The Evolution of Collective Strategies in Fragmented Industries

MARC J. DOLLINGER
Indiana University

This article revises and expands the theory of collective strategy to include firms in fragmented industries. Collective strategy in fragmented industries may be less visible, but it is no less extensive than in concentrated industries because repetitive patterns of pairwise interorganizational activity can aggregate into emergent collective strategy. This implies that collective activity is a ubiquitous strategy, permeating all types of organizations in fragmented industries. The article offers a process model and a mechanism for aggregating pairwise activity into collective activity based on an extension of the prisoner's dilemma game. A curvilinear relationship between environmental factors and cooperative behavior is proposed. Propositions suggest that the effects of cooperation on performance shift from the firm level to the population level as colonization is completed.

Even though collective strategies have been recognized as strategic options for firms in concentrated, oligopolistic markets (Bresser, 1988; Butler & Carney, 1986; Hamel, Doz, & Prahalad, 1989; Khandwalla, 1981), there is considerable evidence that firms in fragmented industries also use similar strategies. However, the extensiveness and frequency of collective activity by firms in fragmented industries have been generally overlooked. This may be due to the apparent paradox of the terms fragmented (connoting a loose-linked disconnectiveness composed of many small-sized competitive elements) and collective (connoting more tightly coupled, formal arrangements between a few large firms). It also may be that because firms in fragmented industries typically have been characterized as small, competitively weak, and subject to intense rivalry (Dess, 1987; Porter, 1980), their collective behavior (at the population level) has been mainly ignored, with the exception of agglomeration economics (Astley & Fombrun, 1983).

Nielsen (1988, p. 489) contended that reliance on the market mechanism seemed to preclude the use of cooperative strategy by firms in fragmented industries. However, firms in fragmented industries should not be relegated to the dustbin of the neoclassical economic model of pure competition. These firms also have the capabilities and requirements for interorganizational and collective strategy options that can increase their power and performance in the organizational field and thereby decrease their dependence relative to larger firms (Metcalf, 1976; Skinner, Donnelly, & Ivancevich, 1987).

The central argument of this article is that collective strategy is less visible in fragmented industries because much of it is emergent strategy. Emergent strategies at the firm level are
defined as patterns or consistencies in firm behavior in the absence of intentions (as contrasted with deliberate strategies in Mintzberg and Waters, 1985). Emergent collective strategy at the population level is the unintended result of aggregated repetitive patterns of pairwise interorganizational activity. The implications of this argument are that (a) collective strategy is more extensive in fragmented industries than previously thought; (b) a mechanism exists within a population of firms in a fragmented setting for initiating and transforming firm-level behavior into population-level behavior without a central organizing authority; and (c) environmental factors that are antecedents of firm-level pairwise cooperative behavior also are antecedents of aggregated population-level collective behavior.

This article addresses four broad questions about firms in fragmented industries and the use of collective strategy. The first question concerns frequency and the extensiveness of use. To what extent are collective and interorganizational strategies employed? What options are available? Recent normative applications and descriptions of competitive strategy overemphasize the conflictual alternatives of strategy (e.g., Thompson & Strickland, 1987), and even Porter (1980, 1985) only reluctantly recognized the potential for collective strategy in fragmented industries. It is possible that even for the small, relatively powerless business there is an alternative to the Hobbesian "all against all" competitive world.

The question of frequency is not trivial. Bresser (1988), for example, made no mention of collective strategy options in fragmented settings and devoted his discussion to oligopolistic market structures. Khandwalla’s (1981) model of competitive rivalry, strategy, and interorganizational relationships posits that organizational size will be positively related to collective behavior. The inference is that firms in fragmented settings (which are characterized by many small firms) do not employ collective strategies. Yet we know that at the firm level, small businesses in fragmented industries engage in boundary spanning (Dollinger, 1984) and use outsiders (Robinson, 1982); so, do they go the next step? Do these strategies exist? This article employs a typology developed by Astley and Fombrun (1983) and revises and extends it specifically to fragmented industries.

Second, what is the mechanism for the development of collective action in fragmented industries? Fragmented industries impose real barriers to collective action that concentrated industries do not. The atomistic nature of firm behavior in these fragmented settings is the cornerstone of neoclassical competitive economic analysis (Henderson & Quandt, 1971). Yet it can be shown without heroic behavioral assumptions (Axelrod, 1984) that repetitive pairwise interaction between actors at the firm level can aggregate into emergent strategy and spread through the population.

Third, what are the environmental and industry influences on collective and interorganizational action in fragmented settings? The relationships between various environmental dimensions (and the firm’s industry—a subset of environment, Dess, Ireland, & Hitt, 1988) and the firm’s strategy have been causally linked (Emery & Trist, 1965; Keats & Hitt, 1988; and many in between). The ability of a nondominant, single, independent firm to unilaterally influence the conditions of business for the entire population is limited, and assumptions to the contrary are heroic (although, this occasionally does occur). However, if environmental and industry influences affect firms’ interorganizational behavior in a similar manner (i.e., isomorphically) over large numbers of organizations, collective and cooperative efforts may occur as a result of these environmental imperatives (Oliver, 1988).

Finally, what is the efficacy of collective strategic action for the firm in a fragmented setting? Does it make any difference in terms of the firm’s performance? Are there certain conditions that make collective activity more effective than others? Even though collective action may increase autonomy and decrease dependence, it may be
an activity that does not manifest itself in financial performance or increased effectiveness. Collective activity may be necessary for survival, but it may not be sufficient for superior performance.

Emergent Collective Strategy and the Nature of Fragmented Industries

Interorganizational cooperation and a theory of collective action are rooted in the sociobiology of Hawley (1950) and exchange theory (Blau, 1964; Cook, 1977), which evolved into the resource dependence model (Aldrich, 1976; Pfeffer & Salancik, 1978). Collective strategy attempts to overcome strategic weakness through interorganizational and collective activity. It represents a search for predictability and stability (Bresser & Harl, 1986), an attempt to control the environment (Metcalf, 1976; Pfeffer & Nowak, 1976; Whetten & Leung, 1979), and an attempt to negotiate order among organizations (Astley, 1984). The key issues are the need to control critical resources versus the costs of these agreements, in terms of increasing complexity, loss of autonomy (Provan, 1984), and information procurement (Williamson, 1975). This is a particularly crucial decision issue in a fragmented setting because such firms typically have neither the economic power to control critical resources nor the slack to absorb these costs.

Fragmented industries pose special problems for the formation and development of collective strategies. These barriers have their origin in the nature of fragmentation. Conceptually, a fragmented industry is one in which “no firm has a significant market share and can strongly influence the industry outcome” (Porter, 1990, p. 191). It is characterized by a large number of small- and medium-sized, privately held firms. No firm acts as a market leader for price- or product-level decisions. For them, signaling (in the sense of providing information to all others in the task environment) as a mechanism for collective activity is not a strategic alternative. Empirically, a fragmented industry has been defined as one in which the top-four firm-concentration ratio is 40 percent or less (Dess, 1987; Porter, 1980). There are literally dozens of industries that meet this criterion, and examples include textile and apparel manufacturers, metal fabricators, and used car dealers (see Porter, 1980, pp. 192–195).

The attributes of fragmented industries impose constraints on the development of collective activity within an industry. The low entry barriers that characterize fragmented settings ensure that there will be many small, privately held firms. This makes information exchange and the recognition of interdependence difficult. The atomistic nature of fragmentation hinders frictionless information dissemination and raises transaction costs. Private ownership impedes public scrutiny, thereby forestalling the development of a central authority to regulate industry members or enforce compliance with a standard set of rules and procedures.

For these reasons most previous references to collective strategy in fragmented industries have been limited to the formation of trade and professional associations (Astley & Fombrun, 1983, Staber, 1985). The logic is that with a large number of relatively small firms, a central authority is required for the coordination of this formal and deliberate collective strategy (Astley & Fombrun, 1983, p. 582). But the theory is incomplete at this point. Given the obstacles to organizing a collective in fragmented industries, how does a trade or professional association (formal and deliberate) develop? At some point the cooperative behavior of pairs and small clusters of interacting firms must emerge as collective strategy. Only the deliberate organization of a formally chartered association adds intentionality at the collective level.

This theoretical gap exists because the distinction between interorganizational strategy and collective strategy is not clearly delineated. Collective strategy has been defined as “a systematic response by a set of organizations that collaborate in order to absorb the variation present in their environment” (Astley & Fombrun, 1983,
This systematic response takes the form of overarching interorganizational behavior. A closely related definition describes collective strategy as "attempts by sets of organizations to manage their mutual interdependence and the system dynamics of their interorganizational en-
vironment" (Bresser, 1988, p. 375). If you substitute the phrase "pairs of organizations" for "sets of organizations," interorganizational strategy is defined. However, "as individual organizational actions aggregate into interorganizational networks, an unintended collective strategy emerges that no one participant could have foreseen" (Bresser, 1988, p. 376, emphasis added). Thus, an implicit collective strategy exists when repetitions of pairwise interorganizational activity occur over large numbers of loosely linked organizations. Such organizations do not have to purposely engage in these activities in order to achieve collective goals. They do not need to be aware that other similar organizations are doing precisely the same thing. From the point of view of the individual organization, this activity is part of firm-level strategy, but the emergent pattern of activity is at the collective strategy level.

Proposition 1 In fragmented industries, repetitive patterns of pairwise interorganizational activity can aggregate into emergent collective strategy

Types of Collective Strategies in Fragmented Industries. Although numerous typologies for strategies at the firm level (competitive strategies) have been developed (Nielsen, 1988), firms in fragmented settings usually are portrayed as circumscribed to operational-level strategies in order to cope with or overcome fragmentation (Porier, 1980). However, if Proposition 1 is true, an examination of pairwise activity can identify the source relationships from which collective strategy, emergent or deliberate, develops. These source relationships can either be commensal or symbiotic (Astley & Fombrun, 1983). Commensal interdependence refers to firms of the same type and level in the production chain, usually competitors. Symbiotic interdependence suggests relationships between firms of different types, usually customers and suppliers. When elevated from the pairwise organizational level to the collective level, commensal and symbiotic interdependence are called confederate and conjugate strategy, respectively.

Commensal Relationships and Confedera
tte Strategies. In concentrated industries, confederate strategy is viewed as an attempt to avoid competition through techniques like point pricing, uniform price lists, standard costing, and product standardization (Khandwalla, 1981; Phillips, 1960). Confederate strategies supplement competitive strategies of price, product, and promotion (Bresser, 1988), and typically they take the form of collusion and informal industry leadership. Confederation is most likely in highly concentrated industries in which direct interaction is possible and oligopolistic tendencies are strong (Astley & Fombrun, 1983). A special case of confederation is the federation (Provan, 1983). D'Aunno and Zuckerman (1987) reviewed the case of hospital federations and hypothesized that these collectivities help reduce the risk of an unreliable actor. Collusion in a concentrated industry requires trust, facilitated by direct contact and information exchange reciprocity (Khandwalla, 1981). Participation in confederations is voluntary and the task structure is high (Scholper, 1987).

In a fragmented industry composed of many small firms, the barriers to formal confederation are high and the prospects for marketwide collusion are seemingly low. Yet in this situation there are many opportunities for commensal pairwise interaction. Pairwise cooperation can be found in many simple operating domains. For example, sharing transportation costs between firms for a truckload-sized shipment from a supplier reduces the delivery expense and enables the competitors to receive volume price breaks. Another example is the bilateral hiring of the competition's workers that enables the firms to share intelligence, that is, information about markets and products, personnel practices and internal policies, and firm perfor-
mance. Table 1 is organized according to Astley and Fombrun’s (1983) typology and presents illustrations of pairwise commensal behavior that can serve as the source of emergent collective activity.

As the need for resources, information, and risk reduction increases, small companies are more likely to enter joint ventures of one kind or another (Moxon & Geringer, 1985). The Wall Street Journal (Saddler, 1989) reported that a number of more formal efforts among small clusters of competitors in fragmented industries have emerged. For example, Michigan’s Flint River Project is a network comprising a dozen or so automotive parts suppliers who want to pursue markets too small and fragmented for the Big Three automakers. These businesses continue to operate separately while sharing manufacturing facilities and marketing and engineering experience. Also, The Northern Flathead Manufacturing Network is a group of companies that produce cabinetry and other wood products in Montana. In addition to banding together for manufacturing purposes, their goals are to recruit outside personnel and to lure outside investors to Montana. Both of these collectivities illustrate attempts to cope with fragmentation.

The confederate strategy has potential problems such as the loss of strategic information, the possibility of mistrust, the potential for increasing external attacks (the bigger target theory), and the attraction of new entrants (Bresser & Harl, 1986). The Wall Street Journal article cited previously also presented an example of an abortive attempt to form a confederation of independent textile contractors in New England. Company, union, and state officials organized the Needle Trades Project as a service organization to provide financial and social services for its members. Originally, a flexible manufacturing network was intended, but potential conflicts between the firms’ business strategies prevented the development of a confederate collective strategy. Instead, they formed an agglomerate, which provides each firm more flexibility and autonomy than a confederation.

**Table 1**

**Commensal and Symbiotic Interorganizational and Collective Strategies**

<table>
<thead>
<tr>
<th>Commensal interorganizational activities — Direct activities with competitors</th>
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<tbody>
<tr>
<td>Joint purchase agreements</td>
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<tr>
<td>Joint sales agreements</td>
</tr>
<tr>
<td>Sharing information with competitors</td>
</tr>
<tr>
<td>Engaged in a joint venture</td>
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<tr>
<td>Engaged in joint research</td>
</tr>
<tr>
<td>Engaged in joint advertising</td>
</tr>
<tr>
<td>Sharing transportation costs</td>
</tr>
<tr>
<td>Hiring competitor’s workers</td>
</tr>
<tr>
<td>Engaged in joint training</td>
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<tr>
<td>Engaged in licensing agreements</td>
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<table>
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<tr>
<th>Symbiotic interorganizational activities — Direct activities with noncompetitors</th>
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<tbody>
<tr>
<td>Joint venture with suppliers or customers</td>
</tr>
<tr>
<td>Joint research with suppliers or customers</td>
</tr>
<tr>
<td>Joint advertising with suppliers or customers</td>
</tr>
<tr>
<td>Hiring suppliers’ or buyers’ workers</td>
</tr>
<tr>
<td>Sharing transportation costs</td>
</tr>
<tr>
<td>Sharing information with competitors</td>
</tr>
<tr>
<td>Engaged in joint training</td>
</tr>
<tr>
<td>Engaged in licensing agreements</td>
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Symbiotic Relationships and Conjugate Strategies The conjugate collective strategy is a work network that has contractual and legal sanctions. Typical structures are joint ventures and interlocks, vertical integration efforts, and R & D partnerships (Khandwalla, 1981). Conjugate strategies are vertical between suppliers and buyers of material, or finance, or finished goods, for example, a manufacturer-dealer network (Skinner & Guitman, 1986). Similar to the confederation, the conjugate collective strategy is voluntary, has high task structure, and indicates a moderately to tightly coupled relationship (Scholper, 1987).

These types of symbiotic arrangements can ameliorate the effects of fragmentation (Harrigan, 1988). Table 1 provides illustrations of symbiotic pairwise relationships. For example, consider a supplier of raw materials or components and the small manufacturer (both in frag-
mented settings) who engage in a cooperative agreement calling for a strategy of joint research and development. At the firm level, this relationship enables the small manufacturer to test the operating characteristics of the supplier’s material for a fee (a gain for the manufacturer) and offers the possibility of improved material over time (a gain for the supplier). If this pairwise relationship is repeated many times over a large number of loosely coupled firms, a collective strategy has emerged. When the supplier R & D relationship reaches a point where the number of repetitions is sufficiently large, it serves to increase the power and autonomy of both populations of firms by standardizing a practice that has positive incremental returns to both sets of participants.

At the firm level, suppliers that refuse to sponsor the R & D and manufacturers who are incapable of conducting R & D are at a disadvantage (ceteris paribus). As the cooperative relationship becomes standard practice, all small manufacturers who maintain this relationship enjoy gains, relative to those that do not cooperate (defectors) and perhaps even relative to the population of suppliers. This does not imply that the suppliers do not enjoy gains in an absolute sense as well (a positive sum game). The development of standard practices between industries does not require an a priori central organizing authority. Subsequent creation and existence of a formal organization simplifies the problem of identifying the collective strategy, and although collective behavior can be characterized by its degree of formality (Bresser, 1988; Bresser & Harl, 1986), the presence of the formal organization is not necessary for the collective action to exist.

Confederate and conjugate collective strategies are the result of direct contact between firms. The agglomerate and organic forms are the collectives that result from indirect contact.

**Agglomerate Collectives.** Such collectives are formed by the combination of indirect association and commensal interdependence. An agglomeration is an information network and an aid to isomorphic decision making (Oliver, 1988). In these situations, control is exercised by economic sanctions (dues or profits), and cartels and trade associations are the prevalent forms (Staber, 1985). Agglomerations usually are found in fragmented populations that have many small, homogeneous units (e.g., retail businesses, farms, small manufacturers). Regarding agglomerate collectives, the population ecologists attempt to demonstrate the futility of individual firm strategy—economic forces dominate, unless a collective strategy is implemented. The agglomerate form is characterized by loose coupling, voluntary participation, and low task structure (Schopler, 1987).

**Organic Networks.** The organic form is one of indirect association (indirect in terms of the business, not individuals) and symbiotic interdependence. In such a network, symbiosis goes beyond vertical interorganizational interaction and extends to the exercise of power. Organic networks are influence networks in which the major form of control is political power. Organic structures are found intertwined in networking types of organizations. Similar to the agglomerate form, the organic collective is characterized by low task structure and voluntary participation (Schopler, 1987).

Birley (1985) investigated the use of these networks by individuals starting their own small businesses in fragmented industries. She found that informal organic networks composed of family, friends, and colleagues represented the primary strategy through which budding entrepreneurs acquired resources and information. This network is composed primarily of interacting, cooperative, pairwise relationships.

Lazerson’s (1988) study of the Emilia Romagna region of Italy described three organic collectives: the Communist Party, extended families, and state agencies. All of these multipurpose collectives (which often are structured as complex holding companies) attempt to mitigate the fragmentation of the manufacturing sector in this region of Italy. They serve to reduce transaction costs and, ironically, enable small busi-
nesses to rely on the market versus hierarchy for exchange. These collectives are organizational forms between markets and hierarchies (Thorelli, 1986).

Table 2 illustrates agglomerate and organic strategies that are typical of fragmented industries.

**A Process Model**

According to Astley and Fombrun (1983), the agglomerate and organic forms are the most extensively employed collective strategies in fragmented industries. They argued that these are less formal and more loosely coupled than the confederate and conjugate strategies. There is ease of entry into and exit from agglomerates and organic networks as well as low transaction costs. However, the agglomerate and organic forms are indirect collective strategies, and they could have developed only as a result of earlier pairwise cooperative behavior. The repetition of pairwise interaction over many organizations can aggregate until a cluster of interacting firms reaches a critical mass (Schelling, 1978). (The term critical mass describes a class of process models of behavior that depend upon a number of actors behaving in a certain way. Applications of critical mass models have been made in epidemiology, ecology, fashion marketing, language usage, racial integration, and even jaywalking. The critical mass needed for an activity to become self-sustaining is a parameter that can be a number, a density function, or a ratio. Schelling [1978, pp. 102–110] provided diagrams and mathematical examples.) The result is emergent collective strategy between firms in direct contact. This strongly suggests that direct pairwise contact, either symbiotic or commensal, aggregates and precedes the indirect and deliberate modes of collective action. Thus, the place to look for the origins of agglomerate and organic collective strategy in fragmented industries is in the emergent conjugate and confederate forms.

In fragmented industries agglomerates and organic networks do not emerge as full-blown, formal collectives without earlier stages of development. Like the confederate and conjugate modes, the agglomerate begins with repeated pairwise interaction that aggregates until a cluster of cooperative firms forms. At this juncture, three possibilities exist: (a) the cluster can remain "as is," and the result is an emergent collective strategy; (b) the cluster can become self-cognizant and form a deliberate confederate or conjugate strategy; and (c) the cluster can become self-cognizant, but the costs of direct contact can outweigh the benefits, and an indirect form of collective, such as the agglomerate, is formed. This is, in essence, what happened in the Needle Trades Project example. Figure 1 depicts the stages of development of collective strategy in fragmented industries.

**Table 2**

*Agglomerate and Organic Strategies*

<table>
<thead>
<tr>
<th>Agglomerate strategies—Indirect commensal activities</th>
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</thead>
<tbody>
<tr>
<td>Member of a trade association</td>
</tr>
<tr>
<td>Member of a professional association</td>
</tr>
<tr>
<td>Using industrywide standard costing</td>
</tr>
<tr>
<td>Producing industrywide standard items</td>
</tr>
<tr>
<td>Pricing from industrywide lists</td>
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<table>
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<tr>
<th>Organic strategies—Indirect activities in the organizational field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member of the chamber of commerce</td>
</tr>
<tr>
<td>Member of an executive roundtable</td>
</tr>
<tr>
<td>Member of the National Federation of Independent Businesses</td>
</tr>
<tr>
<td>Member of a political action committee (PAC)</td>
</tr>
<tr>
<td>Member of a religious organization</td>
</tr>
<tr>
<td>Active in United Way</td>
</tr>
<tr>
<td>Active in other community-oriented groups</td>
</tr>
<tr>
<td>Have contact with the Small Business Administration</td>
</tr>
<tr>
<td>Have contact with a Small Business Development Center</td>
</tr>
<tr>
<td>Have contact with a university</td>
</tr>
<tr>
<td>Serve on any boards of directors</td>
</tr>
</tbody>
</table>

*Proposition 2: In fragmented industries, collective strategy evolves through a series of stages (Figure 1). Originating from commensal and
**Figure 1. The stages of evolution of collective strategy in fragmented industries.**

**Stage I**
- **Firm level**
- Pairwise commensal interaction

**Stage II**
- Repetitive, aggregated commensal

**Stage III**
- Clustered commensal
- Emergent confederate
  - Deliberate confederate or Agglomerate
  - Deliberate confederate or Organic

**Stage IV**
- Emergent conjugate

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**symbiotic pairwise cooperative behavior (Stage I),** the cooperation is repeated over many firms (Stage II), clusters of cooperation subsequently are formed (Stage III), and as the process spreads to the population, a collective strategy emerges (Stage IV).

Whereas Proposition 1 raised the possibility that the phenomenon of emergent collective strategy exists, Proposition 2 suggests that it is the precursor of all deliberate collective strategy in fragmented industries. In a concentrated industry in which perhaps four or five firms may control 60 or 80 percent of the population’s resources, it is easy to imagine the initiation of a collective strategy as a result of a few phone calls or face-to-face meetings. The barriers to population-wide collective action in fragmented industries prohibit this facility, which suggests a more evolutionary process.

**The Mechanism of Emergent Collectivity.** A mechanism for "the evolution of cooperation" was described by Axelrod (1984) in a book by the same name. This book presented the results of a series of computer simulation tournaments of the prisoner's dilemma game. (See Rapoport and Chammah, 1970, for the details of the mathematics of the prisoner’s dilemma game and Nielsen, 1985, for a review of Axelrod’s book.)

The game is a familiar one. Two players (the pair) confront two choices: either to cooperate or to defect. Each must make the choice without knowing what the other one will do. From each player’s point of view, defection has the highest payoff; but if both defect, they do worse than if they had cooperated, thus, the dilemma (Axelrod, 1984, pp. 7–8). The choices that players make can cause four outcomes. If both players defect, they are punished (P) and, say for example, receive 1 point each. If both cooperate, they receive the reward (R) and 3 points each. If one cooperates and the other defects, the detector receives the temptation (T) award of 5 points, while the other receives the sucker (S) payoff of zero.

The assumptions or initial conditions used for the game are both behavioral and environmental, and they display a congruity to the conditions of fragmented industries. The behavioral conditions are met when each actor pursues his or her own self-interest and can recognize and
remember the interaction. These behavioral assumptions pertain to both fragmented and concentrated industries; therefore, they do not, by themselves, distinguish between the two industry settings. However, additional restrictions reflect the realities of fragmented industries better than those of concentrated industries, in which a few large firms can dominate and lead. These additional restrictions are (a) the absence of a mechanism available to enforce threats or commitments, (b) the uncertainty regarding the other player’s move, (c) the absence of signaling or communication, (d) the inability to change the other’s payoffs, and (d) the inability to eliminate the other player (Axelrod, 1984, pp. 11–12). These restrictions correspond to the structure of fragmented industries, even though previous applications of the prisoner’s dilemma to management situations have focused primarily on concentrated industry settings (Nielsen, 1985).

The environmental assumptions are that the game will be played for an indefinite number of times and that the discounted value of the reward for the next transaction is sufficiently high. The expectation of continued and salient interaction precludes noncooperative endgame behavior, for example, one-time deals and near-bankruptcy behavior. The payoff matrix need only be specified such that $T > R > P > S$, where $T$ is the payoff (the temptation) for noncooperation (or defection), $R$ is the reward for pairwise cooperative behavior, $P$ is the punishment for pairwise defection, and $S$ is the sucker payoff for cooperating while the other player defects. An additional requirement of the matrix is that $2R > T$, which prevents players from taking turns exploiting each other and earning higher payoffs. The framework is quite unrestricted beyond these conditions and requires neither comparable and symmetrical payoffs nor an absolute unit of measuring payoffs. Cooperation needn’t be desirable from the rest of society’s viewpoint (Aram, 1989), for example, as in the case of price-fixing collusion. The actors need be only partly rational (bounded rationality rules, and there is no need to assume deliberate choice (Axelrod, 1984, pp. 17–18). When environments or industry conditions present positive-sum payoff matrices with this configuration, the game is on, and the evolution of cooperation may begin.

**Proposition 3:** Pairwise cooperative behavior between firms in fragmented industries emerges when the total rewards for cooperation exceed the payoff for noncooperation ($2R > T$), when there is the expectation of an indefinitely long time horizon, and when the discounted value of the reward for the next transaction is sufficiently high.

The winning strategy in Axelrod’s prisoner’s dilemma (PD) simulation proved to be a cooperative strategy called “tit for tat.” Tit for tat is a “nice” game, and it is simple. The rule is: cooperate on the first move, and then do whatever the other player does. Axelrod showed that given these simple baseline assumptions, independent actors using a cooperative strategy (or call it a behavioral rule, a standard operating procedure, an algorithm for decision making) could outperform actors using noncooperative strategies (Stage I). In Stage II, the rule can lead to the development of large numbers of cooperative actors. Subsequently, through behavior-modeling mechanisms such as imitation and vicarious learning and through direct contact, cooperation can spread among a population of real firms. In addition, the competitive pressures for survival can produce isomorphic behavior in firms, and if cooperation is adaptive, then cooperative behavior will emerge without deliberate imitation (Hannan & Freeman, 1977). A competing theory that can produce the same isomorphism claims that similar characteristics in a population of organizations are the result of the interconnectedness of the structure of the organizational field (DiMaggio & Powell, 1983). Therefore, it is not necessary for the actors to be aware of each other or to deliberately choose a cooperative behavior for the strategy to be repeated.

Once critical mass is reached, clusters form.
and the cooperation becomes self-sustaining. This represents an intermediate stage (Stage III) in the transformation from firm-level behavior to population-level behavior (Oliver, 1988). The results of the simulation showed that a population of noncooperative actors could be "invaded" by a small number of interacting cooperators (forming a cluster), and the population itself could be transformed into a cooperative system. The survival of these clusters depends on reaching a critical mass. Critical mass is the minimum level of activity needed to make the activity self-sustaining (Schelling, 1978, p. 95). It is an event in the process of the evolution of collective strategy. Schelling (1978, p. 218), in his analysis of multirole (n-player) prisoner dilemma situations, defines the critical mass as a parameter that is the minimum size of any coalition, which can gain from abstaining from the preferred choice (the temptation for defecting). Reaching critical mass is the key to the transformation of pairwise firm-level behavior to clusters (Axelrod [1984, pp. 158–159] called this process colonization) and, finally, to the population.

The emergence of self-sustaining clusters presents evidence that the cooperative activity is changing from a firm-level phenomenon to a population-level phenomenon. The nature of the evidence is embodied in the following question: Has the cooperative activity become one of the defining characteristics of members of the population? In the early phases of Stage III, some members of the population may cooperate and some may defect. If the cooperation is functional in the long term (i.e., 2R > T), the defectors will cease to be part of the population; they will either go out of business or their business form and operating practices will so little resemble the cooperators that they will fall outside the boundaries of the population.

Proposition 1 stated that pairwise interorganizational behavior can aggregate into collective behavior. The key to understanding when this will happen is encompassed in the construct of critical mass and the parameter needed to achieve it. Figure 2 illustrates the mechanisms for the evolution of collective strategy that underlie the stages of evolution in Figure 1.

**Proposition 4** The evolution of collective strategy in fragmented industries begins through pairwise cooperation in a positive-sum game environment (Stage I), and it is repeated by the processes of mimetic adaptation, competitive selection, and structural isomorphism (Stage II). When the process reaches a critical mass (between Stage II and Stage III), it can pervade a population through colonization.

### Environmental and Industry Effects

The previous discussion poses two sets of concerns about the environment for firms in fragmented industries. First, what characteristics of the firm's environment and industry will provoke, sustain, or inhibit repetitive pairwise behavior (Stages I and II)? This question addresses the context and antecedents of the origins of cooperative behavior at the firm level. Typically, researchers have concentrated on identifying

![Figure 2. The mechanisms for the evolution of collective strategy.](image-url)
the dimensions of the environment (see Dess et al., 1988, and Keats & Hitt, 1988, for an extensive review) and determining the correlation between operationalizations of these dimensions and subsequent firm behavior and performance (Beard & Dess, 1981; Prescott, 1986). However, the previous section indicated that sufficient conditions for the initialization of pairwise cooperative strategy could be found in the payoff matrix facing firms in a prisoner’s dilemma type of situation (Proposition 3). Therefore, an approach to this first question is to examine how environmental and industry dimensions affect the ability of firms to comprehend the payoff matrix (context) and the actual payoffs (antecedents) that they present to the pairs of players.

The second set of issues deals with the environment at the population level. What are the population-level environmental conditions that facilitate or hamper the transition to colonization, and when will the environment sustain formal and deliberate collective strategy at the population level (Stages III and IV)? The previous propositions can account for the emergence of cooperative strategy, commensal and symbiotic aggregation, the formation of clusters of cooperating firms, and even the emergent colonization of a population, but the link between emergent and deliberate collective strategy remains unexplored. This question is the equivalent of asking, When does the cluster of firms, behaving “as if” it possessed a collective strategy, achieve consciousness?

Environmental Context of Collective Behavior. The context of the environment influences the evolution of collective strategy by affecting the ability of firms to comprehend the payoffs for cooperating and defecting behavior and by determining the importance of the game itself. Three contextual dimensions that affect payoff comprehension and the matrix of rewards are munificence, complexity, and dynamism (Dess & Beard, 1984, Dess et al., 1988; Keats & Hitt, 1988; Tung, 1979). Each has the effect of limiting or encumbering the development of pairwise cooperative behavior at very high levels, encouraging cooperation at intermediate levels, and making cooperation problematic at low levels.

Following from Keats and Hitt’s idea (1988), munificence can be defined as the degree of resource abundance and the capacity to support growth. The small firm in a munificent environment would find that acquiring resources and raw materials presents no problems and that acquiring markets to dispose of finished products entails few difficulties. Under these circumstances, most decisions of a firm would seem rewarding; therefore, the firm would be unwilling to trade autonomy and strategic flexibility for assurances in input and output markets. A rich environment makes the firm indifferent to the payoff matrix and the need for cooperative behavior; the strategic dependencies that make the payoffs for cooperating higher than those for defecting are absent. In other words, the transaction costs of playing the game exceed the benefits of cooperating (Williamson, 1975).

A very lean environment also hampers the development of cooperative efforts because the firm is unlikely to have enough slack resources for strategic flexibility (Aldrich 1979; March & Simon, 1958; Sharfman, Wolf, Chase, & Tansik, 1988). Without slack resources of any kind (money, human resources, managerial time, or excess capacity), the firm is unable to extend itself and must focus solely on surviving. In this situation, the firm lacks the “ante” to get in the game.

In an intermediate munificence condition, the environment is neither so rich and forgiving nor so hostile as to make cooperation, respectively, irrelevant or futile. This is the state of affairs that Porter (1980) described for firms that are successful at coping with fragmentation. They have positioned themselves to avoid the leanest niches, but they are unable to overcome fragmentation by reinventing the industry’s economics and creating a truly munificent environment. These conditions are most amenable to collective be-
behavior because they include payoffs that are motivating and resource levels that are enabling.

Dynamism reflects instability and volatility (Keats & Hitt, 1988). The more dynamic the industry environment, the more change and unpredictability the firm faces. Change and unpredictability present information challenges for the firm. With instability comes risk, specifically the risk that the payoffs from continued cooperation are low or the risk that the relationship may be discontinued. The continuation of cooperation requires that there be an indefinite period of time for the interaction’s duration and that the reward for the next cooperative episode be sufficiently high (Proposition 3). A dynamic environment puts both of these conditions in doubt and impedes the development of cooperation.

However, moderate levels of dynamism support cooperative interfim behavior. For example, a symbiotic vertical interaction decreases risk by contractually arranging for resource acquisition, resource disposal, and other activities within the vertical network. Firms that face moderately unstable industry environments will attempt to couple themselves more tightly with organizations that control critical resources. By engaging in relationships with relevant organizational actors, a fragmented industry’s entrepreneur may be able to use personal influence and power to help protect the firm from the negative consequences of the other actors’ behavior.

Very stable environments will not promote collective action because they remove many of the major motivations for belonging to a collective. The need for the coordination of actions and the management of interdependence through forestalling (which prevents unpredictability), forecasting (which enhances intelligence), and uncertainty absorption (which mitigates the consequences of the negative environment) are diminished (Pennings, 1981).

Complexity refers to the dissimilarity of environmental elements and the extent of their interconnectedness (Keats & Hitt, 1988). A highly complex environment has a retarding effect on the evolution of cooperation. Complex environments make it difficult for the firm in fragmented industries to identify what the payoffs are or how they are measured. The sheer number of actors in a fragmented environment increases the information requirements needed to comprehend the nature of the payoff matrix and the possibilities of interaction. The heterogeneity of a complex environment may provide a different metric for each firm’s payoff, thus complicating the development of cooperative behavior. For example, failure of the Needle Trades Project (discussed previously) to achieve confederation can be directly attributed to the different stages of development that the firms were in and how they measured success (Saddler, 1989).

As was the case for the stable environment, the simple environment reduces the motivation for cooperative behavior by offsetting any benefits with the costs of loss of autonomy or strategic flexibility. However, moderate levels of complexity encourage cooperative behavior. The firm’s managers can comprehend the nature and the value of the payoffs for cooperation, and managing the complexity is salient for firm performance. Figure 3 illustrates the curvilinear relationship between environmental factors and collective strategies in fragmented industries.

The relationship among these three environmental factors, collective strategy, and cooperative behavior in concentrated industries and oligopolistic markets is probably more linear than curvilinear. Large public firms in these settings use continued pressure in order to increase performance, even in munificent contexts, and public managers may be more willing to trade autonomy for decreased risk than the private entrepreneurs who control firms in fragmented industries. A very dynamic environment is less likely to change the players in a concentrated industry because entry and exit barriers are higher. (Although recent merger and acquisition activity indicates that few players are safe.) Lastly, the slack that many larger firms enjoy enables these organizations to deal with high
Formal and deliberate collective strategy can be seen as the outcome of responses to population-level phenomena. In response to population-level stimuli, a cluster of commensal or symbiotic organizations may become self-cognizant and, consequently, may initiate the process of the formation of a central authority to match population-level requirements. Organizations, events, and processes that characterize the population-level environmental stimuli possess the latent or manifest power to affect the game-theoretic process for all firms in a fragmented industry. Firm-level environmental conditions, munificence, complexity, and dynamism affect the abilities of individual firms and pairs of firms to participate in the game. Population-level environmental conditions change the game for everyone. The ability to change the game-theoretic basis for cooperation can take either or both of the following forms: (a) the ability to stop the game by reconfiguring the payoff matrix in the sufficient manner (Proposition 3) or (b) the potential to slow the game by altering the perception that tit for tat is the optimal strategy (Proposition 4).

A number of environmental elements that pose these types of population-level challenges can be identified. For example, threats from federal and state regulators that attempt to challenge and control operating practices in the health care industry increase the payoffs for cooperative behavior. These threats have resulted in the creation of federated interorganizational groups in health and human services (Schopler, 1987). Activist consumer and environmental groups change the matrix by increasing the penalties for noncooperation. Managing social issues such as consumerism and environmentalism requires a formal collective problem-solving process to match the organized activist collectives (Aram, 1989; Austrom & Lad, 1986). Governmental efforts to encourage macroeconomic growth and sectoral development have initiated games by providing incentives for cooperation where none previously existed. These new incentives have prompted the organization
of economic development committees (Metcalf, 1976). Threats to national security from OPEC had the potential to increase the payoffs for cooperation in the formulation of national energy policy (Gray, 1985). Although a national policy has not been articulated, the Department of Energy was created in response. Additional methods for achieving population-level goals include lobbying through public action committees, the formation of trade associations, and joint public relations/advertising efforts (Baysinger, 1984).

These studies indicate that deliberate collective strategies (the creation of a central authority to organize and formalize the aggregated emergent cooperative behavior) is the outcome when threats or opportunities at the population level become salient. For firms in fragmented industries, forces outside their immediate operating environment that are organized as collectives pose these threats. These include governmental bodies, public interest groups, potentially revolutionary technological changes that affect all firms in the population more or less simultaneously, and threats from other groups and populations of competing firms.

The formal collectivity established to respond may be tightly or loosely coupled. Tight coupling takes the form of a contract and agreements that are explicit specifications of a mutually accepted rule for future behavior (Gottfredson & White, 1981). Tight coupling causes the loss of more autonomy and increased transaction costs for the benefits of collective action. Hence, deliberate conjugate and confederate strategies are the outcomes of the most severe population-level threats because the benefits of collective action exceed the high costs of loss of control. Loose coupling conveys responsiveness, while the identity, autonomy, or logical separateness of the firms are preserved (Weick, 1976). Therefore, formal agglomerates and organic collectives are the outcomes of less serious threats to a population because the benefits of autonomy exceed the costs of formal collective response. Table 3 summarizes these relationships.

Proposition 6 Deliberate collective strategies will develop in fragmented industries when organizations, events, and processes at the population level can alter the game for all participants. Under such circumstances, when the benefits of cooperation are greater than the costs of autonomy loss, confederate and conjugate strategies result. When the costs of autonomy loss exceed the benefits of cooperation, agglomerate and organic strategies result.

**Collective Strategies and Performance**

Pairwise cooperative behavior in fragmented industries can be modeled either as a variable or as a positive sum game—both can do better at the expense of some “other” (Khandwalla, 1981; Nielsen, 1988). Because of the nature of fragmentation, the other is unknown, that is, some firm beyond the operating experience of the two players. (Contrast this to the zero-sum assumptions of oligopolistic and concentrated

<table>
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<tr>
<th>Type of Collective</th>
<th>Nature of Contingency</th>
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<tr>
<td>Emergent confederate and conjugate</td>
<td>No population-level threat and costs of central authority greater than benefits</td>
</tr>
<tr>
<td>Deliberate confederate and conjugate</td>
<td>Population-level threat and costs of central authority greater than costs</td>
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<tr>
<td>Agglomerate</td>
<td>Population-level threat and costs of confederation greater than benefits</td>
</tr>
<tr>
<td>Organic</td>
<td>Population-level threat and costs of conjugate greater than benefits</td>
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industries where all firms are quite aware of each other.) It appears that the inevitable conclusion is that at the firm level, ceteris paribus, pairwise cooperative behavior is always positively related to performance (i.e., tit for tat wins).

However, as colonization proceeds and the game spreads to n-players, the gains at the firm level diminish because there are fewer others to gain from. The benefits from the cooperative behavior shift from the pairs or clusters of firms to the population of firms, relative to other populations. For example, consider an aggregated, emergent strategy (e.g., just-in-time inventory delivery systems) in a fragmented industry (e.g., furniture manufacturers and assemblers) that has spread through the population by mimetic adaptation. In the early stages of colonization, those that adopt (cooperate) benefit at the expense of those that do not; lower costs for the adopters means improved performance, and these returns can be reinvested in higher quality products, passed on as lower prices, or paid to shareholders as dividends. When every firm has adopted the strategy, it is no longer an advantage for any of them. Each firm will have had the opportunity to match the quality improvements, to meet the price decreases, or to make payouts to investors. Increases in firm-level performance are exhausted at this point.

Further increases in performance may be visible only at the population level. Collective strategy strengthens the population. Agglomerate strategies that have the effect of, for example, stabilizing prices, decrease rivalry among firms and increase margins and profitability. When all firms in the population participate in the agglomerate, they do not outperform each other (ceteris paribus) as a function of the agglomerate, but the industry as a whole may outperform other, less cooperative, fragmented industries. Figure 4 illustrates this relationship between firm-level performance and population-level performance over the four stages of the colonization process.

Conjugate strategies may include cost sharing, a degree of technology transfer, and the risk reduction of guaranteed supply or demand. For example, IBM reportedly has over 2,000 joint ventures with software manufacturers. These software manufacturers, as individual firms, have engaged in cooperative pairwise behavior with IBM, but in the aggregate they are a population of firms whose behavior represents an emergent conjugate collective strategy. This represents a Stage IV collective (see Figure 1). Continued cooperation with IBM (to the extent that IBM remains a powerful leader in the computer industry) may be positively related to firm-level performance, but no incremental advantage from the IBM link accrues to any firm already in the population. The isomorphism diminishes firm-level differential advantage. However, these firms have a major advantage relative to firms that are not in this population of IBM joint ventures because they have secured resources and legitimacy of the primary player in their environment. The advantage can turn into a disadvantage because the tight coupling with IBM implies a degree of strategic inflexibility. Should IBM lose its market position, all firms in this population would suffer, relative to those that made alliances with better performers or those that maintained their autonomy. (Incidentally, since IBM has the potential to change the game for all players [software manufacturers], it could be predicted that a confederate or agglomerate strategy will develop among these players.)

This discussion has introduced a number of related propositions concerning collective strategy and performance.

Proposition 7A: Pairwise cooperation increases performance at the firm level early in the process toward colonization.

Proposition 7B: Cooperation by firms during the latter stages of colonization may be necessary to avoid poor performance.

Proposition 7C: Progress toward colonization and formal cooperation shifts performance changes from the firm level to the population level.
Figure 4. The relationship between firm- and population-level performance during development of collective strategy.

Implications for Future Research

The central theme of this article is that the development of collective strategies in fragmented industries is a process that begins as pairwise cooperative behavior between firms. As these interactions are repeated and aggregated over large numbers of firms, an emergent collective strategy is created. The formalization of this emergent strategy will occur if environmental elements at the population level create a "consciousness" among the firms and the gains from joining the collective exceed the costs. This theory has implications for both future research and the interpretation of past efforts.

Proposition 1 and the subsequent derivative propositions focus on the importance of identifying the industry setting as the frame for understanding collective strategies. Collective strategy in fragmented industries is different from that in concentrated industries. In addition, there are different levels of industries: international, national, regional, and local. Within each level, the degree of fragmentation may be different. For example, in a study of interorganizational linkages in the commercial television industry, data were pooled over 25 markets, indicating a fragmented industry (Stearns, Hoffman, & Heide, 1987). The hypothesis that there would be a complementary interactive effect between market and linkage complexity on performance received the most support because it took into account the nonlinearity of market complexity and interorganizational strategy. If the data had been analyzed on a per market basis, where each broadcaster is an oligopolist, the results might confirm the linear model.

Proposition 5 addressed the appearance of
nonlinearities in fragmented markets and environments. These environmental influences must be factored in, too. Because the dimensions of the environment affect firm-level behavior, so, too, will these dimensions affect collective-level behavior. The goal for researchers is to elaborate and test a contingency theory of collective strategy that will incorporate environmental factors and business-level strategy as predictors and moderating influences. Although this article offers only limited speculation about the contingencies concerning environmental variables, contingent relationships also may be found concerning the structure and internal controls of the small firm (Miller, 1988), the business-level strategy of the firm (Davig, 1986), or the personal characteristics of the owner-operator (Dollinger, 1984). Adding these dimensions to the model will cast a wider net around the phenomena.

The combinations and permutations of inter-organizational options available in fragmented settings are substantial. Even though Tables 1 and 2 provide an extensive list, other possibilities may exist. A problem for researchers is that emergent collective behavior is less visible in fragmented industries than is formal collective behavior or behavior in concentrated industries. It is imperative that the researcher know the industry and ferret out these connections. Each industry has its idiosyncrasies, and generic lists similar to Table 1 provide clues, not classifications. By examining pairwise linkages and collective behavior, researchers as well as strategists will be forced to acknowledge that firms in fragmented industries are not limited to “all against all” strategies. Theory is perhaps better served by use of “the web of organizational life” metaphor as an alternative to “warfare.”

Propositions 2, 3, and 4 recognize that emergent collective behavior must be understood as a process and that the process begins at the firm level. Research opportunities exist to flesh out the characteristics of the processes and the details of how cooperative behavior differs at different stages. For example, Oliver (1988) suggested that the time span for the development of isomorphism may be an important variable. To what extent does the degree of fragmentation affect the time span? Also, isomorphic forces (the payoff matrix) may have varying effects on different firm characteristics (Oliver, 1988). Which are the first to change and which are the most resistant to pressure for cooperation? Finally, although Figures 1 and 2 seem to suggest that the emergence of a collective represents a progression and a final transformation, it is not clear whether the processes can work in reverse. Formal collectives can disappear, but do they devolve back into pairwise activity or do they die out like dinosaurs when cataclysmic environmental forces appear?

The process model outlined here enables researchers to manipulate conditions for cooperation and practitioners to encourage or discourage cooperation. For example, researchers can manipulate payoff matrices in prisoner’s dilemma situations (Axelrod, 1984), and public-policy makers can increase the salience of future outcomes for constituents and stakeholders where continued cooperation is imperative (Aram, 1989).

Finally, the purpose of cooperative behavior and collective strategy is to enhance firm performance by strengthening the bargaining position of the population relative to its environment. However, Propositions 6 and 7 suggest that, depending on the stage of cooperative behavior, performance improvement may not be detectable at the firm level. Researchers need to creatively develop collective and population-level measures of performance to capture this relationship. For example, possible measures may include the ability of a collective to attract human resources and capital, or the willingness of venture capitalists to concentrate their investments in an industry.

**Conclusion**

Harrigan (1988) suggested that the willingness to cooperate among firms has been increasing over the years, and that this is happening at a progressive rate (p. 143). Does such a progres-
sion represent the beginnings of a colonization of competitive strategy and the emergence of the collective strategy paradigm? This article suggests that a collective paradigm may be more appropriate in the fragmented industry setting than previously believed. Collective strategy emerges from direct pairwise interaction between firms in fragmented industries, and it may be less visible but no less extensive than in concentrated industries because in fragmented industries, repetitive patterns of pairwise interorganizational activity can aggregate into emergent collective strategy. The implication of this notion is that collective activity is a ubiquitous strategy, permeating all types of organizations and relationships in fragmented industries.

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Marc J. Dollinger (Ph.D., Lehigh University) is Assistant Professor of Management, Indiana University, School of Business, Bloomington, IN. Correspondence regarding this article should be addressed to him at Department of Management, School of Business, Indiana University, Bloomington, IN 47405.

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