Strategic Management Journal
Strat. Mgmt. J., **36**: 437–448 (2015)
Published online EarlyView 6 February 2014 in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/smj.2225
Received 16 January 2012; *Final revision received 15 August 2013*

PERFECT TIMING? DOMINANT CATEGORY, DOMINANT DESIGN, AND THE WINDOW OF OPPORTUNITY FOR FIRM ENTRY

FERNANDO F. SUAREZ,[1]* STINE GRODAL,[1] and ALEKSIOS GOTSOPOULOS[2]
[1] *Strategy and Innovation Department, Boston University School of Management, Boston, Massachusetts, U.S.A.*
[2] *SKK Graduate School of Business, Sungkyunkwan University, Seoul, Korea*

The optimal time to enter emerging industries is a key concern in strategy, yet scholars struggle to create a theoretical foundation that can integrate conflicting empirical findings. We incorporate categorical dynamics to industry life cycle theory to enhance existing entry timing theories. We introduce the concept of a dominant category—the conceptual schema that most stakeholders adhere to when referring to products that address similar needs and compete for the same market space—linking it to the dominant technological design and entry-timing advantages. In particular, we propose the existence of a window of opportunity for firm entry that starts with the emergence of the dominant category and ends with the emergence of the dominant design.

INTRODUCTION

The timing of entry into a new market is an important strategic choice for firms. Because of its implications, timing of entry and its effects on firm performance and survival have been key research questions in strategy (Mitchell, 1991), innovation management (Foster, 1986), and organizational theory (Hannan and Freeman, 1989). These streams of literature have provided broad conceptual structures to frame entry-timing strategies, while other scholars have focused on the resources, mechanisms, and conditions that help early movers secure a competitive advantage (Lieberman and Montgomery, 1988).

Entry-timing literature has gradually shifted from studying the effects of being the very first mover to studying order of entry (Lambkin, 1988; Lieberman and Montgomery, 1988), the link between firm capabilities and timing of entry (Lee, 2009; Robinson *et al.*, 1992), and the challenges that first movers face, such as lack of legitimacy (Aldrich and Fiol, 1994; Dobrev and Gotsopoulos, 2010; Hannan and Freeman, 1989) and technological uncertainty (Anderson and Tushman, 1990; Sorenson, 2000). Moreover, some authors have linked timing advantages specifically to the stage of an industry's evolution (Agarwal and Bayus, 2004; Christensen *et al.*, 1999; Markides and Geroski, 2005). Despite this progress, consensus is still lacking regarding the optimal time for entry, and a generalizable theoretical framework capable of discriminating between different cohorts of entrants has yet to be established (Suarez and Lanzolla, 2007).

Keywords: entry-timing advantages; categories; first–mover advantage; industry life cycle; dominant design
*Correspondence to: Fernando F. Suarez, Boston University School of Management, 595 Commonwealth Avenue, Room 649-A Boston, Massachusetts 02215, U.S.A. E-mail: fsuarez@bu.edu

We propose that an enhanced understanding of entry-timing dynamics requires a more nuanced examination of the industry life cycle's "fuzzy front end"—i.e., the earliest period in an industry's evolution when such basic traits as market boundaries (Santos and Eisenhardt, 2009), product characteristics (Utterback, 1994), and user needs (von Hippel, 1994) are still elusive. We build on prior work that has demonstrated the importance of sociocognitive factors at the early stages of industry evolution (Clark, 1985; Kaplan and Tripsas, 2008; Lounsbury *et al.*, 2003), and advocate a stronger focus on categorical dynamics. In particular, we tie notions of socially negotiated category emergence (Bowker and Star, 2000; Kennedy, 2008; Rosa and Porac, 2002; Rosa *et al.*, 1999) to theories of the industry life cycle to create a novel theoretical foundation that can enhance our understanding of industry dynamics and the optimal time for firms to enter emerging industries.

We use the term categories to refer to socially constructed partitions or taxonomies that divide the social space into groupings of objects that are perceived to be similar (Bowker and Star, 2000; Negro *et al.*, 2011b). Our focus is on product categories—that is, categories in which firms choose to position their products. We introduce the concept of the *dominant category*, the conceptual schema that most stakeholders adhere to when referring to products that address similar needs and compete for the same market space. We argue that the emergence of the dominant category demarcates the opening of a window of opportunity for entry into a new industry, because it signals the resolution of sociocognitive uncertainty. The end point of the opportunity window is, in turn, demarcated by the emergence of the dominant design, which as prior literature has demonstrated, resolves technological uncertainty and fundamentally alters the competitive dynamics of an industry (Agarwal *et al.*, 2002; Anderson and Tushman, 1990; Utterback and Abernathy, 1975).

In what follows, we begin by developing our conceptualization of the dominant category and the dynamics that lead to its emergence. Then, we develop a set of propositions regarding timing of entry and firm performance as they relate to the emergence of the dominant category and the dominant design. We close the paper with a discussion of the implications of our theory and provide specific suggestions regarding future empirical research.

THE EMERGENCE OF THE DOMINANT CATEGORY: EXTENDING THE THEORY OF INDUSTRY LIFE CYCLES

Categorical evolution in nascent market spaces can be divided into two major phases. In an initial phase of *divergence*, an increasing number of categories are introduced and used; in the ensuing phase of *convergence*, a few categories start to win favor among market stakeholders, while many others are gradually abandoned.

Initial divergence: the creation of categories

At the beginning of their life cycles, new industries are seldom well defined, and so early entry occurs in a context of great uncertainty with regard to the meaning, boundaries, and even the very existence of the industry (Aldrich and Fiol, 1994; Lounsbury *et al.*, 2003; Santos and Eisenhardt, 2009). Customer needs remain fluid (Clark, 1985), and so does the understanding of the industry by stakeholders—e.g., customers, producers, critics, and regulators (Grodal, 2007; Kennedy, 2008). During this time, the meaning of specific categories and the elements that belong to them are being negotiated (Granqvist *et al.*, 2013). Because categories are still fuzzy, a given category might mean different things to different stakeholders (Vygotsky, 1987). Similar products might be positioned in different categories, whereas dissimilar products might claim membership to the same, still-fuzzy category. Rao (2008: p. 19) demonstrates these dynamics vividly in his description of the early automobile industry. As he notes, during the industry's very early phase, stakeholder confusion resulted in the automobile being "variously referred to as the 'velocipede,' 'motorcycle,' 'locomobile,' 'electric runabout,' 'electric buggy,' 'horseless carriage,' 'automobile,' and 'quadricycle.'"

At such early stages of an industry, differences in categorical positioning often reflect basic technological differences among products or differences in how various stakeholders understand the new industry and its products (Kaplan and Tripsas, 2008). In the previous automobile example, for instance, "*electric* buggy" and "*horseless* carriage" are both examples of how underlying technological characteristics prompted the initial meaning of these two categories.

Alternatively, a novel categorical positioning can reflect the envisioned use of the product or

DOI: 10.1002/smj

correspond to deliberate attempts by firms to differentiate their products from their competition (Rao, 2008). The "Walkman," a category introduced by Sony, did not explicitly reference technological characteristics, but rather the freedom of movement the new device allowed. By creating a new category, a firm can attempt to become the nascent market's cognitive referent or steer the whole market in a particular direction (Santos and Eisenhardt, 2009). For example, the "tablet PC" category was introduced by Bill Gates in 2002 in order to create a distinct identity for Microsoft's products and reignite the (at that time) still-fuzzy "pen computing" market.

Categories, however, can also be created by stakeholders other than firms in their attempt to understand and classify objects in an emerging market space (Kennedy and Fiss, 2013). Users, industry observers, analysts, or even visionaries can play an active role in introducing new categories and influencing the emergence of a collective conceptual schema of the industry. The "mountain bike" category, for example, was created by a bicycle aficionado, whereas a fiction writer coined the "robot" category.

The introduction of new categories by producers, users, and other stakeholders during the early stages of an industry results initially in a rapid increase in the number of categories in use. However, the fluid state of the various stakeholders' understandings implies that no one particular category is likely to gain much of a following. Uncertainty and confusion reign, and early entrants' attempts to predict which category and which understanding of the industry will eventually achieve dominance are prone to error.

Convergence on the dominant category

The initial phase of categorical divergence is generally followed by a phase of convergence during which the number of categories in use declines. As experience and familiarization with the new product class increase, stakeholders become better able to assess which of the product's features, uses, and connotations are relevant and important. Categories that best capture and express such relevant dimensions are preferred and gain traction over alternatives that are gradually abandoned (Kennedy, Lo, and Lounsbury, 2010).

Repeated use and increasing experience offer stakeholders greater certainty about the meaning of the different categories that remain in use—i.e., about the features that products belonging to any particular category are expected to possess (Hannan *et al.*, 2007; Zerubavel, 1997). Categorical boundaries become better defined, and categories gradually assume meanings of their own; i.e., rather than being defined by the products that claim membership in them, they increasingly dictate the characteristics that a product needs to possess in order to be seen as a legitimate member. Subsequent product offerings are judged against these categorical requirements or "categorical test codes" (Hannan *et al.*, 2007: p. 79): products that comply with the requirements of the category to which they claim membership are seen as legitimate members, whereas products that do not comply see their categorical claims questioned (Hannan *et al.*, 2007). Stakeholders might even classify or reclassify a product irrespective of the producer's categorical claims if they find that it complies better with the requirements of another category (Bowker and Star, 2000).

The convergence of understandings and crystallization of categories in an emerging industry not only constrain the ability of producers and other stakeholders to introduce new categories, but also limit their need for doing so. Shared understandings about the meaning of categories and about product characteristics that are deemed relevant and valuable leave less room for the introduction of new categories. Moreover, firms may find it more attractive to position their products in a well-established category because doing so allows them to enter the consideration set of a large pool of customers (Zuckerman *et al.*, 2003). Producers that initially positioned their products in some of the categories that failed to gain traction feel the pressure to reposition them, and producers that stick to categories that are faltering run the risk of being marginalized and seeing their market performance and survival chances suffer. As a result, the rate at which new categories are introduced to the industry declines, and the total number of categories decreases as some of them are abandoned.

Convergence toward a specific perception of the industry leads both producers and other stakeholders to gravitate toward the category that best captures this perception. The preferred category thus gradually gains dominance and becomes the referent for the emerging industry and its products. We define the dominant category as the conceptual schema that most stakeholders adhere to when referring to products that address

DOI: 10.1002/smj

similar needs and compete for the same market space. It follows that,

Proposition 1: The number of categories in a new market space has an inverted-U relationship with time.

The concept of the dominant category is related to, but fundamentally different from the established concept of the dominant technological design. The dominant category is a sociocognitive construct that is triggered primarily by the need of stakeholders to communicate meaningfully with other stakeholders regarding their activities in the emerging industry. Successful categories facilitate information exchange between disparate parties by conveying both the novelty of the category and its relationship to preexisting categories. Emerging categories thus have to resolve the paradox of being simultaneously (1) distinctive enough that they convey the novelty of the underlying product and attract the attention of stakeholders, and (2) familiar enough to be easily comprehensible (Bingham and Kahl, 2013).

This inherent tension between novelty and familiarity is often resolved by recombining existing categories in original ways (Berger and Heath, 2005). For example, the category "voice mail" combines the known element of mail with the novel aspect of the message not being delivered in a written form; likewise, the category "smartphone" invokes the familiar category of "phone" but simultaneously stresses the enhanced capabilities of the new product class by adding the qualifier "smart." However, the success of a category in gaining traction will depend not only on its ability to manage the inherent tension between familiarity and novelty but also on its endorsement by prominent stakeholders (Negro, Koçak, and Hsu, 2011b) and its alignment with contemporaneous cultural trends (Bingham and Kahl, 2013; Wry *et al.*, forthcoming).

In contrast to the dominant category, the dominant design is materially constituted and arises through technological experimentation (Suarez and Utterback, 1995), path dependence (Anderson and Tushman, 1990), and investments in process R&D and economies of scale (Klepper, 1997). Unlike the case of novel categories for which practically any recombination of elements of the cognitive space is possible, the materiality of technological designs limits the experimentation preceding a dominant design to what is technologically feasible. For each product class, there is only a limited set of possible technological trajectories that are feasible. Moreover, once a firm decides to invest and progress along a specific trajectory, technological "path dependence" imposes strong restrictions on what can be done and undone in the design. It is often technologically impossible to go back up the design hierarchy in order to reverse previous decisions (Clark, 1985). In contrast, while switching categories can incur significant costs for firms whose identities become associated with specific product categories (Tripsas, 2009), repositioning a product in a different category always remains a feasible option.

Combining our conceptualization of the dominant category with the industry life-cycle theory, we develop a theoretical framework that depicts the dynamics of a new market space (Figure 1). In line with received theory, we depict the number of firms (density) in the new space as increasing over time, reaching a peak, and then decreasing to stabilize at a relatively low level. The point at which the density curve peaks is often associated with the emergence of a dominant design (Utterback and Suarez, 1993) or, in platform-mediated industries, with the emergence of a dominant platform (Eisenmann *et al.*, 2006; Suarez, Cusumano, and Kahl, 2013; Suarez and Cusumano, 2010).

We complement this accepted model of the industry life cycle by adding the dynamics associated with the emergence of the dominant category. The broken line in Figure 1 plots the number of categories in an emerging market space. During the early divergence phase, the number of categories increases as producers and other stakeholders introduce new categories (Santos and Eisenhardt, 2009). As the industry develops further, a process of convergence unfolds, in which some categories win favor and others recede (Glynn and Abzug, 2002). This process leads to the emergence of a dominant category to which the remaining and future products and producers generally adhere, resulting in a decline in the number of categories in the industry.

Time to the dominant category's emergence

As a collective conceptual schema, the dominant category emerges though iterative interactions among industry stakeholders. Initially disparate understandings or visions of the industry need to converge until a high degree of agreement

DOI: 10.1002/smj

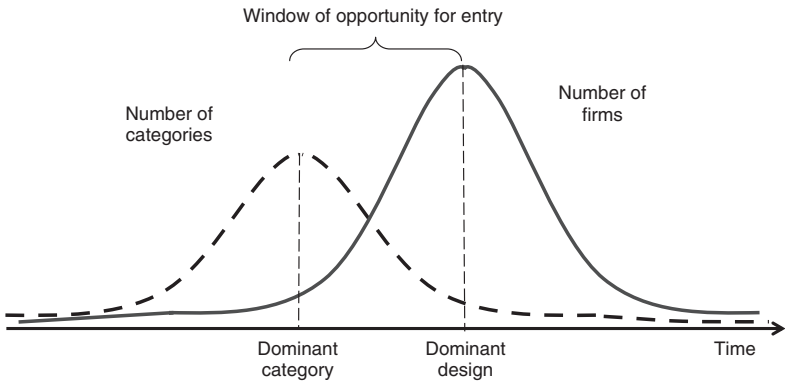

Figure 1. Theoretical framework: dominant category and dominant design during the industry life cycle. During the industry life cycle, the number of categories will increase before the number of firms increases. The emergence of the dominant category occurs as the number of categories begins to decrease. This point in time marks the opening of the window of opportunity for entry, whereas the emergence of the dominant design marks the closing of the window of opportunity

is reached on the meaning of the industry. The duration of this convergence process that culminates in the emergence of the dominant category depends on the number of categories that populate the sociocognitive space, and their distances from one another.

In the first case, the use of a multitude of categories, many of which might be similar and overlapping, contributes to increased confusion among customers and other stakeholders. The use of different categories to refer to similar products makes communication more difficult and hinders understanding (Clark and Wilkes-Biggs, 1986). The emergence of shared notions about the industry is thus delayed, making it harder for any particular category to become dominant.

In the second case, the distance between competing categories implies the presence of different perceptions about the industry and the envisioned uses of its products. The larger the distance between two focal categories, the lower the conceptual overlap between them because they invoke meanings with few connotations in common (Kennedy *et al.*, 2012). For example, at the initial stages of what is now known as the smartphone industry, producers introduced products for which they claimed such disparate categories as "handheld PDA," "multimedia device," "business tool," "gaming device," and "handheld computer." The connotations associated with these categories were considerably different. The category "gaming device," for instance, suggested that the device was to be used primarily for entertainment purposes. In contrast, positioning the device as a "handheld computer" invoked meanings of a sophisticated technology that could be used for a range of activities, including writing and reading documents and sending and receiving e-mail.

The presence of many categories, particularly if they are distant from one another, implies that a dominant category can only emerge through the gradual marginalization and abandonment of some of the competing perceptions about the industry and the corresponding categories. The more distant competing categories are from one another, the more exchange and debate is required for stakeholders to reach consensus on the core connotations of the industry, and the longer it takes for a dominant category to emerge. Therefore, we propose the following:

> *Proposition 2a: The time required for the dominant category to emerge in the early phases of an industry increases with the number of categories.*
> *Proposition 2b: The time required for the dominant category to emerge in the early phases of an industry increases with the distance between categories.*

CATEGORICAL DYNAMICS AND TIMING OF ENTRY

Category formation and first-mover advantages

Although the quest for timing advantages has spurred a long and extensive line of research, it has

DOI: 10.1002/smj

not resulted in widespread consensus regarding the merits of early entry. Early theoretical work on the topic focused on identifying the mechanisms that underpin entry-timing advantages such as resource preemption (Carroll and Hannan, 1989; Prescott and Visscher, 1977), economies of scale in production and R&D (Dixit, 1985; Gilbert and Newbery, 1982; Klepper, 2002; McMillan, 1983), customer-switching costs derived from habit formation and reputation advantages (Carpenter and Nakamoto, 1990; Schmalensee, 1982), and network externalities (Lieberman and Montgomery, 1998).

The counterpoint to these possible advantages of early entry is the uncertainty that firms encounter during the early stages of an industry. Researchers coming from the industry life-cycle perspective have documented the technological and demand uncertainties present before the emergence of a dominant design (Abernathy and Utterback, 1978; Anderson and Tushman, 1990; Sorenson, 2000; Utterback, 1994). Technological uncertainty can lead early entrants to invest in a technological path that may turn out to be inconsistent with the dominant design and thus disadvantageous (Bohlmann *et al.*, 2002).

However, firms that enter during the very early period of industry emergence also have to deal with another kind of fundamental uncertainty, which pertains to how the market space itself will be understood, defined, and delimited by the collective actions of the relevant stakeholders (Rosa *et al.*, 1999; Santos and Eisenhardt, 2009). Firms that enter at such early stages have to navigate the new market space without the guidance and boundaries that the dominant category provides. Even technological experimentation is difficult under such fundamental uncertainty since it is still unclear what the products in the emerging market space should accomplish and on which metrics they will be evaluated (Kaplan and Tripsas, 2008). As perceptions about the industry and the corresponding categories are still in flux, these early entrants run the risk of committing to categories that will not prevail.

Repositioning its products in the dominant category is an option available for a firm that did not initially choose the category that eventually became dominant. Such changes, however, are risky and can hurt the firm's market performance and survival chances (Haveman, 1992) because they require a change in how stakeholders perceive the firm (Tripsas, 2009). Firms that enter before the emergence of the dominant category thus face an elevated risk of having to choose between being stuck in a faltering category or attempting a risky repositioning of their product. In contrast, firms that enter after the dominant category has emerged can rely on it to meaningfully direct their positioning and technological priorities. Therefore, we propose the following:

> *Proposition 3: Firms that enter before the emergence of both the dominant category and the dominant design will tend to perform worse than firms that enter in later phases.*

The window of opportunity

Most research on entry-timing advantages has moved away from an absolute pioneering hypothesis, which posited that the first firms to enter an industry enjoy a competitive advantage (Agarwal and Bayus, 2004; Markides and Geroski, 2005; Robinson *et al.*, 1992). Recognizing that pioneering incurs significant risks (Markides and Geroski, 2005), researchers in the field now generally associate high firm performance with entry during a window of strategic opportunity that occurs prior to the emergence of a dominant design (Christensen *et al.*, 1999: p. s213). The ending point of this window, it is argued, coincides with the emergence of a dominant design in the industry (Anderson and Tushman, 1990). As many authors have pointed out, the emergence of the dominant design changes the resource conditions that are associated with competitive advantages and triggers the onset of industry maturity (Agarwal *et al.*, 2002; Utterback, 1994).

Although there exists wide agreement that the emergence of a dominant design signals the ending point of the window of strategic opportunity for entry, it is unclear exactly what signals the window's starting point. In their study of the disk-drive industry, Christensen *et al.* (1999) considered the starting point to be three years before the emergence of the dominant design. While this is applicable in their context, their operationalization was a result of an *ad hoc* examination of the dynamics of that specific industry and thus is not generalizable. Likewise, Agarwal and Gort (2001), Agarwal and Bayus (2004), and Lee (2009) used data-driven industry markers such as the takeoff in the number of firms and the takeoff in industry sales to demarcate different phases in an industry's evolution. While this constitutes a valuable

DOI: 10.1002/smj

phenomenological approach, it does not lend itself to theorizing about the actual mechanisms that lead to these takeoffs and the associated timing advantages or disadvantages. In fact, it can be argued that these takeoffs are themselves the effects of the underlying dynamics of the industry life cycle rather than the causes of timing advantages.

We argue that the concept of the dominant category offers the missing piece needed to better specify the window of strategic opportunity for entry and to theoretically define its starting point. Before a dominant category emerges, confusion and disinformation reign among stakeholders, who find it difficult to communicate meaningfully (Rosa and Porac, 2002). It is only when a dominant category emerges that much of this uncertainty dissipates, as the meanings and perceptions of products and their uses sharpen. The resolution of categorical uncertainty significantly improves information exchange, allowing firms that enter at this stage to communicate meaningfully with customers, suppliers, analysts, and other stakeholders and to position their products to correspond with the dominant perception of the industry. Shared understandings about the industry relieve firms of the need to educate stakeholders, while the sharpening of industry boundaries aids them in navigating the remaining technological and market uncertainties. Firms that enter after the emergence of a dominant category can focus on technological experimentation that is consistent with the dominant category, thus enjoying a competitive advantage over earlier entrants.

The window of opportunity that opens with the emergence of a dominant category remains open only for a limited time, and its end is demarcated by the emergence of a dominant design. The onset of the industry's maturity shifts the locus of competition toward production processes and economies of scale (Gort and Klepper, 1982; Utterback and Abernathy, 1975). The resolution of technological uncertainty leads to a greater degree of commoditization and cost-based competition. Such developments lead to concentration in industry structure in an environment that is increasingly hostile to new entrants (Klepper, 2002). We therefore propose the following:

> *Proposition 4: Firms that enter during the time window between the emergence of the dominant category and the emergence of a dominant design will tend to perform better than firms that enter during other phases*.

DISCUSSION

In this paper, we theorize about the implications of categorical dynamics for industry life cycles and first-mover advantages. Industry evolution and industry life cycle occupy central positions in research across diverse disciplines (Abernathy and Utterback, 1978; Gort and Klepper, 1982; Hannan and Freeman, 1989), but the existing literature has focused predominantly on the technology side of industry evolution. Our work in this paper adds in four ways to a growing literature on the cognitive and social underpinnings of industry evolution (e.g., Clark, 1985; Garud and Rappa, 1994; Kaplan and Tripsas, 2008; Pontikes, 2012; Rosa *et al.*, 1999). First, we enhance the current understanding of the dynamics of early industries by introducing the concept of a dominant category. Second, we stress that categorical emergence is not purely determined by technological characteristics but is also created by firms' deliberate attempts to claim advantageous market positions and stakeholders' efforts to make sense of an evolving categorical space. Third, we integrate the social and technological aspects of industry evolution by bringing together the dominant category and dominant design concepts into a unified model of industry evolution. Fourth, this integration allows us to extend theories of entry-timing advantages by proposing a parsimonious and generalizable definition of the window of opportunity for firm entry. In what follows, we comment on the implications of our propositions, highlight some potential limitations, and propose possible avenues for future research.

The co-evolution of categories and designs

Prior literature has depicted industry evolution as primarily a technological process (Abernathy and Utterback, 1978; although a notable early exception was Clark, 1985), and the evolution of categories as a separate and primarily sociocognitive process (Porac *et al.*, 1995). In reality, the two are intertwined and mutually constituted. Early in the process, categories often reflect and directly express salient technological features of the underlying product. The electric buggy category in the early automobile industry, for example, was clearly inspired by a prominent technological feature of the new vehicle, namely, the use of electricity as its main source of power. However, categories not only respond to technological

DOI: 10.1002/smj

features but also can borrow from virtually any element in the cognitive space to stress simultaneously the novelty and the familiarity of the new product. Another category used in the early automobile industry—the horseless carriage—directly communicates that the new product resembles a preexisting and familiar one, the carriage, while also stressing its novel characteristic of being self-propelled rather than horse-drawn (Bingham and Kahl, 2013).

In addition, once categories become established and well defined, they can also guide firms' technological experimentation and help them focus on what stakeholders in the industry value and deem relevant. The emergence of the dominant category helps to clarify which product characteristics are legitimately associated with the new market space and which are not. Shared understandings about the industry allow stakeholders to make better sense of the products that best serve their needs (Kennedy, 2008) and to compare technological features within this specific set. In the cochlear implant industry, for example, the dominant categorical schema dictated that the new device should recognize not only environmental clues but also human speech, thus directing firms' technological experimentation and development in that direction (Garud and Rappa, 1994). Porac, Rosa, and Saxon's (2001) study of the "minivan" industry also demonstrated this point. They showed that in the early phases of the industry firms used a variety of categories such as "minivan," "compact van," and "people mover" to reference their products and introduced a wide array of different product designs. As agreement among producers and other stakeholders gradually converged toward the use of the (dominant) minivan category, certain technological characteristics (e.g., the sliding doors) gained more favor than other definitions, eventually leading to the emergence of a dominant design.

In general, categorical schemata dictate the characteristics that products claiming membership in a category need to possess. Products that deviate from the requirements of the category in which they claim membership are penalized in the market for their lack of conformity (Hannan *et al.*, 2007). At the same time, categorical schemata and rules of membership are not necessarily stable, and they often continue to evolve to reflect technological developments. At the early stages of the smartphone category, for example, products claiming membership in it were expected to display WiFi capabilities among their technical characteristics in order to be considered legitimate members of the category. As the technology continued to evolve, however, so did the meaning of the category, and so in 2013 a legitimate member of the smartphone category also needed to have a touch screen, a feature that was not common in the industry only a few years earlier.

The window of opportunity

The concept of the window of opportunity for firm entry into new markets stems naturally from research on entry-timing advantages. If first movers' performance suffers from a nascent industry's lack of structure (Aldrich and Fiol, 1994; Dobrev and Gotsopoulos, 2010; Lieberman and Montgomery, 1998), while late entrants are disadvantaged by intensified competition (Carroll and Hannan, 1989; Klepper, 2002), then entry during an intermediate time window ought to maximize firm performance. Yet, while the concept of the strategic window is intuitive, its starting and ending points have not been easy to define.

Research on industry life cycles has argued convincingly that the end point of the window of opportunity coincides with the emergence of a dominant design that marks a shift in the nature of competition in the industry toward a regime in which economies of scale and investments in production methods become increasingly important (Abernathy and Utterback, 1978; Anderson and Tushman, 1990; Klepper, 1997; Utterback, 1994). However, identifying a theory-based and generalizable marker for the starting point of the opportunity window has been more difficult. For instance, Christensen *et al.* (1999) propose that the window of opportunity for entering an industry occurs "during the period just prior to the emergence of a dominant product design" (p. s213). Following a similar approach, Markides and Geroski (2005) suggest that successful "fast-second" firms enter an industry "just when the dominant design is about to emerge" (p. 120). Although these attempts convey the basic idea of a window of opportunity, they do not provide specific guidelines on how to define it.

Other studies have tried to specify various data-driven markers to distinguish different entry cohorts. Agarwal and Bayus (2004) and Lee (2009), for example, suggested distinguishing among firms that enter before the takeoff in the

DOI: 10.1002/smj

number of firms, firms that enter between the takeoff in the number of firms and the takeoff of industry sales, and finally firms that enter after the takeoff of sales. Gort and Klepper (1982) and Agarwal and Gort (2001) used discriminant analysis to identify the boundaries between entry cohorts, but empirical markers such as these can vary significantly from one industry to the next, and in the absence of a robust theoretical rationale to explain what drives the observed pointers, implications from one industry context are not easy to generalize to other contexts. This lack of theoretical anchoring of the various markers that have been proposed has indeed led to confusion and contradictory results with regard to the optimal time for firm entry into emerging industries. In contrast, the concept of the dominant category goes beyond data-driven markers and offers a generalizable and theory-based concept that can help to identify the opening of the opportunity window. As a result, it provides a more complete specification of the industry life cycle that considers both technological and sociocognitive factors.

Firms' categorical strategies

Firms that enter nascent industries can choose to either create their own categories or position their product(s) in categories already in existence. These positioning choices influence not only the firms' performance but also which categories gain traction and which one eventually achieves dominance. Indeed, even though the uncertainty that characterizes nascent industries creates challenges for firms, it also offers them the opportunity to influence the direction of industry evolution and, in particular, which perception of the industry becomes dominant (Santos and Eisenhardt, 2009).

A firm that actively advocates a new category essentially attempts to draw other stakeholders toward its own specific perception of the industry (Lounsbury and Glynn, 2001). Such a proactive categorical strategy requires not only that the firm position its products consistently but also that it engage in active, symbolic management in order to shape stakeholders' perceptions (Santos and Eisenhardt, 2009; Zajac and Westphal, 1995) and the emergent categorical schema. This is a high-risk but potentially high-return strategy: the firm and its products may emerge as the industry's categorical referents but may also run the risk of being locked into a specific categorical position that fails to gain traction.

An alternative, less proactive strategy is for firms to anticipate the shape of the industry rather than attempt to actively influence it. Positioning one or multiple products in different categories simultaneously allows firms to hedge their bets, potentially gaining footholds in multiple categories (Granqvist *et al.*, 2013) without fully committing to any particular one (see Sorenson, 2000, for an analogous multitechnology strategy). Rather than trying to influence how other stakeholders perceive the industry, firms that follow this strategy attempt to guess which category will gain dominance and prepare for quickly switching course if their guess is proven wrong. This strategy, however, can still have significant influence on which category eventually achieves dominance because support or lack of it for a category can sway the momentum in the industry in one direction or another.

Empirical research strategies

Our theoretical framework opens up new vistas for research on the impact that the dynamics of category formation have on industry life cycles and entry-timing advantages. One research strategy is to examine how categories are used in stakeholders' communications. For example, in order to study the categorical dynamics within the emerging industry for tablet PCs one could track the use of categories like "eBook," "e-reader," "iPad," or "tablet PC" in order to understand how those categories evolved over time.

The use of textual sources to track categories has gained traction in recent empirical research on category formation (Barley, 1983; Pontikes, 2012a, 2012b). Pontikes (2012b), for example, identified 456 categories used by 4,566 companies to claim membership within the software industry. Firms' press releases, annual reports, and trademark and patent applications all contain categories that firms use to educate stakeholders and make categorical claims when introducing their products (Fiss and Zajac, 2008). Such firm communications leave a clear record of firms' categorical claims and can thus be collected, coded, and analyzed with data-analysis software (Pontikes, 2012b).

Categorical positioning can also be traced through firm-level interviews (see, for example, Granqvist *et al.*, 2013), when appropriate research techniques are used to overcome the challenges of retrospective bias (see Eisenhardt, 1989). Furthermore, data can be collected on categories generated by other stakeholders, such

DOI: 10.1002/smj

as industry analysts and regulators, which is a well-established approach in the literature. For example, Zuckerman (1999, 2000) used categories generated by market analysts to examine the effects of multi-category membership on firm performance. Such data can facilitate empirical studies that take into account not only technological but also sociocognitive factors to test the propositions advanced in this and other related papers, and can provide us with a more complete understanding of the implications of entry timing for firm performance and survival.

ACKNOWLEDGEMENTS

The authors would like to thank the editor and two anonymous referees for their valuable comments to earlier versions of this manuscript. All authors contributed equally.

REFERENCES

Abernathy WJ, Utterback JM. 1978. Patterns of innovation in technology. *Technology Review* **80**: 40–47.

Agarwal R, Bayus BL. 2004. Creating and surviving in new industries. *Advances in Strategic Management* **21**: 107–130.

Agarwal R, Gort M. 2001. First-mover advantages and the speed of competitive entry, 1887–1986. *Journal of Law and Economics* **64**: 161–177.

Agarwal R, Sarkar MB, Echambadi R. 2002. The conditioning effect of time on firm survival: an industry life cycle approach. *Academy of Management Journal* **45**: 971–994.

Aldrich HE, Fiol M. 1994. Fools rush in? The institutional context of industry construction. *Academy of Management Review* **19**: 645–670.

Anderson P, Tushman ML. 1990. Technological discontinuities and dominant designs: a cyclical model of technological change. *Administrative Science Quarterly* **35**: 604–633.

Barley SR. 1983. Semiotics and the study of occupational and organizational cultures. *Administrative Science Quarterly* **28**: 393–413.

Berger JA, Heath C. 2005. Idea habitats: how the prevalence of environmental cues influences the success of ideas. *Cognitive Science* **29**: 195–221.

Bingham CB, Kahl S. 2013. The process of schema emergence: assimilation, deconstruction, unitization and the plurality of analogies. *Academy of Management Journal* **56**(1): 14–34.

Bohlmann JD, Golder P, Mitra D. 2002. Deconstructing the pioneer's advantage: examining vintage effects and consumer valuations of quality and variety. *Management Science* **48**: 1175–1195.

Bowker GC, Star SL. 2000. *Sorting Things Out: Classification and its Consequences*. The MIT Press: Cambridge, MA.

Carpenter GS, Nakamoto K. 1990. Competitive strategies for late entry into a market with a dominant brand. *Management Science* **36**: 1268–1278.

Carroll GR, Hannan MT. 1989. Density delay in the evolution of populations of newspaper organizations: a model and five empirical tests. *Administrative Science Quarterly* **34**: 411–430.

Christensen CM, Suarez FF, Utterback JM. 1999. Strategies for survival in fast-changing industries. *Management Science* **44**: 207–220.

Clark KB. 1985. The interaction of design hierarchies and market concepts in technological evolution. *Research Policy* **14**: 235–251.

Clark HH, Wilkes-Biggs D. 1986. Referring as a collaborative process. *Cognition* **22**: 1–39.

Dixit A. 1985. The role of investment in entry deterrence. *Economic Journal* **90**: 95–106.

Dobrev SD, Gotsopoulos A. 2010. Legitimacy vacuum, structural imprinting, and the first-mover disadvantage. *Academy of Management Journal* **53**: 1153–1174.

Eisenhardt KM. 1989. Building theories from cases study research. *Academy of Management Review* **14**: 532–550.

Eisenmann T, Parker G, Van Alstyne M. 2006. Strategies for two-sided markets. *Harvard Business Review* **84**: 92–101.

Fiss P, Zajac E. 2008. The symbolic management of strategic change: sensegiving via framing ad decoupling. *Academy of Management Journal* **49**: 1173–1193.

Foster R. 1986. *Innovation: The Attacker's Advantage*. Summit Books: Melbourne, Australia.

Garud R, Rappa M. 1994. A sociocognitive model of technology evolution: the case of cochlear implants. *Organization Science* **5**: 344–362.

Gilbert RJ, Newbery DMG. 1982. Preemptive patenting and the persistence of monopoly. *American Economic Review* **72**: 514–526.

Glynn MA, Abzug R. 2002. Institutionalizing identity, symbolic isomorphism and organizational names. *Academy of Management Journal* **45**: 267–280.

Gort M, Klepper S. 1982. Time paths in the diffusion of product innovations. *Economic Journal* **92**: 630–653.

Granqvist N, Grodal S, Woolley J. 2013. Hedging your bests: executives' market labeling strategies in nanotechnology. *Organization Science* **24**: 395–413.

Grodal S. 2007. *The Emergence of a New Organizational Field – Labels, Meaning and Emotions in Nanotechnology*. Stanford University: Palo Alto, California.

Hannan MT, Freeman J. 1989. *Organizational Ecology*. Harvard University Press: Cambridge, MA.

Hannan MT, Polos L, Carroll GR. 2007. *Logics of Organization Theory, Audiences, Codes Ecologies*. Princeton University Press: Princeton, NJ.

Haveman HA. 1992. Between a rock and a hard place: organizational change and performance under conditions of fundamental environmental transformation. *Administrative Science Quarterly* **37**: 48–75.

von Hippel E. 1994. *The Sources of Innovation*. Oxford University Press: Oxford, UK.

Hsu G. 2006. Jacks of all trades masters of none: audiences' reactions to spanning genres in feature film production. *Administrative Science Quarterly* **51**: 420–450.

Hsu G, Hannan MT, Kocak O. 2009. Multiple category memberships in markets: an integrative theory with two empirical tests. *American Sociological Review* **74**: 150–159.

Kaplan S, Tripsas M. 2008. Thinking about technology: applying a cognitive lens to technical change. *Research Policy* **37**: 790–805.

Kennedy MT. 2008. Getting counted, markets, media reality. *American Sociological Review* **73**: 270–295.

Kennedy MT, Chok JI, Liu J. 2012. What does it mean to be green? The emergence of new criteria for assessing corporate reputation. In *Oxford Handbook of Corporate Reputation*, Barnett ML, Pollock TG (eds). Oxford University Press: New York; 69–93.

Kennedy MT, Fiss P. 2013. An ontological turn in categories research: from standards of legitimacy to evidence of actuality. *Journal of Management Studies* **50**: 1138–1154.

Kennedy MT, Lo JYC, Lounsbury M. 2010. Category currency: the changing value of conformity as a function of ongoing meaning construction. *Research in the Sociology of Organizations, Categories in Markets: Origins and Evolution* **31**: 369–397.

Klepper S. 1997. Entry, exit, growth and innovation over the product life cycle. *American Economic Review* **86**: 562–583.

Klepper S. 2002. Firm survival and the evolution of oligopoly. *RAND Journal of Economics* **33**: 37–61.

Lambkin M. 1988. Order of entry and performance in new markets. *Strategic Management Journal* **9**: 127–140.

Lee G. 2009. Understanding the timing of 'fast-second' entry and the relevance of capabilities in invention vs. commercialization. *Research Policy* **38**: 86–95.

Lieberman MB, Montgomery DB. 1988. First-mover advantages. *Strategic Management Journal* **9**: 41–58.

Lieberman MB, Montgomery DB. 1998. First-mover (dis)advantages: retrospective link with resource-based view. *Strategic Management Journal* **19**: 1111–1125.

Lounsbury M, Glynn MA. 2001. Cultural entrepreneurship, stories, legitimacy, the acquisition of resources. *Strategic Management Journal* **22**: 545–564.

Lounsbury M, Ventresca MJ, Hirsch M. 2003. Social movements, field frames industry emergence: a cultural-political perspective on U.S. recycling. *Socio-Economic Review* **1**: 71–104.

Markides C, Geroski PA. 2005. *Fast Second: How Smart Companies Bypass Radical Innovation to Enter and Dominate New Markets*. Jossey-Bass: San Francisco, CA.

McMillan IC. 1983. Preemptive strategies. *Journal of Business Strategy* **4**: 16–26.

Mitchell W. 1991. Dual clocks: entry order influences on incumbent newcomer market share and survival when specialized assets retain their value. *Strategic Management Journal* **12**: 85–100.

Negro G, Hannan MT, Rao H. 2011a. Category reinterpretation and defection: modernism and tradition in Italian winemaking. *Organization Science* **22**: 1449–1463.

Negro G, Koçak Ö, Hsu G. 2011b. Research on categories in the sociology of organizations. *Research in the Sociology of Organizations* **31**: 3–35.

Pontikes EG. 2012a. Fitting in or starting new? An analysis of invention, constraint, and the emergence of new categories in the software industry. Working paper 12–61, University of Chicago, Chicago, IL.

Pontikes EG. 2012b. Two sides of the same coin: how ambiguous classification affects multiple audiences' evaluations. *Administrative Science Quarterly* **57**: 81–118.

Porac JF, Rosa JA, Saxon MS. 2001. America's family vehicle: the minivan market as an enacted conceptual system. In *Path Dependence and Path Creation*, Garud R, Karnoe P (eds). Lawrence Erlbaum Associates: Mahwah, NJ; 213–242.

Porac JF, Thomas H, Wilson F, Paton D, Kanfer A. 1995. Rivalry and the industry model of Scottish knitwear producers. *Administrative Science Quarterly* **40**: 203–223.

Prescott E, Visscher M. 1977. Sequential location among firms with foresight. *Bell Journal of Economics* **8**: 378–393.

Rao H. 2008. *Market Rebels: How Activists Make or Break Radical Innovations*. Princeton University Press: Princeton, NJ.

Robinson WT, Fornell C, Sullivan M. 1992. Are market pioneers intrinsically stronger than later entrants? *Strategic Management Journal* **13**: 609–624.

Rosa JA, Porac JR. 2002. Categorization bases and their influence on product category knowledge structures. *Psychology and Marketing* **19**: 503–531.

Rosa JA, Porac JR, Runser-Spanjol J, Saxon MS. 1999. Sociocognitive dynamics in a product market. *Journal of Marketing* **63**: 64–77.

Santos FM, Eisenhardt KM. 2009. Constructing markets, shaping boundaries: entrepreneurial power in nascent fields. *Academy of Management Journal* **52**: 643–671.

Schmalensee R. 1982. Product differentiation advantages of pioneering brands. *American Economic Review* **72**: 349–368.

Sorenson O. 2000. Letting the market work for you: an evolutionary perspective on product strategy. *Strategic Management Journal* **21**: 577–592.

Suarez FF, Cusumano M. 2010. Services and the emergence of dominant platformsChapter in. In *Platforms, Markets and Innovation*, Gawer A (ed). Edward Elgar Publishing: Cheltenham, U.K.; 77–98.

Suarez FF, Cusumano MA, Kahl S. 2013. Services and the business models of product firms: an empirical analysis of the software industry. *Management Science* **59**(2): 420–435.

Suarez FF, Lanzolla G. 2007. The role of environmental dynamics in building a first mover advantage theory. *Academy of Management Review* **32**: 377–392.

Suarez FF, Utterback JM. 1995. Dominant design and the survival of firms. *Strategic Management Journal* **16**: 415–430.

Tripsas M. 2009. Technology, identity, and inertia through the lens of "The Digital Photography Company". *Organization Science* **20**: 441–460.
Utterback JM. 1994. *Mastering the Dynamics of Innovation*. Harvard Business School Press: Boston, MA.
Utterback J, Abernathy W. 1975. A dynamic model of product and process innovation. *Omega* **3**: 639–656.
Utterback JM, Suarez F. 1993. Technology, competition and industry structure. *Research Policy* **22**: 1–21.
Vygotsky L. 1987. *Thought Language*. Plenum Press: New York.
Weber K, Heinze K, DeSoucey M. 2008. Forage for thought: mobilizing codes for the market for grass-fed meat dairy products. *Administrative Science Quarterly* **53**: 529–567.
Wry T, Lounsbury M, Jennings PD. Forthcoming. Hybrid vigor: securing venture capital by spanning categories in nanotechnology. *Academy of Management Journal*.
Zajac EJ, Westphal JD. 1995. Accounting for the explanations of CEO compensation: substance and symbolism. *Administrative Science Quarterly* **40**: 283–308.
Zerubavel EW. 1997. *Social Mindscapes: An Invitation to Cognitive Sociology*. Harvard University Press: Cambridge, MA.
Zuckerman EW. 1999. The categorical imperative: securities analysts and the illegitimacy discount. *American Journal of Sociology* **104**: 1398–1438.
Zuckerman EW. 2000. Focusing the corporate product: securities analysts and de-diversification. *Administrative Science Quarterly* **45**: 591–619.
Zuckerman EW, Kim T-Y, Ukanwa K, von Rittmann J. 2003. Robust identities or nonentities? Typecasting in the feature-film labor market. *American Journal of Sociology* **108**: 1018–1074.