HOW ORGANIZATIONAL THEORY CAN HELP NETWORK THEORIZING: LINKING STRUCTURE AND DYNAMICS VIA CROSS-LEVEL ANALOGIES

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ABSTRACT

Traditionally, organizational theory has been a receptacle of methods and mechanisms from network theory. In this paper, we argue that organizational theory can also be an active contributor to network theory's conceptual development. To that end, we make explicit a theoretical strategy that has only been used informally by network theorists so far, which – following Vaughan (2002) – we refer to as analogical theorizing. *Using the basic correspondence between dyadic relationships as the most minimal form of "organization," we show that processes and mechanisms extracted from various theoretical strands of organizational theory can be mapped onto the dynamics of social relationships. This allows us to build novel theoretical insight as it pertains to issue of relationship emergence, maintenance, and decay in social networks.*

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INTRODUCTION

The historical relationship between organizational theory and both social network analysis and network theory has been primarily one of asymmetric importation of concepts, mechanisms, and techniques from either social network analysis or network theory to organizational theory. This strategy has undoubtedly resulted in important analytic and conceptual gains for organizational theory, resulting in a virtual explosion of network-inspired research in organizational analysis (Borgatti & Foster, 2003; Brass, Galaskiewicz, Greve, & Tsai, 2004). This includes, among other developments, (i) the emergence of a "network approach" to interorganizational behavior and strategy; (ii) the reconceptualization of the internal social structure of organizations in terms of networked relationships; (iii) the emergence of an approach to individual and organizational performance in which social relations (conceptualized as "social capital") play a preponderant role; and (iv) the use of network mechanisms to explain patterns of coordination, differentiation, and homogeneity among populations of organizations and persons within organizations (Borgatti & Halgin, 2011).

Our main argument is that organizational theory can be more than a receptacle of insights from network theory. We show that processes and mechanisms imported from (classical and contemporary) organizational theory can actually be used to further develop network theory, by reconceptualizing basic processes related to the emergence, evolution, and maintenance of network ties using basic models and mechanisms from organizational theory.

One word about our conceptualization of network theory in what follows; as Borgatti and Halgin (2011) have noted, exactly what constitutes "network theory" continues to be shrouded in mystery if not outright skepticism as to its very existence. Here we borrow from their exemplary clarification of these issues. According to Borgatti and Halgin, *network theory* proper deals with relational processes (such as the position of an individual or firm in a system of relations) as predictors of performance outcomes at either the individual or the organizational level. The *theory of networks* on the other hand deals with network topology as the outcome of some (non-relational) process (e.g., institutional or social psychological factors). Finally, the *network theory of networks* deals with the origins of network structures out of previous relational dynamics and the mechanisms through which existing network structures connect to outcomes that are themselves of a relational or positional nature further down the line.

Network theory is without a doubt the most theoretically coherent, conceptually advanced, and mathematically sophisticated strand of network research. Here the "information flow" model common to Granovetter's (1973) strength of weak ties theory (SWT) and Burt's (1992) structural holes (SH) argument does the brunt of the conceptual work in predicting performance outcomes in organizational theory (with the power-dependence "bond" model of collective action a distant second). In a similar way, the theory of networks can boast of an old theoretical pedigree. This begins in the 1940s and 1950s – in Heider's and Festinger's Gestalt psychology inspired cognitive approach to the dynamics and phenomenology of social relationships – and culminates with Emerson's pioneering conceptualization of exchange process in terms of power-dependence relations in the 1970s.

In what follows, we restrict our attention to processes in which network relations figure as antecedents and outcomes (network theory of networks) for the simple reason that we see this area as the one most in need of conceptual development. Given more recent developments, our view is that a lot of the conceptual action in network theorizing will move toward key issues that can only be theorized from within the framework of network theory of networks (without necessarily ignoring fundamental issues in network theory and the theory of networks).

Let us point to what we believe is the primary driver of this dynamic. The recent availability of fine-grained dynamic network data (e.g., Moody, McFarland, & Bender-deMoll, 2005; White, Owen-Smith, Moody, & Powell, 2004) has forced us to move beyond the implicit "static" model of network ties dominant in classical network theory along with its attendant "positionalist" and "structuralist" emphasis. In classical network theory, network ties are relatively stable "pipes," conceptualized mainly as *conduits* through which things or contents *flow* or as *slots* that define a given node's *position* in the structure. Recent research and theory on the dynamics of dyadic relationships reveals a different picture (Rivera, Soderstrom, & Uzzi, 2010). Rather than being relatively static pipes, network ties are constantly being formed, dissolved, and renegotiated (Bidart & Lavenu, 2005; Burt, 2000, 2002). In this respect, neither flow nor positional processes can be conceptualized independently from these dynamics (Ahuja, Soda, & Zaheer, 2012, pp. 434–435; McEvily, Jonathan, & Marco, 2012, p. 547).

An important insight follows from this observation. If social relations are constantly evolving over time, they cannot be the sorts of things that simply do things to people or organizations, since they in all probability

are changing at a faster rate than (most of) the outcomes that they are putatively causing. Instead, we presume that persons and organizations (within environmental and structural constraints) actively *do things to* network relations (e.g., enacting them, neglecting them, choosing to keep them, or dissolving them). The issues of agency, endogeneity, and dynamic change that Borgatti and Halgin (2011, p. 1177) admittedly note have been somewhat undertheorized in network theorizing come back with a vengeance (Lewis, Gonzalez, & Kaufman, 2012; Rivera et al., 2010). Even when we are exclusively interested in network relations as a producer of outcomes, the inherent dynamicity of social networks poses a problem for the standard positional analysis characteristic of classical network theory. As Ahuja et al. (2012, p. 434) note, "An understanding of network outcomes is incomplete and potentially flawed without an appreciation of the genesis and evolution of the underlying network structures."

This renewed attention to dynamics brings back a concern with classical questions regarding the origins of personal relationships (e.g., DiMaggio, 1993; Lazarsfeld & Merton, 1954; Lizardo, 2006), as well as the factors that account for their (now conceived as problematic) persistence through time (Burt, 2000, 2002). Accordingly, we argue that the time has come to reopen central conceptual issues that belong to the network theory of networks proper: in particular, issues related to the *emergence* of network ties, their *maintenance* and *evolution* over time, and ultimately the factors that contribute to dynamic *tie persistence* and *decay*. Our basic claim is that the conceptual legacy left behind by the last three decades of research and theory in organizational theory is particularly well positioned to further our understanding of these processes. Our approach is thus consistent with recent calls to reorient network theorizing around issues of "dynamic stability" in which networks are conceptualized as "complex adaptive systems that exhibit both persistence and change" (Kilduff, Tsai, & Hanke, 2006, p. 1032).

ANALOGICAL THEORIZING

We propose that a theory-building strategy based on cross-level analogical comparisons (e.g., Vaughan, 1992, 1999, 2002) is appropriate for the task of using well-established ideas from organizational theory to shed light into the network theory of networks issues outlined above. We provide illustrative examples of the fruitfulness of this approach by showing how insights

AU:4

from organizational ecology, institutional economics, and institutional theory can further our understanding of the linkages between structure, culture, and processes of (dyadic) relationship formation, maintenance, and dissolution.[1] Like Rivera et al. (2010), our basic unit of analysis and theorizing is the dyad. Thus, our main theoretical focus is on the evolution, maintenance, and decay of dyads over time.[2]

Our basic point of departure is the insight that a relationship can be considered (and is usually considered) an entity that has some level of phenomenological independence from the participants (Lawler & Yoon, 1998; Martin, 2009).[3] In some respect, a relationship is the simplest form of "organization." Thus, analogical theorizing from organizational theory to the dynamics of dyadic relationships is a feasible project.[4]

Analogical theorizing

> is a heuristic, theory-generating, comparative method … It relies on selecting cases on the basis of some event, activity, or phenomenon of theoretical or substantive interest, and the comparing it with another example or examples that appear, hypothetically, to share that feature … analogical comparison is [typically] made between socially organized settings that vary in size, complexity and function. The point is then to proceed with comparison in a discovery-oriented yet systematic way that identifies both the similarities and differences between the cases, which then … may aid in the development of general theory across cases. (Vaughan, 2002, p. 3) AU:5

From this perspective, it is completely legitimate to treat network dyads as incipient "organizations" (Vaughan, 1986, 2002, p. 31). The basic heuristic is then to proceed to link the panoply of middle-range organizational theories concerned with the dynamics of organizational foundings, boundary maintenance, and dissolution to the dynamics of tie formation, persistence, and decay. This is a theory-building strategy that has been implicitly, but largely unsystematically, pursued in network theorizing (e.g., Burt, 2000; Lizardo, 2006; Marquis, 2003). Here, we attempt to systematize this approach making sure to, whenever appropriate, draw explicit linkages to the corresponding entities, processes, and mechanisms from organizational theory that we see as having a direct analogue in the realm of networks and personal relationships. Note that this approach is also thoroughly consistent with the "structuralist" penchant in network research to identify mechanisms and empirical regularities that do not respect levels of analysis or levels of aggregation, minus the penchant for comparative statics. As Rivera et al. (2010, p. 93) note, empirical generalizations related to the dynamics of dyadic ties, "often generalize across contexts, actors, and ties, giving rise to interesting self-similar patterns across interpersonal, interfirm, and even interstate research."

AGE DEPENDENCE AND LIABILITY OF NEWNESS OF RELATIONSHIPS

Organizational ecology affords a productive and powerful source of cross-level analogies for theorizing the dynamics of network ties. One reason is that organizational ecology has been historically distinctive within organizational theory in its focus on theorizing the dynamics of organizational populations over comparative statics.

To begin, we can establish an intuitive one-to-one mapping between the basic processes and mechanisms operative in organizational ecology and those operative in the dynamics of dyadic ties. The establishment of a network tie is clearly analogous to an episode of organizational founding, while the phenomena of relationship maintenance and relationship dissolution are clearly analogous to those of organizational survival and organizational mortality.

The Liability of Newness

A key observation in organizational ecology is that mortality rates in organizational populations are age dependent. The direction of this dependence is predictable. Drawing on Stinchcombe (1965), organizational ecologists propose that incipient organizations suffer from a *liability of newness*, such that newly forming enterprises are much more likely to disband than older established organizations (Freeman, Carroll, & Hannan, 1983). Can the same be said about dyadic relationships?

Burt (2000) uses longitudinal network data among 345 bankers from a large financial organization to examine the relative mortality hazard of dyadic relationships within a single organization. He finds that this hazard is governed by the same principle that seems to obtain for organizational mortality: at an early stage, relationships have a high probability of dissolving. However, as relationships age, their dissolution hazard declines dramatically. This led Burt to suggest that just like organizations, dyads suffer from a liability of newness (see also Burt, 2002, p. 343).

As Burt (2000) argued, implicitly following the theory-building strategy that we are explicitly advocating here, similar mechanisms explain why there exists a liability of newness in both organizations and network relationships. Like organizations, relationships entail setup costs, and just like organizations, newly forming relationships are characterized by a relative

lack of trust and predictability and by the absence of routines that each partner can fall back on. Furthermore, just as newly formed organizations must compete against established organizations, newly formed relationships must compete with already established relationships, as partners do not have infinite resources such as time, energy, or attention. Over time, partners are able to "feel out" which relationships provide them with comfort and predictability and which ones do not. Strong selective pressures thus operate early in the relationship building process, which means that through a selection mechanism older relationships will be more likely to possess the characteristics (predictability, trust, ease of interaction, routines) that help them endure over time. Relationships that lack these characteristics will dissolve early on: "the longer a relationship has survived, the more likely that the two people involved are compatible, so the higher the probability that the relationship will continue into the future" (Burt, 2000, p. 3).

Proposition 1. Early-stage relationships have a higher mortality risk (are more likely to dissolve) than older relationships.

Proposition 2. After an age threshold is reached, relationships can "lock-in" acquiring high levels of stability and a low dissolution hazard.

Vaisey and Lizardo (2010), for instance, rely on this selectionist mechanism to propose that inherent *cultural matching* processes operate early in the relationship formation processes of youth. They find that over time, ties in the ego-network that are culturally dissonant are more likely to decay than those that are culturally proximate. This is consistent with recent theory and research that argues that so-called "assortative mixing" may be as much a result of the selective dissolution of nonhomophilous ties (presuming initial random mixing) than the active choice of similar partners (Noel & Nyhan, 2011).

Clock-Resetting Processes

The most intuitive approach is to consider the "clock" that measures dyadic "age" as starting when the relationship first forms. However, just like in organizations, there are various processes that can act on the larger social context within which the relationship is embedded and that essentially function to "reset the clock" and bring back the mortality hazard characteristic of the liability of newness (Amburgey, Kelly, & Barnett, 1993). Burt (2000) AU:6

provided empirical evidence for the existence of one such phenomenon: he found that when a dyad is embedded in a triad and either of the other two links was disrupted, the mortality hazard of the focal dyad increased even if it was relatively "old." In effect, for embedded relationships, disruption of the local relational environment resets the age clock and brings back the liability of newness. Burt notes that a clear implication of this finding is that "the decay-inhibiting effect of age described as the 'liability of newness' in population ecology need not be about learning or selection processes. It could instead be about the *continuity of the social structure* in which aging occurs" (Burt, 2000, p. 24, italics added).

We can extend this insight to other exogenous shocks to the larger environment that might increase the mortality hazard of increasing ties within work organizations. The main idea is that any such disruption, such as those that occur during mergers, acquisitions, and internal reorganizations, may put existing relationships (seemingly in a state of "lock-in") at renewed risk (Brass et al., 2004, p. 797).

Proposition 3. Exogenous shocks to the relational environment may "reset the clock" of existing relationships increasing the mortality hazard of extant network ties.

RELATIONAL IMPRINTING AND THE HAZARDS OF REDEFINITION

The theory of "organizational imprinting" (Stinchcombe, 1965) is one of the most empirically successful fragments of organizational ecology. The central proposition of the theory is that once organizational structures are embodied in taken-for-granted routines, they are very difficult to modify. This implies that the environmental characteristics common to a given cohort of organizations during their founding periods will be predictive of the sorts of structures and routines that they display in the future independently of contemporaneous conditions. This runs against the common (managerialist) perception of organizations as malleable, constantly adapting systems.

The imprinting argument has two main implications: first, given resistance to change, most changes in organizational populations occur via *selection* (differential entries and exits of organizations into and out of the population) rather than via *adaptation* (Hannan & Freeman, 1984). This is

analogous to the contention that most large-scale social change in attitudes and behaviors occurs via the replacement of cohorts in a population rather than by changes in behaviors and attitude throughout the individual life course. Second, attempts to change core features of organizations (when they occur) should increase the failure hazard (Hannan & Freeman, 1984). From this perspective, an organization that has undergone radical changes in structures and routines resets its clock and brings back all of the perils of disbandment that come with the liability of newness.

It is straightforward to extend these insights to the dynamics of dyadic relationships. First, we should expect that dyadic relationships should retain their original "definition" (e.g., culturally agreed upon "type" that defines the relevant behavioral heuristics) through time. The initial designation, as to what "kind" of relationship two persons have, counts as a core feature of the relationship. For instance, "core features" of friendship as a type of relationship are expectations for mutuality and transitivity, while core features of the patron–client relationship are expectations of asymmetric, unilateral fealty directed from the client to the patron (Martin, 2009). Thus, if a dyadic relationship begins as an advisor–advisee tie or as a confidant tie, we should expect that designation to remain stable through time. The same insight applies to interorganizational networks. Once defined as a specific type of tie (e.g., collaboration), there is a particular "inertia" built into that relationship that militates against a radical redefinition of its content and meaning (Kim, Oh, & Swaminathan, 2006). Note that the relational imprinting argument points to the existence of *time-delayed effects* of social structure on nonrelational, performance-based outcomes. This is in contrast to the emphasis on contemporaneous effects of structural patterns characteristic of classical network theory (McEvily et al., 2012).

Marquis (2003) used the imprinting cross-level analogy to analyze patterns of durability in the intercorporate network of the top 51 cities (in terms of number of public companies) at two points in time. He reasoned that period-specific characteristics of the community and the larger environment at the time of emergence would shape the extent to which certain cities would display a tendency to retain local versus extra-local corporate connections. Local connections would persist even after the factors that made them a more reasonable option than extra-local ties (e.g., transportation and communication costs) had dissipated. In support of this argument, he finds that organizations that developed their intercorporate network before the emergence of modern transportation technologies (e.g., air travel) retain more localized network connections into the modern era.

Proposition 4. Surviving network ties tend to retain the core features characteristic of their formative period across time, even after environmental conditions change.

There is another implication of the relational imprinting argument: we should expect that attempts by either or both members of the dyad to redefine the terms of the relationship reset the clock and bring back the liability of newness increasing the relationship dissolution hazard. The reason for this is that this sort of redefinition constitutes a disruption of the core features of the relationship. For instance, two coworkers can begin as friends, but one of them is promoted to a position of authority and goes on to redefine the relationship as one between a superior and a subordinate. This counts as a radical change in the core features because it introduces a measure of antisymmetric hierarchy where the previous understanding implied symmetric mutuality. Alternatively, two coworkers may go from acquaintances to romantic partners. This is a violation of the core features because romantic ties bring with them different "structural implications" (Martin, 2009) than coworkers' ties. For instance, a cross-sex intimate friendship that excludes the romantic partner is problematic in a way that cross-sex intimate friendship that excludes a coworker is not.

Proposition 5. Attempts to modify the core features of an existing relationship increase the hazards of dissolution, in particular for older, already established relationships.

CONTINGENCY BETWEEN TIE STRENGTH AND CULTURAL CONTENT

Recent insights from work at the intersection of network theory and cultural sociology suggest that cultural contents and network relations are coconstitutive (Mische, 2003, 2011; Pachucki & Breiger, 2010; Schultz & Breiger, 2010). An emphasis on coconstitution allows us to theorize predictable patterns of *contingency* and *dependence*, between characteristics of relationships (e.g., strength, multiplexity, and age) and characteristics of cultural contents. In this respect, the relative durability of dyads over time may be dependent on the relative fit between the features of the relationship (e.g., strength) and features of the cultural contents that flow through it.

We suggest that this theoretical proposal can be made more concrete (and generative of further insights) if we draw a cross-level analogy derived

from institutional and transaction-cost economics (e.g., Williamson, 1981). The key conceptual move here is to map the notion of asset specificity to the realm of cultural contents. As originally conceived, asset specificity refers to the specialization of buyer–seller relationships due to idiosyncratic features of the product, the transaction, or both (Williamson, 1981). This specificity creates a bond between the producer and the buyer. The level of specificity of *cultural* content, such as intricate knowledge of off-off-Broadway theater or simply knowing who won the Super Bowl the night before, can serve a similar function within networks. Just as transaction costs have to be taken into account whenever two actors attempt to engage in some sort of economic transaction in the market, we may argue that the recurrent exchanges of cultural contents that constitute a network tie within a dyadic relationship may be subject to variable "transaction costs" which are dependent on the relevant asset specificity of the cultural content that is exchanged.[5]

Asset specificity "describes the condition where the identity of the parties matters for the continued relationship" (Tadelis & Williamson, 2012, p. 10). It is a key insight in cultural sociology that some forms of culture are deeply connected to the identity of the participants, while other forms of culture represent a common currency of default things to talk about that do not portend such a deep connection to identity (DiMaggio, 1987). Drawing a cross-level analogy, we propose that asset-specific cultural content is one that presupposes acquaintance with the identities, tastes, and background of other persons, and nonasset-specific cultural content is one that can be expected to be deployed in interaction with others, even if they are relatively strangers or acquaintances. As Aral, Brynjolfsson, and Van Alstyne (2007, p. 8) note, "some information is simply 'stickier' … and more difficult to transfer … due to its specificity … complexity … [and] the amount of related knowledge of the receiver … ."

Thinking of the relative accessibility of cultural contents as a form of asset specificity and the type of tie (e.g., strong vs. weak) as a type of governance structure can help us theorize dynamic patterns of contingency between the content and function of a network tie and specific features of the relationship (e.g., tie strength). The basic idea here is that we should observe a *content-fit process* linking the type of cultural content that constitutes the network tie and the governance structure under which the tie is embedded. In general, presumably trivial or "general interest" content (not endowed with much "asset specificity") can flow via either weak or strong ties. However, asset-specific content, characterized by highly particularistic forms of cultural knowledge, is more likely – ceteris paribus – to

constitute strong ties, especially strong ties embedded in a large relational context (Collins, 1975; Lizardo, 2006).

In a paper looking at the dependencies between types of cultural tastes and strong and weak ties, Lizardo (2006, p. 784) proposed one version of this cross-level analogy. He noted that dyadic relationships could be thought of as the sites of interindividual "transactions" (such as the exchange of gossip or conversation related to a given set of cultural issues). If this is the case, then we should expect there to exist an affinity between the relative accessibility of certain cultural contents and one key characteristic of network ties, namely, tie strength. He found that participation in cultural activities that have a narrow distribution in social space (such as high-status culture) was a better predictor of whether a person had a lot of close confidants than participation in cultural activities that have a wider distribution in social space (such as popular culture). Conversely, popular culture is a better predictor of the number of self-reported casual contacts than is high-status culture. Building on Uzzi (1999), we can think of *network complementarity* (the capacity to benefit from the simultaneous possession of both embedded and arms-length ties) as being generated by a form of *cultural complementarity* (the capacity to match heterogeneous cultural contents to the type of tie in question).

Content-Fit Dependencies: The Case of Gossip

We can extend this theoretical model to account for observed affinities between relational content and type of network ties in settings familiar to organization scholars, and ultimately to the dynamics of dyadic tie formation, tie maintenance, and tie decay. Take for instance, the well-studied subject of workplace gossip. In the context of a work organization, positive gossip is a more generalized cultural resource than negative gossip. The former is the sort of baseline conversational resource that could be brought up at any time (so-called water cooler talk) with minimal repercussions, even when acquaintances or relative strangers are present. Negative gossip, on the other hand, is the sort of "asset-specific" resource that requires a presumption of common knowledge, trust, and even basic agreement on certain fundamental values and attitudes among the participants in the conversational exchange. The pattern of distribution of these two types of cultural contents across strong and weak ties supports the content-fit hypothesis: positive gossip is more likely to constitute both intimate and instrumental ties, but negative gossip is selectively mobilized within

relationships that are more intimate (Grosser, Lopez-Kidwell, & Labianca, 2010).

Proposition 6. Strong ties are more likely to survive over time via the recurrent mobilization of asset-specific cultural content.

We can think of the ties as either enclosed within larger "boundaries" or not so enclosed. The decision to do so is analogous to specifying the boundaries of transactions within transaction-cost economics. This can give us purchase of the conditions under which we would expect "groups" to form, if we think of groups as establishing the boundaries under which certain "transactions" (dyadic ties) are enclosed.

Proposition 7. Highly specific or idiosyncratic cultural content will tend to flow via strong ties, and these ties will tend to be enclosed within a dense set of other strong ties (group).

Hansen (1999), for instance, finds support for the hypothesis that some information is more easily transferred than others are and that ease of transfer is correlated with the nature of the tie. He shows that noncodified knowledge, or knowledge not documented in writing at the time of the transfer, is far more difficult to communicate and thus more likely to move successfully across strong ties.

The Strength of Weak Culture

In a recent paper, Schultz and Breiger (2010) proposed a "strength of weak culture" argument. Their basic idea is that familiarity with cultural content and practices that are presumed to be familiar to most people is useful in the creation of shallow relationships of acquaintance. These relationships, while not useful if the aim is to cultivate intimacy or receive emotional support, can be of strategic use for other more instrumental purposes, as classically argued by Granovetter (1973). Extending the content-fit argument outlined above to this case, we can theorize that there should be an elective affinity between the capacity to connect to "bridges" in the social structure and the mobilization of this sort of "popular" cultural content (so-called "weak culture"), hence the "strength" of this sort of "weak" cultural content. The capacity to form weak connections to others in a periodic fashion is important, because it has been shown that bridging ties decay at a faster rate (Burt, 2002).

Proposition 8. Highly generalized or nonspecific cultural content is useful for the formation and maintenance of ties that bridge across culturally defined groups (strength of weak culture hypothesis).

Content-Fit Dependencies: Implications for Information Diffusion

The proposition that different types of cultural content have an affinity for a different type of ties has implications for how we theorize the dynamics of cultural diffusion within organizations. For instance, Aral et al. (2007, p. 14) distinguished between "event news" defined as "simple, declarative, factual information that is likely triggered by an external event and is of general interest to many people in the organization" and "discussion topics" defined as "specific, complex, and procedural, characterized by back and forth discussion of interest to limited and specialized groups of people." They found that – consistent with the content-fit dependence argument – event news diffused through the organizational network irrespective of the tie strength or the functional status (e.g., hierarchical) of the tie. This pattern of diffusion was characterized by rapid spikes and short time to full network saturation. Discussion topics, on the other hand, are affected by functional considerations, node-level characteristics, and embeddedness and diffused preferentially through stronger ties, and this results in a more segmented, slower pattern of diffusion.

CODE-IDENTITY THEORY AND THE STRENGTH OF UNIPLEX TIES

Multiplexity refers to the phenomenon whereby distinct role-relations, exchanges, and "bases for interaction" overlap in a single dyad (Verbrugge, 1979, p. 1287). For instance, two actors may be both friends and coworkers, and as such may exchange both emotional support and advice. In classical network theory, multiplex ties are contrasted to uniplex ties in the same way in which Ferdinand Tönnies (1957) contrasted *Gemeinschaft* ("community") to *Gesellschaft* ("society"). Multiplexity is associated with the blending and combination of bases for association and interaction – for instance, so-called "role interlock" (Breiger & Pattison, 1978; Lazega & Pattison, 1999). Multiplex ties thus imply a diffuse, less instrumental basis

of association, which is different from the more specialized and presumably more instrumental nature of uniplex ties.

The key assumption of the classical approach to multiplexity in network theory is that ties that combine a multiplicity of contents and commitments (multiedges in graph-theoretic terms) are somehow stronger than ties that combine only a single type of content or cultural definition. The dynamic implication is clear: *multiplex ties should be more durable, easier to maintain, and experience slower decay than uniplex ties*. To our knowledge, most work on role interlock and multiplexity – with the exception of Kapferer's (1972) classic study – has relied on cross-sectional data (e.g., multiplexity was conspicuously absent from Rivera et al.'s (2010) comprehensive review of dyadic dynamics), so this remains largely a theoretical suggestion. In this section, we draw on recent work on organizational theory, to suggest that there are good theoretical reasons to suspect that multiplexity may be *deleterious* to the long-term survival of dyadic relationships and that – ceteris paribus – uniplexity might actually play a role in slowing dynamic decay.

AU:7

Code-Identity Theory

What we refer to as "code-identity theory" builds on a relatively simple set of primitive concepts (Hannan, Polos, & Carroll, 2007). First, there is a given set of focal *entities* subject to cultural definition. The given entities acquire an *identity* whenever audiences apply a set of identity codes in an attempt to label them. For instance, a for-profit food establishment might be labeled as a "Chinese Restaurant." This labeling is done by an audience (e.g., regulators, customers, and other stakeholders) in order to align their expectations regarding the quality and features of the products produced by that entity. The basic theoretical proposition of code-identity theory is straightforward. We should expect that entities whose identity codes straddle well-established categorical or cognitive boundaries to be less stable, more likely to be subject to contested definition, less likely to achieve high levels of cognitive institutionalization, less able to garner resources from the environment critical for survival, and more subject to negative reactions from interested parties than entities whose identity codes are based on unitary and coherent identities. That is, entities subject to identity codes that span across categories are less likely to be well received than entities that have well-delimited categorical niches (Hsu, Hannan, & Koçak, 2009).

AU:8

The reason for this is that category-spanning entities are more likely to violate the default expectations of the relevant audience. For instance, a film that features *both* Cowboys *and* Aliens is likely to be neither a good Western nor a good science fiction flick. Deviations from the expectations set by the identity codes are met by the audience with bewilderment and confusion and subsequent demotion of that entity from being a "good example" (prototype) of its kind. Thus, the identity codes applied by members of the audience serve both a cognitive purpose (classification) and a normative purpose (they set the standards to which the entity is held accountable in its self-presentation). Ceteris paribus, it is easier for any entity to comply with a narrowly defined set of codes (e.g., be a food joint that serves only Chinese food) than to straddle the boundaries of incompatible categories (be a fusion restaurant serving Chinese and French food). A jack-of-all-trades is bound to be a master or none. A AU:9 now rapidly growing line of research shows that we can predict a host of organizational outcomes of interest from the categorical coherence (or lack thereof) of organizational actors and products. Category spanning results in violation of relevant identity codes, and these violations are met with negative audience reaction, which affects performance (Hannan, 2010; Hsu et al., 2009).

Multiplex Ties as Category-Spanning Ties

Our argument is that organizational theory can help us to theorize the dynamics of network ties in a way that upends the expectations derived from the classical network theory of multiplexity. Multiplex ties are redefined as *category-spanning ties*, that is, by their membership in multiple (possibly incompatible) categories (e.g., boss and romantic partner). Uniplex ties do not span categories; they are assigned a single (small) set of identity codes.

Following the above line of reasoning, we should expect that category-spanning ties will be harder to maintain over time and will be subject to harsher pressures toward dissolution at early stages. The reasons for this are analogous to those that motivate the basic empirical implication of code-identity theory: in category-spanning ties, partners will have a harder time establishing a working understanding of what the relationship "is" in the first place (cognitive incoherence). This relative lack of cognitive institutionalization increases the likelihood of confusion as to what the relevant normative and behavioral expectations are and precludes the establishment

of trust and behavioral routines (the same mechanisms involved in the liability of newness). This is a topic – under the guise of "blended friendships" (Bridge & Baxter, 1992, p. 201) – that has been treated from the point of view of affective "dual role tensions" between "personal" and "role" relationships in the psychological literature.

Proposition 9. Category-spanning ties are less stable (have a higher dissolution hazard) than ties that belong to a small set of categories.

Audiences and the Perceptual Nature of Multiplexity

One important thing to note is that in code-identity theory, it is stakeholders, external to the focal organization (e.g., critics, customers), that are primarily involved in both determining whether a given organization meets the relevant criteria for category membership and for enforcing compliance with the expectations defined by the codes. A relevant question is who exactly plays the role of the audience in our analogical mapping. We propose that the audience in charge of defining the relative categorical coherence of dyadic relationships is, simply, the other network members. Building on Krackhardt (1987), we propose that whether a relationship is multiplex or uniplex depends on the "perceiver" of that relationship (which may include the actual persons involved in the relationship). Thus, a given individual may view a particular relationship that he or she is a member of as either uniplex (friend) or multiplex (friend and colleague) and so can alter. From this dyadic perspective, a categorically coherent relationship is one that is subject to one identity code by one or both members of the dyad.

Categorical incoherence increases in the number of identity labels that either ego or alter use to characterize the relationship (acting as the "audience" for their own relationship). We may also view a given relationship as also being characterized by its relative perception as uniplex or multiplex by members of the network *beyond* ego and alter. Here, a given relationship degree of category spanning is given by the total number of identity labels that other persons assign to it. Thus, regardless of their own ego and alter-centric viewpoints, a given relationship's categorical coherence decreases in the number of labels that other persons attach to it.

Proposition 10. Relationships that are perceived to straddle multiple categories by the relevant audience are less stable (have a higher

dissolution hazard) than relationships that are perceived to belong to a small set of categories.

Category Distance

As has been acknowledged in recent research in the code-identity research program (e.g., Kovacs & Hannan, 2011), the simplest way to think of category spanning is to see it as some monotonic function of the *number* of labels that are applied to that entity. Thus, ceteris paribus, an entity that is assigned five identity labels is more likely to straddle categories than entities that are assigned two labels. This approach will work most of the time, but it will run into trouble whenever we are dealing with labels that are not equidistant from one another in the "cultural space" from which they are drawn (Kovacs & Hannan, 2011). Intuitively, we would like to count a relationship in which two persons are perceived to be both "advisor–advisee and lovers" as more likely to span categories than one in which they are perceived to be "colleagues, advisor–advisee, and coworkers" even though this last relationship is subject to more labels than the former. The reason for this is that we can rely on our intuition that the lover and advisor–advisee labels are more distant from another than are colleagues, advisor–advisee, and coworkers. We should thus expect that:

> **Proposition 11.** Category-spanning relationships that are perceived to mix characteristically distinct contents (e.g., work related and leisure) or functions (instrumental and expressive) are perceived as less legitimate and are therefore less stable (have a higher dissolution hazard) than relationships that specialize in content or function or which mix distinct but compatible contents or functions (e.g., advice and collaboration; talk about sports and movies).

Studies of the phenomenon of "workplace romance" provide evidence consistent of the perceptual and legitimacy issues characteristic of this type of category-spanning relationship. Brown and Allgeier found that workplace romance between persons in different ranks was perceived in a negative light by both managers (1995) and coworkers (1996). Horan and Chory (2009) found – in a study of full-time employees in an organization – that the perceived relationship quality of a peer who dates a superior experiences substantial deterioration in comparison to a peer dating another peer (coworkers report that they feel less solidarity with

that peer). In a follow-up study, Horan and Chary (2011) found that peers who date superiors are also perceived as less credible and less trustworthy than coworkers who date equal status peers (the workplace romance penalty was particularly strong for women who date superiors). AU:10

CONCLUDING REMARKS

In this paper, we have shown that organizational theory can be a productive source of insights for developing systematic theory on the mechanisms involved in generating dynamic patterns of change and persistence in social and organizational networks. We argued that four basic strands of organizational theory provide an analogical source domain for theorizing endogenous relational dynamics: (i) ecological hypotheses regarding age dependencies in the hazard of organizational failure, from which we derived *the liability of newness argument*; (ii) organizational imprinting hypotheses, from which we derived the *relational imprinting argument*; (ii) transaction costs theories linking the specificity of cultural contents with the type of relational governance structure, from which we derived a *content-fit dependence argument*; and (iv) theories of categorical identity and category-spanning, from which we derived an argument for the *dynamic weakness of multiplex ties argument*.

These are not the only possible sources of insights that network theorists can use from organizational theory, but they do strike us as some of the most plausible. This impression is reinforced by the fact that some of them have already played a role in research in the networks and organizations literature. This is the case in particular for the liability of newness and imprinting arguments (Burt, 2000; Marquis, 2003). We also demonstrated that we can make theoretical sense of a good range of results in the field using the content-fit dependence hypothesis, even though the implication of this argument is yet to be self-consciously explored by researchers (e.g., Aral et al., 2007; Grosser et al., 2010). Nevertheless, some of our proposals are novel and require empirical testing in future efforts; we offer these as guides for further empirical research. This applies in particular to (a) the dynamic implication of the relational imprinting argument, namely, the proposal that changing core features of a relationship increases the chances of dissolution and (b) the proposal that category-spanning multiplexity is actually a dyadic liability rather than a diffuse strength as argued in classical network theory.

Dynamicity in Networks

We would like to close by suggesting that the potential existence of so many distinct dynamic mechanisms operating on the expected survival chances of network ties may help to explain why networks are so "dynamic" in the first place. Building on our theoretical proposals, we can identify at least three classes of processes and activities that generate volatility at the level of dyadic relationships: (1) actor-level processes, (2) tie- or edge-level processes, and (3) environmental (supradyadic) processes.

Actor-level processes refer to those activities regularly engaged in by persons or organizations that have the (intended or unintended) consequence of producing volatility in the dyadic relationships in which they are involved. These include attempts to redefine the core features of a relationship (imprinting argument), attempts to take a relationship from uniplex to multiplex (category-spanning argument), or attempts to use cultural contents that do not fit the character of the tie for its maintenance (content-fit argument). Edge-level processes refer to mechanisms inherent in the nature of social relationships, such as the initially high setup costs that produce the liability of newness, or the fact that certain relationships are better transmitters of certain types of cultural contents than others. Finally, environmental processes refer to those dynamic changes in the immediate relational surroundings of a tie that have an effect on its future viability. These range from the emergence or dissolution of triads or higher order motifs within which a dyad may be embedded, or to exogenous shocks in the larger environment that may act to reset the clock and bring back the liability of newness for a given subset of relations in a network.

Note that even in the limiting case in which actors do nothing, social and organizational networks will experience endogenous dynamics due to edge-level and environmental processes. The edge-level process par excellence is tie-aging (liability of newness). Edge-level processes may also interact with more agentic processes at the actor level and structural processes at the environmental level to produce coupled dynamics. As actors form new ties by either choice (actor-level process) or due to structural factors (environment-level process), these novel ties will be subject to age-dependence dynamics. Furthermore, the emergence of new relationships may add to the volatility of existing dyads in the network, through the diffusion of disruptive, clock-resetting processes throughout the system. In all, the simultaneous operation of multiple volatility-generating mechanisms, operating at different temporal scales and levels of aggregation, will generate recurrent patterns of dynamic complexity, unlikely to be captured by

either static or deterministic models. In this respect, accounting for complex patterns of network dynamics at multiple levels emerges as an important, as yet somewhat underdeveloped, agenda for the future of network theorizing.

NOTES

1. We use the term "relationship" to denote the totality of ties between two persons at any given point in time. A relationship may include only one tie (uniplex) or may consist of multiple ties (multiplex). The number of ties a relationship comprises may shift over time. For example, a single relationship may begin with a single tie (coworker), evolve to include multiple ties (coworker and friend), and shift again to only one tie (friend).

2. The dynamics of dyads are distinct from the dynamics of triads (for a cogent discussion, see Krackhardt, 1999). For this reason, how organizational theory might shed light on the life course of triads is beyond the scope of this paper. Nevertheless, some of the propositions that we develop do take the "environment" in which dyads are embedded into account, which may include its inclusion within a triadic structure.

3. Our main theoretical focus is on the evolution, maintenance, and decay of dyads over time. Accordingly, our propositions rest on a conception of a dyad as a relational *state* rather than a relational *event* (i.e., a one-time interaction). Thanks to Steve Borgatti for suggesting this distinction.

4. We are not suggesting that dyads are organizations in all respects. Like organizations, however, dyads are subject to a number of similar genetic, cultural, and structural features. For example, both are formed within a context or environment and experience "aging" (i.e., a tie may be considered "new" or "old" just as an organization may be considered "new" or "old"), are subjects to processes of classification and cultural definition, and may be more or less elaborated in structure and function.

5. Recurrent exchanges of cultural content constitute *ties*, not *relationships*. For instance, a relationship may consist of two people who are both coworkers and friends. They may share negative workplace gossip and personal information not related to work. If both leave their jobs and work elsewhere, they lose the "coworker" tie and cease discussions of negative workplace gossip, but maintain the friend tie and continue to share personal information related to that role/tie. We thank the editors for encouraging us to clarify this distinction.

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