mediating role of industry model innovation by strategists, and the cognitive processes that are involved. Earlier in this paper, we suggested that collective category nomenclatures could be characterized as pools of categorical knowledge that can flexibly be deployed at the firm level for a variety of business purposes. Several studies have tracked category innovation at the field level and have provided an account of how new categories emerge and are legitimized (e.g., DiMaggio, 1987; Navis and Glynn, 2010; Lounsbury and Rao, 2004; Rao, Monin, and Durand, 2005; Rosa *et al.*, 1999; Khaire and Wadhvani, 2010; Engler, 2015; Jones *et al.*, 2011; Bingham and Kahl, 2013; Cattani and Fliescher, 2013). The infinite dimensionality of stimuli provides strategists with situational flexibility to categorize products and other firms in idiosyncratic ways. Research suggests that intra-individual categories emerge and change due to "top down" conceptual influences such as theories of the world, personal goals, and structured domain knowledge, as well as "bottom up" cues from the environment (e.g., Boster and D'Andrade, 1989; Murphy and Medin, 1985; Goldstone, 1994). Both types of information are inputs into a strategist's industry model, and can lead to model innovation that links developments in the market with collective systems of classification. How this intersection plays out in the minds of individual strategists while making sense of the competitive landscape is still an open question in the literature.

What some have called "strategic categorization" is yet a fourth area of potentially fruitful interdisciplinary research (e.g., Vergne and Wry, 2014; Pontikes and Kim, forthcoming; Rhee, 2015). Strategic categorizations are systematic attempts to manipulate a firm's category membership and/or the category structure as a whole to enhance a firm's added value. Asymmetric resource endowments and mobility frictions create stable patterns of similarities and differences among firms that provide cognitive material for competition and categorization. Whetten (2006: 220) specifically connected a firm's identity to its "binding commitments" that lend stability to a firm's behavior and character while linking it to categories that both

legitimize the firm and distinguish it in the competitive process. However, these commitments are only inputs into competitive sensemaking, and added value is an inference rather than an *ex ante* given in real-time market transactions. While stable configurations of actor attributes are a necessary condition for categorizing firms, infinite dimensionalization ensures that they are not a sufficient condition. Firms are complex and “fuzzy” configurations of overlapping attributes. Identifying stable attribute configurations is not always self-evident. This reinforces Whetten’s (2006) suggestion that market identities are in reality “claims” that are explicitly made to signify a unique space that reflects a firm’s commitments. These claims are embedded in a sensemaking process in which firms are interpreting available cues and matching these cues to interpretive categories. That firms engage in strategic categorization has been well established in the strategy and organizations literature (e.g., Santos and Eisenhardt, 2009; Navis and Glynn, 2010; Khaire and Wadhvani, 2010; Hargadon and Douglas, 2001; Rhee, 2015), and indeed is the basis for much theory and research in the marketing discipline. It is self-evident that firms are motivated to claim identities that give them an advantage in a market. From a strategic perspective, however, the key issue is category plausibility and whether a firm’s category claims are accepted or contested. The possibility that there are cognitive barriers to entry adds to more traditional models of contestable markets, and there is much whitespace to explore at the loosely coupled intersection of resource endowments and category claims.

Categories and competition in antitrust deliberations and theory

Although attention to the problem of categories and competition has waxed and waned over the years in economics, strategic management, and organizational theory, the topic has been a continual source of theory, research, and debate in the antitrust literature (Werden, 1992; 1998; 2014; Kaplow, 2010). In this paper, we have included antitrust regulators within the group of non-contractual third-parties who influence categories and competition through their role in codifying categorical nomenclatures, shaping real-time market transactions, and enabling or constraining the industry models of firm strategists. Aside from the fact that government regulators often have coercive power to enforce their categorical interpretations, we see no fundamental difference between the role of regulators and other non-contractual third parties in their effects on categories and competition. However, the area of antitrust regulation is important, technical, complex,

and dominated by law and economics. The connections between antitrust regulation and the strategy and organization literature on categories and competition have been undeveloped and under-theorized. For this reason, it is useful to end our paper with a separate discussion hinting at how such connections could be established and studied in future research.

Interestingly, over the years, there have been calls for the inclusion of strategic management research and theory in antitrust deliberations (e.g., Porter, 1991). Indeed, a recent issue of the *Antitrust Bulletin* explicitly advocated a multidisciplinary approach to antitrust that incorporates insights from strategic management research (Gundlach, 2014). We believe that the problem of categories and competition is one conceptual gateway that can open up interesting and important points of theoretical contact between strategic management research and antitrust theory and practice. Porter (1991) suggested that an important contribution of strategic management to antitrust theory and practice is defining the relevant unit of competition in industries marked by firms with heterogeneous strategies. According to Porter (1991: 455), strategic heterogeneity implies that “remedies aimed at reducing market power cannot always be industry-wide but rather must be directed at the groups of firms following similar strategies (strategic groups).” As we noted previously, antitrust courts are venues in which different definitions of categories and competition are proposed and contested using a combination of legal and economic principles, prior case precedents, econometric evidence, testimony by various market actors, institutional knowledge, and common sense (Harris and Jorde, 1984; Baker and Bresnahan, 2008). Greene and Yao (2014: 809) argued that an interesting application of a strategic management perspective in antitrust deliberations would be to explore how a behavioral and cognitive approach to market definition might “change the predictions of econometric models used to estimate the competitive effects of mergers.” Moreover, antitrust deliberations provide a useful repository of data and commentary that can be exploited in the study of competitive sensemaking. Macher and Mayo (2010), for example, studied a classic antitrust case involving two ski resorts in Aspen Colorado. They detailed the competitive sensemaking by both the plaintiff and the defendant, who essentially entertained different definitions of the relevant market, with each respective definition being advantageous to that party’s own interests. Their observations suggested that substantial differences existed between the

litigants in their definition of categories and competition, which were also reflected in significant variation in the legal strategies supporting their cases. Research of this sort holds much promise for unpacking the black box of categories and competition in real world situations with significant financial effects

CONCLUSIONS

Competitive categorization processes are fundamental to differentiated markets. They are so fundamental that categories are sometimes pushed to the background in research on markets as taken-for-granted assumptions when modeling competitive processes and outcomes. But assuming away market categories can only be taken so far. Over the years economists, strategic management researchers, and organizational theorists have advanced important insights about how to conceptualize, measure, and examine the effects of competition and categories in their respective research and theorizing. Each of these fields has worked largely in isolation of one another, however, and their respective approaches are characterized by what appear to be complementary strengths and weaknesses. In this paper, we reviewed these approaches and their strengths and weaknesses, and have mapped three broad issue arenas that appear ripe for multidisciplinary research and theorizing. Working at the intersection of economics and organizational theory, strategic management researchers seem especially primed to push forward with this multidisciplinary agenda.

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Table 1a. Strengths of current approaches to categorization and competition

IO Economics/ Product Identities e.g., Berry, Levinsohn, and Pakes (2004)	Strategic Management/ Strategic Identities e.g., Nohria and Garcia-Pont (1991)	Organizational Theory/Field Identities e.g., Rosa <i>et al.</i> (1999)
<p>Granular estimates of competitive influence at the product dyad level.</p> <p>Estimates of value capture at the point of bargaining and purchase decisions.</p> <p>Can be used to predict product demand in the short-run based on price changes and patterns of substitution.</p> <p>Robust and flexible enough to allow for different sets of product and buyer attributes, permitting varying definitions of the competitive space for counterfactual analysis.</p>	<p>Maps both competition and cooperation at the firm level and recognizes similarities in the “strategic attributes” of firms. Goes beyond product attributes as the basis for categorization of firms.</p> <p>Reflects patterns in strategic behavior, capabilities, dominant logics, and managerial (and possibly other) representations of the industry landscape.</p> <p>Informs strategic benchmarking and analysis, strategic intent, market entries and exits, and the positioning of firms within and between product markets and industries.</p> <p>Value capture (i.e., cross-elasticities) at the product level is a key consideration, but so is value creation within and across products. Value innovation.</p>	<p>Assumes market opacity and recognizes that multiple audiences that are not contractually involved in the value chain are important to making sense of patterns in products, firms, and value chain activities.</p> <p>Maps categories of products, firms, and customers as part of the institutional structure of an organizational field. The field becomes a source of cognitive content for value chain participants to assimilate into their own representations and behavior.</p> <p>Dynamic analysis, mapping and explaining the creation and evolution of product and strategic categories over time.</p> <p>Recognizes that field level category dynamics can influence firm outcomes, depending on the audience.</p>

Table 1b. Weaknesses of current approaches to categorization and competition

IO Economics/ Product Identities e.g., Berry, Levinsohn, and Pakes (2004)	Strategic Management/ Strategic Identities e.g., Nohria and Garcia-Pont (1991)	Organizational Theory/Field Identities e.g., Rosa <i>et al.</i> (1999)
<p>The approach requires that product ontologies are stable enough for product attributes to be definable and attribute data to be available.</p> <p>Backward looking based on existing product attributes and purchase decisions already made. Future demand estimations require stable cross-elasticities.</p> <p>Attribute selection is based on “common knowledge.” An infinite regress problem in attribute selection without such common knowledge.</p> <p>Without common sense category boundaries to define a broad market space <i>ex ante</i>, dyadic cross-elasticities across the entire economy become computationally and conceptually problematic.</p> <p>Does not capture the strategic intent of firms entering, exiting, and modifying product attributes across time. Does not explain attribute origins and change, only cross-elasticities among existing attributes.</p> <p>Determines competitive interdependence among firms based on “historical” product attribute prices -- cannot predict “threat of substitution” not revealed in cross-elasticities among existing attributes.</p>	<p>Attribute selection has been a real problem and the source of much controversy and criticism. Criteria for attribute selection have largely been ad hoc and researcher specific.</p> <p>Choosing a level of abstraction and set of rules for categorizing firms has also been ad hoc and dependent on the particular clustering technique chosen.</p> <p>Despite a few attempts at a dynamic analysis, strategic group mapping has largely been static and cross-sectional. In fact, strategic group composition and boundaries may evolve as a result of firm strategic decisions and behavior (e.g., partnerships with firms from other groups) that in turn affect the degree of (dis)similarity within and across groups.</p> <p>The relationship between strategic group categories and competitive interdependence has not been clearly established.</p> <p>Researchers have never really settled on a set of outcome variables that can be plausibly and reliably explained by strategic group categorizations. There has been a dearth of research on outcomes other than profitability. It is likely that group-outcome relationships are market and, perhaps, even firm specific, yet these contingencies have not been adequately studied.</p>	<p>Lacks a consistent micro theory connecting field level categories to value capture and creation. Linkages in the literature have not been systematically specified. A frequently used outcome variable is sales revenue, but the mediating causal linkages have not always been clearly articulated and remain poorly understood.</p> <p>Have avoided the infinite dimensionalization problem by using category “labels” as proxies for category existence. The underlying ontologies of product and firm categories have been studied only sporadically. Also, the degree of categorical consensus at the field level is an open question.</p> <p>The impact of field level identities on value capture and creation is likely to be audience dependent, but no theory of audiences exists and the study of audience types has been ad hoc and unsystematic. The existence of multiple audiences also complicates the way one should think about “performance” and competitive advantage.</p> <p>The relationship between the linguistic categories examined in many studies and market level competitive interdependence has not been clearly explicated.</p>

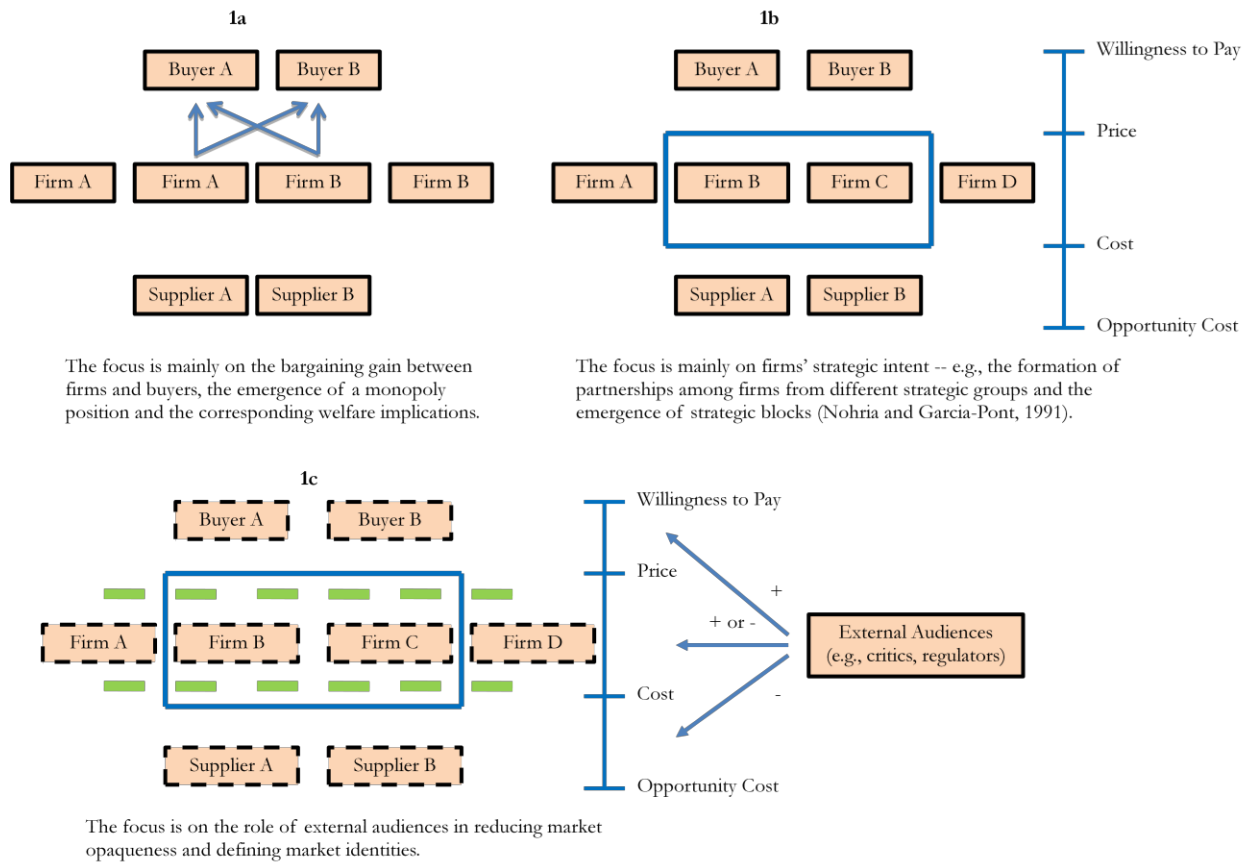


Figure 1. Three approaches to mapping competitive boundaries

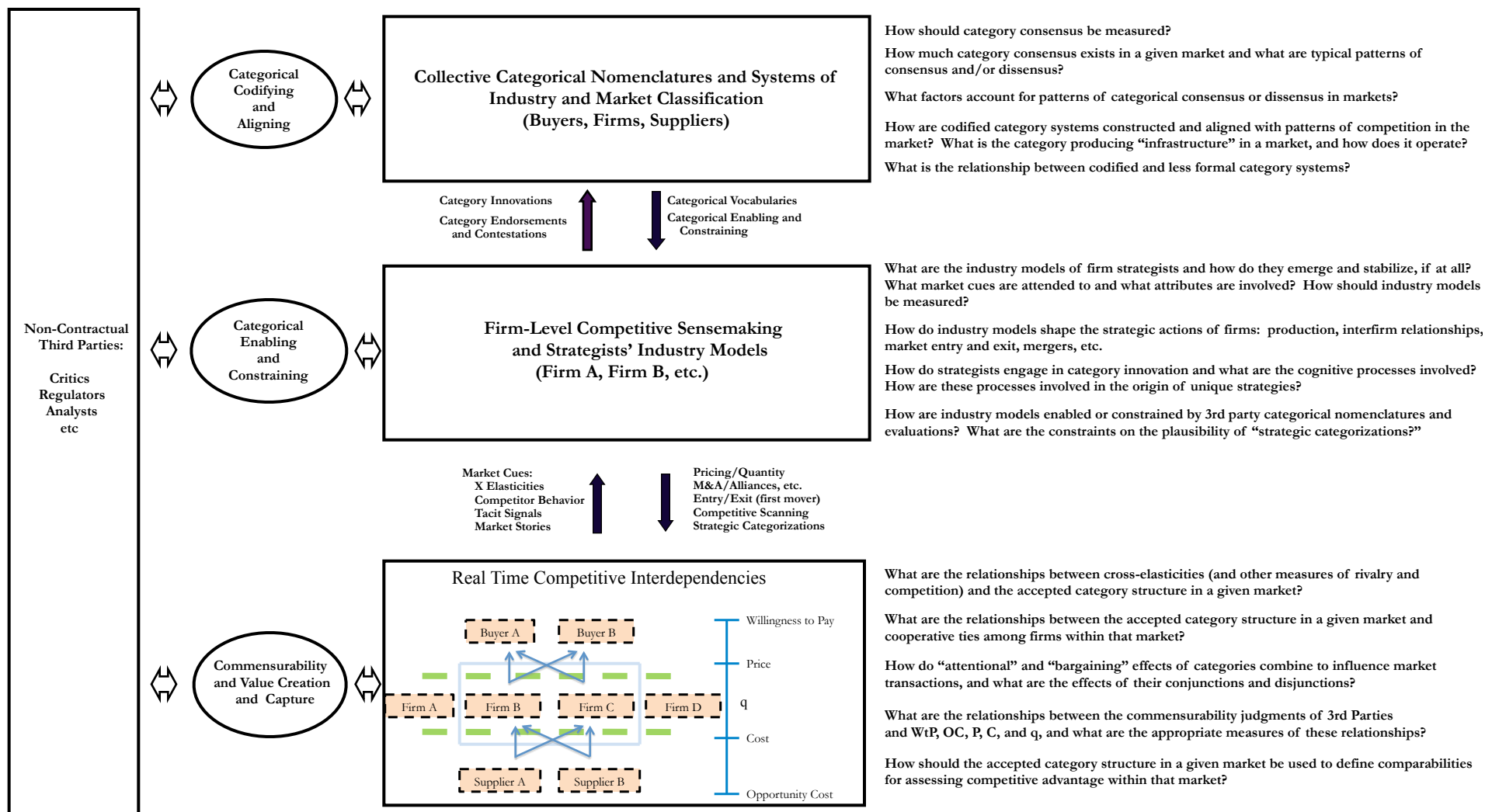


Figure 2. The cognitive embeddedness of competition in markets: A heuristic framework and questions for future research