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Making Snowflakes Like Stocks: Stretching, Bending, and Positioning to Make Financial Market Analogies Work in Online Advertising

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Analogy to financial markets have proven powerful in establishing novel or potentially controversial business concepts, even in contexts that deviate significantly from financial markets. This phenomenon challenges theory that suggests analogies work best when elements from a source and target domain map closely to each other. To develop a theory that explains how organizations make initially imperfect analogies “work,” we use a case study of online advertising exchanges, a market-inspired model for buying and selling online advertising space. We find that as organizations stretch an initially misfitting exchange analogy from financial markets to online advertising, they iteratively bend their activities in superficial, structural, and generative ways to match the analogy and position themselves for advantage in the new space being created. Whereas prior studies emphasize shared cognition about familiar domains as the reason why analogies work, our study offers a dynamic account in which stretching, bending, and positioning combine to not only establish the financial market analogy but also subtly change the understanding of markets.

Keywords: analogy; behavioral strategy; financialization; financial markets; online advertising; performativity; business models

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Introduction

Over the past two decades, scholars from a variety of disciplines have used the notion of financialization to describe “the increasing role of financial motives, financial markets, financial actors, and financial institutions in the operation of domestic and international economies” (Epstein 2006, p. 3). As part of financialization, analogies to financial markets have become powerful tropes for explaining a variety of industry and organizational practices (Froud et al. 2006, MacKenzie et al. 2007). For example, studies have shown how financial and market-based concepts have reshaped corporate governance practices (Lazonick and O’Sullivan 2000, Fiss and Zajac 2004), inspired new tools and techniques for valuation (MacKenzie and Millo 2003, Callon and Muniesa 2005), and served as templates for reconfiguring market exchange practices (Garcia-Parpet 2007). Although financial and market-based concepts thus increasingly shape and influence societal schemas and organizational activities (Davis 2009), scholars still have a limited understanding about why and how financial markets become blueprints for organizations and industries (Marti and Scherer 2016).

Fundamentally, this spread of financial and market-based concepts reflects a case of analogy work, where organizational actors look to a *base* or *source domain* (i.e., financial markets) for inspiration and guidance about how to solve problems in a *target domain* (i.e., another industry) (Gavetti et al. 2005). Prior research suggests that analogies help organizations explain the significance of new offerings or business models and position them relative to existing categories and relationships (Leblebici et al. 1991, Hargadon and Douglas 2001, Ocasio and Joseph 2005, Cornelissen and Clarke 2010, Etzion and Ferraro 2010, Gavetti 2012). Recent work in behavioral strategy also explains how analogies help organizational actors identify strategic alternatives and design novel strategic options (Gavetti et al. 2005, Garbuio et al. 2015, Haas and Ham 2015). Further, successful analogies highlight salient dimensions that are similarly related in the two domains (Gavetti et al. 2005, Lovallo et al. 2012), drawing on deep structural parallelism between the analogy’s source and target domains (Gentner 1983, Gentner and Holyoak 1997, Gavetti and Rivkin 2005, Cornelissen et al. 2011). In contrast, less successful analogies tend to be marked by a lack of surface similarity between dimensions of the source and

target domains (Gentner and Toupin 1986, Brown and Kane 1988, Gavetti et al. 2005, Vinokurova 2012). This suggests that when analogies do not effectively map elements of the source domain to the target domain, corresponding inferences and learning from the analogy are less effective (Gentner et al. 2001) and may lead to poor strategic decision making (Gavetti and Rivkin 2005, Vinokurova 2012).

However, the widespread use of financial market analogies would appear to challenge this theoretical account, as such analogies appear to work successfully, even in situations with only superficial similarity. For instance, consider the recent reshaping of the online display advertising industry based on a financial market analogy. Deep structural differences exist between assets traded on financial markets and the ad impressions traded on online advertising exchanges; while stocks are legally homogenized because of value grounded in a contractual claim (Carruthers and Stinchcombe 1999), online ad impressions exhibit very significant heterogeneity. One online advertising CEO clearly described this contrast:

Here's the thing: online ad impressions are more like snowflakes than stocks: no two are exactly alike, and they melt. For example, a share of Time Warner is a share of Time Warner, but a single ad impression on Time.com is not exactly the same as any other. . . . Even worse, a share of Time Warner will exist in perpetuity, but a single display ad-serving opportunity comes into existence in real-time when a browser visits a page and. . . spoils fractions of a second later when the ad is required to load.
(John 2010)

Cases like this therefore challenge existing theory linking the successful application of analogies to systematic correspondences between elements of an analogy's source and target domains (Gentner 1983, Holyoak et al. 2001, Cornelissen et al. 2011).

Furthermore, the application of analogy theories developed at the individual level is likely to require a significant understanding of analogy work at the collective level (e.g., Bingham and Kahl 2013). For example, Etzion and Ferraro (2010) highlighted how organizational use of an analogy can change over time based on organizational processes; while analogies initially confer normative legitimacy, they may eventually inspire creative changes in practices. Therefore, developing a theory of how organizations use financial market analogies requires a research design that observes how a relevant audience invokes and understands the analogy over time. Jointly, these observations motivate our research question: How do organizations make imperfect analogies to financial markets work?

We explore this research question through a qualitative analysis of the development of online advertising exchanges, a new business model that emerged within the broader online advertising industry. Traditionally,

advertising agency-based models featured direct sales forces that bought and sold bundled offerings of creative services (for the production of advertisements) and operational services (for the purchase and placements of these advertisements in various media such as newspapers or television). In contrast, online advertising exchanges extensively used analogies to financial markets to introduce and develop a novel business model that successfully challenged the advertising industry's historical reliance on agency-based organizational models. Using a comprehensive collection of text blogs, websites, media, and interviews, we present detailed case studies of four online advertising exchanges to explain the processes by which organizations make imperfect analogies to financial markets work.

Our findings extend theoretical insights from the cognitive science and management literature on analogy by revealing three distinct types of activities organizational actors use to make financial market analogies work: *stretching*, *bending*, and *positioning*. First, we observed organizational actors *stretching* the financial market analogy by invoking it despite a significant structural misfit. Second, and perhaps most importantly, we observed that stretching is complemented by another activity we call *bending*, in which organizational actors alter the structure of their own activities to fit the financial market analogy. Whereas stretching is the act of applying a financial market analogy despite its lack of fit, bending reflects organizational efforts to adjust the target context of online advertising to conform more tightly to the financial market analogy. Further, we observed that bending progressively moves from superficial or surface bending to more advanced structural bending and eventually to generative bending that leads to the introduction of novel and entirely financial market-based concepts and products into display advertising. Finally, while engaging in stretching and bending, the firms we studied engaged in *positioning* to advance collective interests and to differentiate their offerings relative to their rivals in the nascent market by articulating detailed, idiosyncratic interpretations of the analogy that enhanced the perceived appeal of their particular offerings.

Our findings indicate that the power of financial market analogies does not necessarily reside in structural similarity between financial markets and the target domain. Rather, financial market analogies work when organizations collectively *make* them work by stretching them to invoke the desirability of an alternative means of market exchange, bending their activities to fit them, and positioning themselves within the space created by their analogy work. Our study extends the emerging stream of research on the strategic use of analogy (Gavetti et al. 2005, Cornelissen and Clarke 2010, Cornelissen et al. 2011, Gavetti and Ocasio 2015) by developing an account of analogies in which analogies are made to

work as a collective effort in which organizations not only stretch a market analogy to an innovation, but also fit, or bend, activities associated with the innovation as needed to make the analogy work. Our study suggests structural similarities between source and target domains are not as essential to successful application of analogies as previously posited. Also, our study contributes to the growing literature on performativity by showing how analogy functions as a mechanism by which financial market practices and associated theories of financialization reshape social action when exchange-based markets are applied to nonfinancial domains (Garcia-Parpet 2007, MacKenzie et al. 2007).

The Strategic Use of Analogies

In line with broader arguments about the process of financialization (e.g., Krippner 2001, Dore 2008, van der Zwan 2014), a variety of scholars have noted that concepts associated with financial markets have increasingly influenced organizational practices (Fligstein 2002, Epstein 2006, Davis 2009). For example, organizations have engaged in activities such as outsourcing, divestitures, and leveraged buyouts while adopting market-based understandings of corporate control (Davis et al. 1994). In a similar manner, organizations have incorporated market-based principles for handling a variety of strategic issues ranging from executive succession to product development (Thornton and Ocasio 1999, Thornton 2004). Increasingly, firms also have adopted a shareholder value orientation (Lazonick and O'Sullivan 2000, Froud et al. 2006) that has resulted in the adoption of different organizational practices such as the use of stock options and financial control systems (Fiss and Zajac 2004). Further, while Davis suggested that “the guiding principles of financial investment spread by analogy far beyond their original application” (Davis 2009, p. 6), surprisingly few researchers have studied the processes by which organizations use analogies to incorporate such ideas into their business models.

The use of analogy, “a structure-mapping between a known domain (the *base* domain) and a domain of inquiry (the *target* domain)” (Gentner 1982, p. 108; italics in original), presents a form of associative thinking that provides a natural reasoning mechanism for decision makers in situations featuring ambiguity and complexity (Gentner and Holyoak 1997, Markman and Moreau 2001, Gavetti 2012). Work in cognitive science suggests that the analogical process can be broken down into three main phases: retrieval, mapping, and application (Falkenhainer et al. 1989, Holyoak and Thagard 1997). Specifically, the decision maker must *retrieve* one or more candidate analogs to select a source domain; *map* various elements of the source (e.g., entities and relationships) onto the target domain in a process of structural parallelism marked by consistent, one-to-one correspondence

between mapped elements (Holyoak et al. 2001); and *apply* the analogy to “induce an outcome, to describe or explain a novel situation, or to generate a new schema for understanding the world” (Eliasmith and Thagard 2001, p. 247). As decision makers move through these three phases, problems can be solved as knowledge is transferred between different domains (Gomes et al. 2006).

Prior work suggests that analogies play three important roles in facilitating the transfer of concepts from the source domain to the target domain. First, analogies help convey and give meaning to new phenomena that do not easily fit into existing categories (Leblebici et al. 1991, Hargadon and Douglas 2001, Rindova and Petkova 2007, Bingham and Kahl 2013). Second, analogies establish understanding and legitimacy by transposing conventions to the domain of the natural order: analogies naturalize social classification and help actors see one thing in terms of another (Douglas 1986, Cornelissen et al. 2011). Finally, analogies serve as a fundamental cognitive mechanism used to recombine innovations from disparate domains in order to design new strategic options (Garbuio et al. 2015, Haas and Ham 2015).

Empirically, several recent works in organization studies have examined the use of analogy in a variety of contexts such as the establishment of sustainability reporting (Etzion and Ferraro 2010), the adoption of novel technologies such as electric lighting (Hargadon and Douglas 2001) or the business computer (Bingham and Kahl 2013), and the justification of strategic change (Cornelissen et al. 2011). These studies leverage foundational theoretical arguments from cognitive science to explain why some analogies are more successful than others (Gavetti et al. 2005, Cornelissen and Clarke 2010, Gavetti 2012). In considering the relative effectiveness of analogies, scholars have typically focused on their selection, differentiating between two types: superficial (or attribute) analogies and structural (or relational) analogies (Gentner 1983, Gentner et al. 2001, Gavetti and Rivkin 2005). In superficial analogies, the source and target domains feature similar surface characteristics but lack similarity at a deeper, more causal level (Gentner and Toupin 1986, Brown and Kane 1988, Cornelissen et al. 2011). In structural analogies, however, the source and target domains share many characteristics that form a “web of relationships” (Gentner et al. 2001, Gavetti et al. 2005, Cornelissen et al. 2011). Most importantly, such analogies are marked by structural parallelism, that is, “consistent, one-to-one correspondences between mapped elements” (Holyoak et al. 2001, p. 8). Further, according to Gentner’s (1983) systematicity principle, elements that belong to a system of interconnecting relationships are more likely to be transferred than isolated elements, again pointing to the importance of viewing analogies as matching connected systems of relationships (Gentner and Markman 1997).

Cornelissen et al. (2011, p. 8) summarized this theoretical perspective by observing that analogies “based on an extended web of counterparts will be more easily understood and are also more likely to be granted with legitimacy.”

Applying Financial Market Analogies

The spread of financial market analogies to nonfinance contexts calls this account into question and suggests it may be incomplete. Even though financial markets feature idiosyncratic characteristics not shared by other industries, organizational actors increasingly use market analogies to reshape contexts as diverse as environmental pollution and online advertising. Whereas stocks and other financial assets confer ownership rights supported by an extensive legal framework that assures their commensurability (Carruthers and Stinchcombe 1999), so-called markets for pollution rights or online advertisement space lack commodity-like products and formal legal frameworks. The financial market analogy thus in principle creates a superficial analogy rather than structural one-to-one mapping of concepts from a source to a target domain.

Further, existing theory in cognitive science has focused considerably on analogy selection (Gentner and Markman 1997, Holyoak and Thagard 1997) and has largely assumed that the salient dimensions of an analogy’s source domain map on to a clear and fixed reference point in the target domain (Gick and Holyoak 1983). However, it is unclear that such arguments from cognitive science can be readily transferred to the organization or industry level (e.g., Bingham and Kahl 2013). Further, recent work suggests that practitioners apply analogies more reflectively and that imperfect analogies sometimes function more effectively (Gavetti et al. 2005), as differences between the source and target domain may at times inspire innovation (Etzion and Ferraro 2010).

Building on these arguments, we see a need to develop a more interactive account of the strategic use of analogies that extends existing cognitive perspectives by incorporating the ways in which organizational actors manipulate representations of both the source and target domains to “make analogies work.” Such an account further needs to account for how existing entities, characteristics, and relationships are reshaped to more closely resemble financial markets, as suggest by recent works on performativity (Ferraro et al. 2005, Beunza et al. 2006, MacKenzie et al. 2007, Muniesa 2007). For instance, Garcia-Parpet (2007) showed how innovators deliberately transformed the market for strawberries in a French village into an exchange-based auction intended to resemble an economist’s view of a “perfect market.” Similarly, others have examined how the introduction of technologies such as the Black-Scholes option pricing formula (MacKenzie and Millo 2003) and the stock ticker (Callon and Muniesa 2005)

transformed social action in markets, shifting the view toward understanding how artifacts can shape economic decisions to conform more closely to theoretical models. In the current study, we are likewise interested in how *analogy work*—the reconfiguration of representations as well as market relations and practices—contributes to an agentic perspective of how actors construct organizational strategies and collectively build markets.

Data and Method

Empirical Context

To study how organizational actors make analogies to financial markets work, we explore the use of analogies in the rich ecosystem that supports the buying and selling of online display advertising. Since the Interactive Advertising Bureau (IAB) began reporting in 1996, online advertising revenues have grown from \$130 million to almost \$43 billion in 2013 (PricewaterhouseCoopers 2014). The interactive advertising industry now serves an estimated 400 billion advertising impressions each day (Brand 2014). Industry insiders recognize a number of forms of digital advertising, including paid search (e.g., contextual links), display advertising (e.g., banner ads), rich media (including video), classified ads, sponsorships, referrals (lead generation), and email (embedded ads) (Hallerman 2010). The development of new technologies has facilitated the development of innovative business models and organizational forms, fueling the rapid growth of this industry.

Internet-based advertising is typically divided into search (advertisements dynamically selected for specific individuals based on specific search requests) and display (advertisements dynamically selected for specific individuals based on context, browsing history, or various other data). Sellers of display advertising include traditional media publishers, search engines, social networks, and a plethora of niche content producers such as blogs and specialty interest websites. Historically, agencies purchased advertising space for their clients from direct sales forces of media outlets. However, over time publishers faced the problem of having a larger inventory of Internet display advertising impressions than they could sell in this old-fashioned way; as a result, they struggled to monetize their potential ad space. The rapid growth of this unsold ad space—trillions of impressions that formed the so-called “remnant” inventory—rapidly overwhelmed the capacity of traditional agency-based sales channels.

In response, new business models such as the advertising network emerged to help market actors liquidate this unmet demand. Ad networks operated outside of traditional advertising agencies and publishers and consolidated relationships with smaller publishers or advertisers to achieve scale economies. For example, the ad network Glam Media grew by buying inventory from a variety of

smaller websites with female viewers between the ages of 18 and 49, then selling these aggregated impressions to advertisers interested in that demographic.

In the mid-2000s, some ad networks began to position their market-making activities as “exchanges” that facilitated “real-time bidding” on individual impressions. Organizations such as DoubleClick (the leading provider of ad server technology in the industry), Right Media (an ad network), AdECN (an advertising exchange partnered with an ad network), ADSDAQ (an ad network), and AdBrite (an ad network) sought to shift their identities from ad networks to ad exchanges. They invoked explicit analogies to financial markets by comparing the market for display advertisements to the New York Stock Exchange (NYSE), the NASDAQ, or Electronic Communications Networks (ECN). Although only a fraction of the overall market for online display advertising impressions were traded on the advertising exchanges at the time, the broader market validated the appropriateness and effectiveness of these models by the end of 2007: Yahoo purchased Right Media for \$680 million, Google acquired DoubleClick for \$3.1 billion, and Microsoft purchased AdECN for an estimated \$70 million. Exchange-based trading continued to grow rapidly, and by 2011 an investment bank estimated that about 35% of online display ads were sold using a nonguaranteed “biddable” selling model (Osborn 2012). Further, industry experts projected exchange-based trading to grow at a compound annual rate of almost 50% per year from 2014 through 2018 (Weide 2013). The prevalent use of financial market analogies and the subsequent external validation of the advertising exchange innovation thus make the online display advertising industry an ideal empirical context in which to study our research question.

Data Collection and Analysis

Our initial data source was a comprehensive corpus consisting of press releases, websites, blogs, white papers, presentations, and articles from trade journals, newspapers, and the Internet published between 1996 and 2014. We compiled preliminary content by searching general business media and 164 specific marketing and advertising sources on Lexis/Nexis for discourse related to the online advertising industry. The text corpus we analyzed included well over 3,000 pages of data. We supplemented these materials by examining the content produced by actors in the online advertising ecosystem, paying particular attention to blogs such as AdExchanger (<http://www.adexchanger.com/>) or the Interactive Advertising Bureau (<http://www.iab.net/blog>) that specialize in publicly addressing topics of interest related to the display advertising ecosystem. For companies of particular interest, we gathered historical records of company websites, blogs, and media activity using the Internet Archive (<http://www.archive.org>).

We further conducted 45 semistructured, formal interviews with industry experts working in diverse segments of the online advertising ecosystem, including advertising networks, advertising exchanges, media publishers, and advertising agencies. In selecting interviewees, we used Lincoln and Guba’s (1985) guidelines for purposeful sampling, choosing informants who would be most knowledgeable about the industry. Using a snowball technique, we asked informants to recommend additional people who could provide insights about emergent topics of interest. Interviews lasted one hour on average and loosely followed an interview guide that included questions designed to gather information on the interviewees’ personal biographies, their industry-related experiences, and our specific issues of theoretical interest. We took detailed notes during these interviews, which enabled us to triangulate our findings to build more reliable interpretations (Yin 2002). To supplement the interviews and archival analysis, the first author engaged in two weeks of participant observation at a local advertising agency and attended a number of digital media trade shows sponsored by the Interactive Advertising Bureau.

To analyze our data, we employed inductive data analysis building on principles from grounded theory (Glaser and Strauss 1967). Specifically, we developed a customized approach to analyze our data based on our research question and empirical context. This approach involved three distinct phases of analysis. In the first phase, we examined the use of financial market analogies in the online display advertising industry between 1996 and 2014. We used open coding to identify categories of interest in our data (Van Maanen 1979, Strauss and Corbin 1998). During this process, we sought to identify categories, or first order concepts, related to our research question that were closely grounded in our empirical data. In this phase of analysis, we paid particular attention to data from actors with an industry perspective, such as those affiliated with the Interactive Advertising Bureau. During this phase, we identified the years between 2004 and 2008 as being particularly significant in terms of the prevalent use of financial market analogies and the central importance of defining events in the industry’s history.

In the second phase, we focused our analysis on four organizations that claimed the label “advertising exchange” between 2004 and 2008: Right Media, AdECN, ContextWeb and their ADSDAQ exchange, and AdBrite. We theoretically selected these organizations based on their explicit use of analogies to financial markets in pursuit of their objective of creating an advertising exchange. We analyzed historical records of their company websites, blogs, and media activity. Based on these data and the interviews, we created narrative case histories for each company, centering our analysis on the introduction of exchange platforms or exchange-related products and services. By selecting four cases

Table 1 Properties of Cases

Characteristic	Right Media	AdECN	ADSDAQ	AdBrite
Analogical referent in financial market	NYSE	NYSE; Electronic Communications Networks (ECN)	NASDAQ	eBay
Positioning	Flexibility/Openness	Equality	Control	Transparency
Marketplace participants	Publishers; advertisers; ad networks	Ad networks	Publishers; advertisers; ad networks	Publishers; advertisers
Number of participants	20,000 buyers and sellers	7–8 ad networks	5,350 buyers and sellers	30,000 buyers and sellers (long-tail)
Size	Significant ad exchange	Small ad exchange	Medium-sized ad exchange	Medium-sized ad exchange
Target inventory	Remnant	Remnant	Premium	Premium and remnant
Exchange platforms or exchange-related products and services	Yield Manager (2005) Right Media Exchange (6/2006) Right Media Publisher Media Exchanges (PMX; RMX) (9/2006; 1/2007)	AdECN Exchange (10/2005) Expansion of the AdECN Exchange (8/2006)	ContextAd (9/2004) ADSDAQ Exchange (10/2007) ADSDAQ Trading Desk (4/2008)	AdBrite 2.0 (11/2006) OTX exchange (4/2008)

with idiosyncratic interpretations of the financial market analogy, we were able to observe diverse analogy practices in order to develop an understanding of the patterns underlying financial market analogy work and generate a more robust account. We provide summary characteristics of our cases in Table 1.

In the third phase, we looked for relationships between concepts to understand the dynamics of our phenomena of interest (Gioia et al. 2012). We developed a theoretical model of how organizations make financial market analogies work by iteratively engaging with the existing theoretical literature on analogies, the general industry discourse from phase 1, and data from cases in phase 2. Our objective was to create a grounded theoretical explanation of the processes used by organizations to make financial market analogies work as they attempt to build support for their innovations.

Right Media. Right Media was founded by Mike Walrath in 2003 to offer consulting services for display advertising to advertisers and publishers, but the company quickly shifted its business model to become what industry observers call an ad network—a company that connects web publishers with advertisers. Walrath justified this strategy: “We realized...how inefficient and opaque the market was and how little information companies had about the prices they were paying as a buyer or the revenue they were getting as a seller” (Walrath 2007). As its business model developed, the company began to construct a marketplace independent of its ad network. By early 2005, the organization was describing itself as “the ONLY auction-based marketplace for online advertising” (Right Media 2005a). The firm’s value proposition was that it enabled advertisers to pay only what an impression was worth and publishers to realize the full value of their inventory. Or, as Right

Media posted on their website, “our core innovation: we tie price to value” Right Media (2005c).

Right Media’s marketplace operated as an ad inventory auction system. For buyers, Right Media set a cost per action for each potential impression advertisers might buy. This flexible bidding functionality differentiated Right Media from static networks that could not dynamically adjust pricing—a limitation that prevented such networks from serving both low- and high-value impressions. For sellers, Right Media enabled publishers to submit their inventory of advertising impressions to the marketplace via “ad calls.” In combination, these services constituted a platform strategy (see Gawer 2010) that enabled Right Media to auction impressions to the highest bidder.

By the end of 2005, Right Media described its exchange (now called Yield Manager) “as akin to an auction marketplace, like eBay or NASDAQ, except instead of electronically facilitating the sale of merchandise or stocks, Yield Manager facilitates the sale of online advertising” (Thomases 2005). On their website, Right Media highlighted how their marketplace promoted healthy competition that benefited buyers and sellers. In July 2006, Right Media extended Yield Manager to formally launch the Right Media Exchange, which they described as follows:

Interactive advertising’s first open media exchange. Connected on a common platform, buyers and sellers seamlessly trade more than two billion impressions on the exchange each day. The Right Media Exchange enables competition in an open, fair market to drive more value for ad networks, publishers and advertisers.

Right Media (2006)

Shortly after launching the advertising exchange, Right Media sold 20% of the company to Yahoo in October 2006. In April 2007, Yahoo purchased the remaining

80% of Right Media for \$680 million. As part of the purchase, Yahoo had agreed to “become a fundamental player in the Right Media Exchange” (Walrath 2006).

AdECN. AdECN was founded in 2003 by Bill Urschel, a serial entrepreneur. Urschel decided to start an online display advertising company because he had noticed “waste and inefficiency in the market” (Kuo 2006). He critiqued the ad network business model, suggesting that “there were too many middlemen taking bites out of the transaction” and “the stock market approach would bring massive efficiency” (Kuo 2006). AdECN launched a preliminary advertising exchange in October 2005, “the first real-time, per impression, auction-based exchange for display advertising” (AdECN 2005). AdECN explicitly invoking an analogy to financial markets in descriptions of the exchange, suggesting that AdECN was structurally similar to the New York Stock Exchange: ad networks with “seats” on the exchange traded inventory on behalf of their publisher and advertiser clients. As such, AdECN’s exchange model differed significantly from the Right Media Exchange in that AdECN directly interacted only with ad networks, not advertisers or publishers. AdECN consistently emphasized the importance of neutrality, similar to the NYSE: “the exchange does not participate on a percentage or revenue share basis in the transaction, because it must remain a disinterested, neutral marketplace for its members” (AdECN 2007a).

AdECN launched in October 2005 with one ad network partner, Experclick. Ten months later, they opened the exchange up to other members in August 2006. Although AdECN failed to generate the volume of transactions generated by the Right Media Exchange, Microsoft still bought the company for an estimated \$70 million in July 2007.

ContextWeb’s ADSDAQ Exchange. The third case is the ADSDAQ, an advertising exchange introduced by ContextWeb. The company was founded in May 2000 as a traditional advertising network and launched a proprietary product called ContextAd in September 2004. The core functionality of ContextAd was to “serve contextually relevant advertisements to the most motivated potential customer in as little as 20 milliseconds” (ContextWeb 2004). ContextAd delivered profits via an arbitrage model, purchasing inventory from publishers on a per-impression basis and then selling the inventory to advertisers using cost-per-click pricing.

In May 2007, ContextWeb launched the online advertising exchange ADSDAQ, described by the company as “the first true online advertising exchange” (ContextWeb 2007). ContextWeb differentiated its solution from other exchanges and networks by highlighting a unique approach to pricing control based on the ability of traders to set “bid” and “ask” prices. The firm further

focused on premium inventory, in contrast to other exchanges such as Right Media or AdECN which primarily focused on remnant inventory. In the Right Media Exchange, for example, publishers ceded control of their pricing to an automated algorithm. In contrast, ContextWeb targeted premium inventory by structuring the ADSDAQ exchange so that publishers and advertisers retained significant pricing control.

Initially, the ADSDAQ Exchange serviced only existing ContextWeb ad network clients. However, in October 2007 the firm launched a self-service Exchange Selling Desk for publishers. In March 2008, ADSDAQ further expanded its scope, launching an Agency Trading Desk that enabled any publisher to place inventory on the exchange, streamlined transactional processes, and provided additional information about the effectiveness of campaigns. In September 2011, ContextWeb merged with Datran Media to become PulsePoint.

AdBrite. AdBrite began as an ad network founded in 2004 by Philip Kaplan and Gidon Wise. Between 2004 and 2008, AdBrite launched two innovations that transformed it into an exchange. In November 2006, AdBrite launched AdBrite 2.0, “the world’s first fully transparent online advertising marketplace” (AdBrite, Inc. 2006). AdBrite highlighted its fundamental features:

AdBrite now offers a full-service marketplace where advertisers can deliver the right ad to the right person at the right time—and at the right price. Every ad on AdBrite 2.0 is auctioned in real time to the highest bidder.

(AdBrite, Inc. 2006)

AdBrite emphasized that its marketplace reached the Internet’s so-called long-tail by allowing “website publishers to monetize the brand value of their content and brand advertisers to cost-effectively reach their target audience” (AdBrite, Inc. 2006).

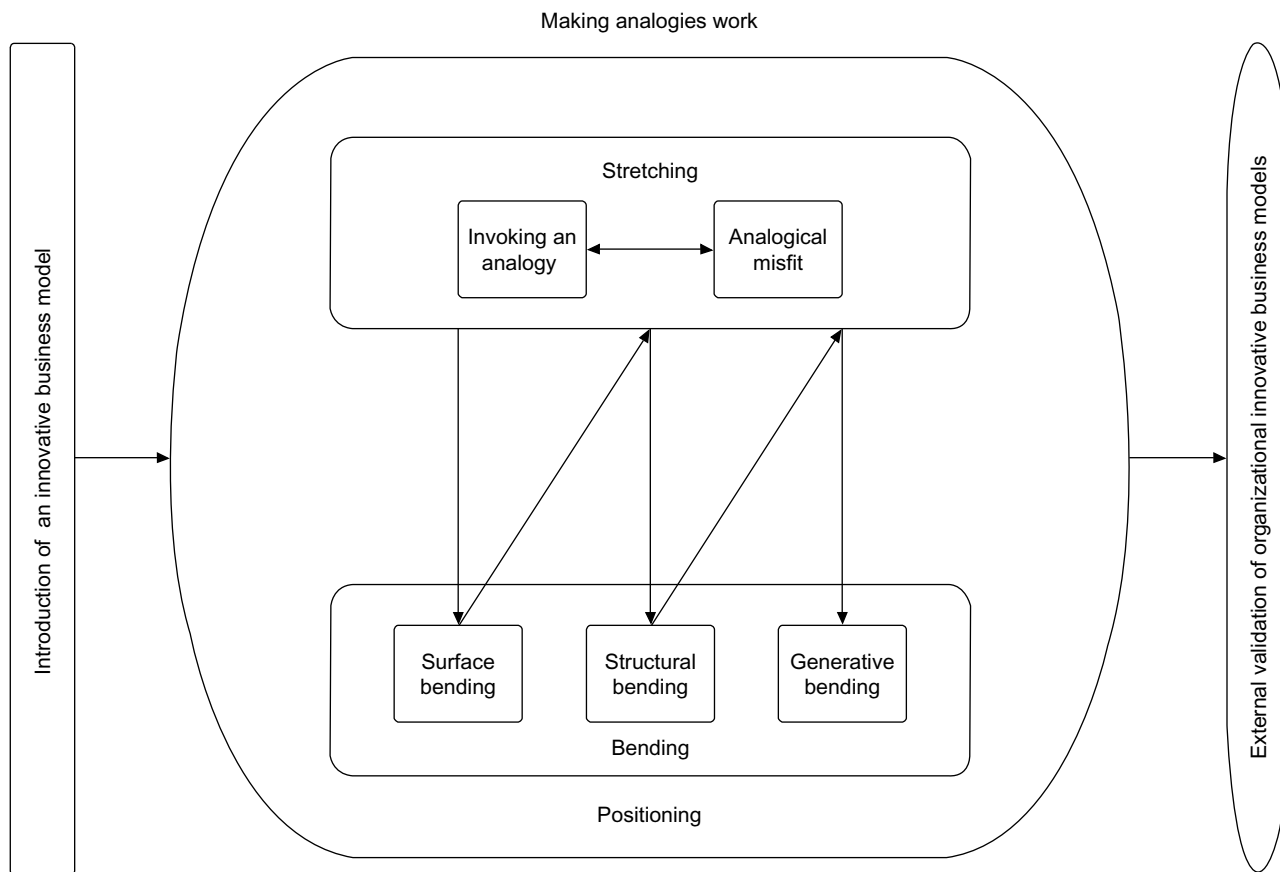
In April 2008, AdBrite launched its real-time bidding Open Targeting Exchange (OTX):

OTX empowers providers of targeting technologies to build businesses on their technologies without acquiring and managing their own base of publishers and advertisers. Technology partners determine optimal matches among publisher zones and advertisements in the AdBrite system via a Realtime API. Targeting providers can set their own pricing and margins by adjusting their bids, allowing strong vendors to profit while focusing on their core strengths.

(AdBrite, Inc. 2008)

Essentially, the OTX marketplace created a competition platform for ad sales algorithms; AdBrite’s CEO summarized the purpose of the exchange with a single sentence: “May the best algorithm win!” (AdBrite, Inc. 2008). Although AdBrite raised more than \$35 million in investment funds, the company eventually folded in 2013.

Figure 1 A Theoretical Model of How Organizations Make Financial Market Analogies Work



A Theoretical Framework for the Use of Financial Market Analogies

We present our theoretical model explaining how organizations make analogies to financial markets work in Figure 1. First, organizations use the financial market analogy to justify an innovative business model. We observed actors collectively *stretching* concepts from financial markets to online advertising, a target domain that had not previously been seen as possessing similar characteristics. Stretching involves invoking the financial market analogy despite the existence of a tangible structural misfit. To address this analogical misfit between financial markets and online advertising, we observed firms *bending* their activities and practices to construct similarities between the source domain of the financial market and the target domain of online advertising. Over time, bending practices evolve from surface bending (i.e., constructing superficial associations between entities in two domains) to structural bending (i.e., constructing deep or structural associations by developing common relations between entities in two domains) to generative bending (i.e., creating new entities and relationships between entities in the target domain inspired by the source domain). Finally, organizations elaborated their stretching and bending activities as they engaged

in *positioning* by simultaneously promoting the general analogical relevance of financial markets while offering self-interested, idiosyncratic interpretations of the financial market analogy to establish the superiority of their innovations relative to other offerings in the competitive marketplace. We now describe our theoretical model more fully and in context.

Stretching

In stretching, innovators invoke the financial market analogy to suggest the appropriateness and desirability of idealized market characteristics for a novel context, even though structural features of the two contexts generally are considered to be quite different. To accomplish this, organizational actors assert the relevance of idealized attributes associated with financial markets, extending these attributes from the source domain to a target setting with different characteristics and relationships. The concept of stretching recognizes that relationships in the source domain may not map perfectly (or even well) onto the target domain. As a result, actors may need to engage in a significant amount of adaptation to fit the analogy to the unique requirements of the target domain of the innovation (Gentner and Holyoak 1997). The goal of adaptation is to create entity parallelism by matching the analogy to the target (Keane 1996). However,

such adaptation requires a nontrivial amount of effort when the target and source domains are not isomorphic. While prior literature has focused on the initial selection of an analogy, it is less clear whether mappings themselves can be changed (Holyoak and Thagard 1997); “even though most cognitive theories of analogy include an adaptation stage, little is known about adaptation and how it influences the course of analogical problem solving” (Keane 1996, p. 1066). Taking the challenge of adapting the analogy as our starting point, we now show how the actors we observed stretched the financial market analogy to suggest its appropriateness for the online advertising industry.

Invoking the Analogy. The companies in all of our cases constructed explicit analogies between their offerings and financial markets. One observer retrospectively noted the following:

Since the mid-2000s, Madison Ave has been compared to Wall Street. This helped fuel innovation and investments, and brought more scientists and engineers into the area. . . . When ad exchanges were presented as equals to the financial markets, they were great for the advertising marketplace. This comparison helped convey a proven model, define market efficiency, add automation, and introduce standards for impressions. (Brand 2014)

The analogy to financial markets took very direct forms in all our cases. For instance, Right Media suggested, “much like NASDAQ, an online media network facilitates transactions of somewhat standardized products between buyers and sellers” (McGrory 2005). The company further extended this argument:

The exchange. . . plays the same role as the NYSE does for financial markets. Not only does it provide the underlying transactional infrastructure for media, it will provide a common, trusted, enforceable set of rules and regulations that all exchange participants adhere to. (O’Kelley 2006)

AdECN likewise described its exchange by explicitly invoking an analogy to financial markets:

The AdECN Exchange serves its members, who in turn serve their advertisers and publishers. By way of analogy, AdECN is the New York Stock Exchange, and the members of the exchange are stockbrokers like Merrill Lynch, Fidelity, Charles Schwab, and so on. Advertisers and publishers never deal directly with the AdECN Exchange, they always work through a member broker—exactly the same way investors who buy and sell stocks always work through a stockbroker, rather than trading directly on the exchange. The member’s advertisers and publishers need not even be aware that their advertising network is trading on the AdECN Exchange. (AdECN 2007b)

While invoking the analogy to financial markets, the companies we studied were careful to justify this comparison by critiquing existing inefficiencies in the

industry. For instance, AdECN offered a critique of the industry by invoking a comparison to stock exchanges:

What’s wrong with the way the industry works today? It is incredibly inefficient. Imagine a world full of stock brokers but without a stock exchange. If you went in to buy 1,000 shares of IBM from your broker, he would have to have another client willing to sell you 1,000 shares of IBM—or he would have to call around to his other broker friends to see if they had a seller of IBM shares. (AdECN 2007c)

To motivate their analogy, these innovators argued that relative to the financial market, the existing display advertising ecosystem featured significant inefficiency and waste. AdECN differentiated between the ad exchange model and previous advertising business models related to rate cards:

Why an auction for every impression? Isn’t a fixed rate for a set number of impressions simpler? Simpler, yes—but incredibly wasteful. . . . With a real-time auction, each and every impression is sold to the highest bidder. (AdECN 2007c)

This focused comparison between traditional rate card and real-time auction pricing methods highlights how auction pricing solved a significant pricing problem inherent in the traditional model. Further emphasizing the advantage of the brokerage model, AdECN claimed, “this is the way it has worked on the stock exchange for a couple of hundred years” (AdECN 2007c), thus aiming to legitimize its preferred solution by naturalizing it (Douglas 1986).

Invoking the analogy often did not involve the structural mapping processes that current theory assumes necessary to establish similarity between an analogical source and target domain. Instead, stretching created a loose association between financial markets and online advertising. Organizational actors used the analogy to assert idealized characteristics of the market, but many of these connections relied on very broad associations that did not delve into the specifics of how the analogy worked. This superficial use of the analogy elicited industry discussions that challenged the appropriateness of the financial market analogy, with some actors questioning whether the analogy had been stretched too far.

Analogical Misfit. As noted by Keane et al. (1994, p. 389), “an analogous solution may not always solve the problem immediately, it may have to be validated or tested and adapted to the reality of the problem situation.” Indeed, a number of industry participants and observers suggested that the financial market analogy presented a stretch because of the lack of structural similarity between financial markets and online advertising. As one executive we interviewed explained,

So there are a lot of things from the finance analogy that don’t really apply. You can’t apply the [mathematical] techniques to the things themselves. How do you

define the class? There are an infinite amount of classes to think about. Which features do you use to describe the impressions? (Interview, ad exchange executive)

Discrepancies between the base and target stemmed from several sources. First, entities in the financial market domain did not necessarily have direct correspondences in the world of advertising. One observer noted the following:

In financial markets, the players simply include a buyer, seller, and an exchange. An ad exchange can be more complex, with buyer, agency trading desk, DMP (one for buyers, one for sellers), DSP, exchange, SSP, and Ad Server—each having a fee. (Brand 2014)

Apart from the actors involved, the products exchanged were also quite different. As noted in the opening of our paper, impressions and stocks have rather different properties, including the facts that stocks have relative permanence and are legally made commensurate while impressions lack both of these properties. Another market participant noted the following:

The other thing we screw up in our space is trying to use stock exchange or commodity marketplace language to describe what happens in the digital media exchanges. But there isn't an exact equivalent of most of these concepts. . . . The problem is that a futures contract is not the same thing—not even remotely—as a guaranteed media buy. (Picard 2014)

Second, relationships between entities in the financial market source domain did not necessarily correspond with entities in the online advertising target domain. This becomes evident when comparing the role played by stock exchanges versus advertising exchanges.

Clearing in a financial exchange is a way to tackle problems such as price and discrepancy between buyers and sellers. On Madison Ave, parties need to work things out themselves with inefficient means like “makegoods.” Also, when fraud or nonpayment happens, the publisher is completely at risk. Wall Street, on the other hand, is heavily at the center of their activities and has a process for accountability, and account systems for nonpayment. (Brand 2014)

As a result of these significant discrepancies, several market observers noted that the use of the financial market analogy lacked significant substance, as exemplified by the following reflection:

Try explaining an ad exchange like this, it's actually quite amusing. Generally what happens is the other person's eyes glaze over slightly and he starts nodding as if everything has been made extremely clear even though he still has no clue what the ad exchange actually does. You see, the NASDAQ analogy really doesn't make sense but nobody wants to sound stupid and say “I don't get it,” so they let it slide and remain confused. . . . The real problem is that the NASDAQ analogy works just as well for Advertising.com as it does for Right Media, adECN or AdsDaq [sic]. (Nolet 2007)

Summary. The concept of stretching thus refers to the public assertion of an analogy with substantially different features from the target domain. Invoking an analogy to financial markets generated many questions; some observers felt that the two domains were marked by analogical dissimilarity, not similarity. This feature of financial market analogies was not fully considered in prior research, in which the effectiveness of analogical similarity—particularly deep structural similarity—was a primary focus (Gavetti et al. 2005, Lovallo et al. 2012). In our current setting, similarity was not present when the analogy was first invoked, resulting in resistance to the analogy and its associated offerings. By itself, analogy stretching could not address the critique that advertising markets and financial markets lacked deep structural similarity. Organizational innovators thus needed to utilize a complementary mechanism to address this misfit.

Bending

While stretching extends the financial market analogy to another context with quite different characteristics, we observed another complementary mechanism for achieving a fit between the analogy and the structure of the activity that we call *bending*. Whereas stretching modifies the analogy to fit the target context, bending alters the context to fit the analogy. The ad exchanges engaged in bending to actively and iteratively construct correspondences between their offerings and their interpretations of the financial market analogy. Specifically, we observed three forms of bending that occurred in sequence and built on each other: *surface bending* refers to fairly superficial forms of creating resemblances or similarities between existing entities in the target and source domains; *structural bending* refers to the realignment of existing roles and relationships to more closely mirror the relationships present in financial markets, as suggested by the principle of systematicity (Gentner 1983); and *generative bending* is the process of modeling new entities and relationships on financial markets with no prior corresponding referents in the target context. In combination, the three forms of bending (surface, structural, and generative) reshape the target context to create similarity between the source and target domain. We now discuss each of these forms of bending in turn.

Surface Bending. The first form of adjustment we observed in our cases related to constructing surface resemblance to financial markets. As Gentner and Holyoak (1997) noted, base analogs must be mapped to target analogs to identify a systematic correspondence between both and create alignment. This is essential, since appearance similarities are significantly easier to notice than purely analogical ones (Gentner and Markman 1997). Literal similarity is particularly accessible as corresponding entities can be mapped via object descriptions or relational structures (Gentner 1983, Brown and

Kane 1988); observers typically perceive surface similarity as being correlated with deep structural similarity (Brown and Kane 1988), thus they are more sensitive to it. Keane (1996, p. 1067) referred to such similarity as entity-parallelism, where “the entities (i.e., objects and relations) in the solution have known corresponding objects in the target problem.”

Drawing on these insights from cognitive psychology, we argue that the companies we studied first aimed to legitimize and anchor the financial market analogy through a process of surface bending aimed at mapping entities in their target context to the base analog. However, this surface bending is not necessarily (and frequently not at all) correlated with creating deep structural similarity, making surface bending relatively easier to achieve and simultaneously easier to reverse.

Surface bending is evident in the language ad exchanges used to describe and name themselves. For instance, the ADSDAQ to NASDAQ comparison was reinforced with every use of the ADSDAQ moniker. AdBrite reinforced the comparison by naming its core product/technology OTX, an acronym for Open Targeting Exchange (Levine 2008) reminiscent of FOREX, the over-the-counter exchange for trading foreign currency. While the comparison to the NYSE is not directly reflected in AdECN’s name, it is prominent throughout the firm’s early company presentation materials.

Beyond their external appearance, the use of financial market language also extended to these firms’ internal operations. For instance, one executive described how his firm began to refer to marketing campaign managers as “traders.” Further, such “traders” were supported by “analysts” who studied potential media purchases and made recommendations to the traders. Members of the support staff were given new titles, yet minimal modifications were made to their roles and competencies.

Surface bending presented an early and fairly shallow form of reshaping entities and roles to create closer correspondences to their stock market counterparts. Many market participants and observers were quite aware that surface correspondence did not imply deep structural similarity. For example, one executive made the following remark:

Over the years I’ve seen “exchanges” that were auction-houses for remnant inventory. One of them held an auction three days a week, using a whiteboard. There are “exchanges” where the members were merely introduced to each other in a sort of dating service, leaving it up to the members to contact each other and work the deals.
(AdECN 2007c)

Surface bending thus is not so much a form of decoupling (Meyer and Rowan 1977) as it is a form of Batesian mimicry where one entity aims to resemble another in appearance or behavior such that a signal receiver has difficulty distinguishing between them (Ruxton et al.

2004). An AdECN executive illustrated surface bending by retrospectively commenting: “What is a true exchange? It’s kind of a silly question. It is whatever you want it to be...the stock exchange analogy was good enough. It held water” (interview 2012). However, as bending progressed, some actors began to consider creating a deeper structural resemblance between their activities and financial markets. Mike Walrath made the following remark about Right Media’s business model:

It’s loosely modeled on the stock market. Some companies [trying to do exchanges] are talking about really modeling it after Nasdaq. They’re focusing on trying to replicate that, and the ad market doesn’t work like securities.
(Klaassen 2007)

We turn to this closer modeling of relationships between financial markets and display advertising next.

Structural Bending. Brown and Kane (1988, p. 519) observed, “Dependence on surface similarities is useful but fallible, however, as all surface similarities do not correlate with deep structure. Appearances, as in the case of whales and fishes, can be misleading.” While surface bending proved helpful to the firms we studied in anchoring the financial market analogy for their audiences and customers, it did not address the critique that there was a lack of deep structural correspondence to the financial market. In response, the firms we studied began to deepen their bending activities in attempts to resemble financial markets more closely; an activity we call structural bending. The term draws on Gentner’s (1982) argument that successful analogies entail structural alignment between base and target domains. This alignment requires true structural parallelism (consistent, one-to-one correspondences between mapped elements) and systematicity, that is, “an implicit preference for deep, interconnected systems of relations governed by higher-order relations, such as causal, mathematical, or functional relations” (Holyoak et al. 2001, p. 8). The ideas of structural parallelism and systematicity suggest that strong analogies are marked not only by matching entities but by matching systems of relations between these entities (Gentner 1983, Gentner and Markman 1997). Building on these arguments, the notion of structural bending involves the reconfiguration of existing relationships in the target domain to match the analogy of choice with respect to relations and the higher order constraining relations connecting them. Structural bending does not involve matching the target to the base precisely; rather, the goal is to make the target coherently resemble the base by constructing similar relationships between entities in the source and target domains.

The structural bending we observed took several forms, all of which involved rewiring relationships to resemble financial markets. All of the focal firms constructed auction-based exchanges to facilitate trading

of online ad impressions, where “like the stock market’s shares, impressions are priced, bought, and sold based on supply and demand” (Whitney 2008). These ad exchanges incorporated several features of actual financial market exchanges. For instance, while buyers and sellers had previously used direct sales type channels, the firms we studied eventually established automated exchange platforms to facilitate trading. The common element of these exchanges was the construction of a bidding system that auctioned advertising impressions to the highest bidder. While earlier self-described exchanges might have operated with “an auction three days a week, using a whiteboard,” these automated systems meant that “Every ad... is auctioned in real time to the highest bidder” (AdBrite, Inc. 2006).

Such bidding systems presented a significant departure from previous ways of buying and selling ad impressions. For instance, AdECN aimed to reshape the ways buyers and sellers interacted by limiting membership on their exchange to ad networks who act as traders. Their model of an exchange forced publishers and advertisers to go through “traders,” much like the pre-2005 NYSE model in which trading rights were limited to the owners of seats on the exchange such as Merrill Lynch, Fidelity, or Charles Schwab (AdECN 2007c). AdECN thus restricted trading relationships to strengthen the role of the ad network, directly modeling itself on the NYSE’s organization.

In a similar fashion, Right Media highlighted how their auction pricing mechanism encouraged competition by implementing a system similar to a traditional auctioneer who cajoles bidders:

We’ve created a true auction-based marketplace that brings together advertisers and publishers. Both parties benefit equally—every time. Why? Because on every ad call, we can evaluate the value of the individual impression and make sure the price is right. Advertisers can bid on each impression independently—that’s billions of bids each month... This ensures ultimate flexibility as advertisers strive to achieve their goals.

(Right Media 2005b)

ADSDAQ and AdBrite modeled themselves on financial markets by employing a pricing mechanism whereby publishers and advertisers set a firm “bid” or “ask” price. For instance, AdBrite operated an auction pricing model where the highest bidder paid just a penny more than the second-highest bid price, leading to experimentation regarding the right bid or ask price:

Start with a high bid to maximize your exposure and see which sites convert for you. If the market rate for banners is \$1 CPM, try a \$2 or \$3 CPM bid. Likewise for CPC text bids—if the market is 20 cents per click, try a 50 cent bid. With AdBrite’s market-based pricing, you’ll only pay a penny more than the next-highest bidder, so you’ll typically pay less than your max bid.

(Blum 2008)

The reshaping of relationships to create structural alignment was not restricted to the interactions between buyers and sellers, but again spilled over into the firms’ internal operations. While in early days “traders” resembled their counterparts in finance in name only, the resemblance became much deeper:

These traders are the ones buying the media in real time, thus taking on the risk of executing ineffective buys, rendering the use of this analogy more commensurate with the experience of these participants. Akin to the structure of trader-analyst relations in financial markets, the trader does not necessarily follow the analyst’s recommendation but can rely on it in the buying process. (Clifford 2008)

Much like their financial counterparts, such traders now would “spend their days in front of two computer screens, feeding their systems with data and trying to perfect their trading algorithms.” Beyond formal titles, the structure of their everyday lived experiences in this market had come to resemble those of financial market actors. Structural bending thus relies on the systematicity principle: the “deep” adoption of the financial analogy matches a connected system of relations rather than a simple alignment of entities. (Gentner 1983)

Generative Bending. Structural bending thus follows the systematicity principle; by reconfiguring existing advertising market transactions such as the buying and selling of impressions, the firms we studied achieved structural parallelism with financial markets. However, as structural bending increased, an even more advanced form of alignment emerged through a process that we call generative bending. As they engaged in this third form of bending, actors drew on financial market products and relationships to introduce novel practices into the advertising world that had no prior corresponding entities or relationships. Whereas structural bending was used to reconfigure the process of buying and selling impressions from direct negotiation between two parties to an automated double-sided auction resembling a stock exchange, generative bending was used to introduce completely novel, nonindigenous practices stemming entirely from the financial market (such as the creation of indices or the selling of futures on ads) into the advertising industry, thus completing the construction of structural similarity between both domains.

The firms we studied engaged in generative bending through the introduction of novel products after the exchange notion became more established in the advertising domain. One executive we interviewed explained, “as the exchange gets going there can actually be instruments like options and puts and covered calls that can reduce any financial risk for the publisher, too.” Similarly, another executive observed the following:

Right now it’s more the in the moment, taking advantage of the spot market with aggressive bid management... But we’re certainly thinking about where that goes

later in terms of secondary markets, derivatives, options, hedges, all the rest. (Clifford 2008)

The same idea was expressed by another executive:

Once there's a marketplace where you can buy and sell using your own technology, you can absolutely create financial instruments or media instruments. . . . I think what you'll see is traders come in, and they'll look to create derivatives on certain packages of media and resell them to other guys. You'll see a whole marketplace develop because of this technology shift. (Clifford 2008)

All of the firms we studied created new indices and forms of measurement that utilized financial market notions of profitability and attribution; they diverged from traditional advertising assumptions about the inherent inability to measure advertising effectiveness. For instance, Right Media explicitly developed metrics and products based on the financial market analogy in the form of an index modeled on stock market indices:

Impressions do have a similar correlation to how stocks are categorized. We did try to do a little bit of categorizing publishers instead of stocks—like a Fortune 500. . . we would offer to advertisers: “Buy our top 200 publishers!” It was kind of like buying an index fund. (Interview, ex-Right Media executive 2010)

Likewise, a patent filing by Yahoo (which acquired Right Media) describes a process for monetizing page views using futures contracts:

A futures contract regarding the page view is offered for sale on an exchange, such as an ad exchange. The futures contract specifies an obligation to purchase the page view with respect to the future date for the estimated price. The futures contract may be offered for sale on a date that precedes the date on which the page view is to be offered for sale. (U.S.20110040632 A1, filed August 17, 2009)

This technology thus describes the creation of the equivalent of a true derivative based on an underlying entity—in this case, a future page view. AdECN and AdBrite's OTX system likewise developed increasingly sophisticated forms of algorithmic trading associated with financial markets, and refined their exchanges by enabling ad networks to pursue a financial strategy of “arbitrage” by 2007.

As these examples indicate, online ad exchanges engaged in generative bending as they created new transactional forms; organizational actors in the firms we studied explicitly used financial instruments such as derivatives to model the creation of novel processes in the advertising world. Generative bending is thus the last form of bending, in that it is used to structurally remodel the target domain to mirror the base and expand its features to create truly novel practices and relationships in the target domain.

Summary. In bending, the firms we observed used an analogy to financial markets to structure their products and services. In essence, online advertising firms actively constructed similarity between their domain and the source domain of financial markets. They employed financial market-like understandings of measurements and indices to develop better understandings of the causal effectiveness of advertising. Further, the firms developed custom reporting to ensure they delivered on the financial market promise of higher performance, with much of this reporting resembling finance reporting. While some existing research highlights the role analogies play in inspiring new and creative ideas (Etzion and Ferraro 2010), our findings indicate that the analogy not only inspired innovation, but also functioned as a constraint: actors worked to make the flow of activity fit their analogy of choice. To summarize, our findings indicate that deep structural similarity was not an inherent property of the analogy to financial markets. Instead, we show that organizational actors actively and iteratively constructed superficial similarity and deep structural similarity by bending their offerings to match their analogical.

Positioning

Whereas stretching and bending refer to ways in which innovators collectively aim to create correspondence and fit between a base analogy and a target context in order to develop broad support for a model, positioning refers to the ways in which actors use the analogy to support their idiosyncratic instantiations of it, emphasizing different aspects of the analogy to make their case. As they engaged in positioning, the firms we studied sought to exploit the structural similarity of their particular interpretation of the financial market analogy relative to competitive offerings in order to gain support for their approach. Positioning envelops both stretching and bending in the sense that both of these activities take place within an overall positioning discourse that aims to promote an individual organization's particular agenda.

While the firms we studied engaged in stretching to build support for the use of a financial market analogy and bending to restructure the online display ad market, they engaged in positioning to advance their particular interests by using financial language as they competed with each other in the market. While many innovators collectively shared the challenge of establishing the exchange notion, they faced a complementary challenge of extracting rents from this restructuring.

Constructing Market Positions. Each firm highlighted how it presented a more authentic exchange by emphasizing particular evaluation criteria aligned with its market offering. For instance, Right Media emphasized how an auction-based marketplace inherently increased the strategic flexibility of market participants:

We're the only marketplace that allows advertisers to vary pricing based on how much the impression is worth

to them. This ensures ultimate flexibility as advertisers strive to achieve their goals. (Right Media 2005c)

It is this focus on flexible pricing that Right Media claimed as underlying its distinctive position in the market based on an individual auction model:

The way we deliver results is through the first and only real-time auction of online advertising space. That's worth repeating. Right Media operates the ONLY auction-based marketplace in the industry. (Right Media 2005a)

AdECN took a different approach by highlighting the integral role of neutrality in an exchange. The firm directly critiqued its competitor, Right Media, for operating both an exchange and an ad network that participated on the exchange. As Bill Urschel, AdECN's CEO, commented after Yahoo bought Right Media, "if you're Right Media... you are just selling the remnant media out of Yahoo... you can be transparent, but not neutral" (interview 2012). In contrast, AdECN highlighted the benefits of a brokerage model:

The exchange makes the match, delivers the goods to the highest bidder, handles the accounting, and collects from and pays all of the members. An exchange has to be a neutral, disinterested party in the transactions. It cannot care who wins an auction. (AdECN 2007c)

Taking yet another approach, ADSDAQ emphasized the importance of control as captured in its "It's the (Pricing) Control Stupid!" aphorism (Sears 2010). With this positioning, ADSDAQ stressed the ability of its consumers to obtain premium inventory rather than the remnant inventory offered by AdECN or Right Media:

In other exchange and network businesses, publishers are not permitted to set an "Ask" price but receive a revenue share of the "Bid" price from the advertiser. This model only allows for a remnant inventory pool and inhibits market volume and liquidity. (ContextWeb 2007)

In contrast to more rigid pricing approaches, ADSDAQ differentiated its model of an exchange by focusing on "premium" inventory and pricing control for publishers via their "bid" and "ask" pricing model, suggesting that "measurement is imperative in order to reflect the true value of ContextWeb's page level targeting" (comScore, Inc. 2009).

Finally, AdBrite aimed to differentiate its offering by emphasizing transparency. The company described itself as "the first fully transparent ad exchange to offer real-time bidding" and promised participants "full visibility as to the properties they are buying" (AdBrite, Inc. 2009). AdBrite's signature tagline claimed it to be "a completely transparent and effective advertising exchange" (e.g., AdBrite, Inc. 2009). Having suggested that transparency is critical to what it means to be an exchange, this emphasis was further reinforced by explicitly employing a "pay for performance" approach (Leggatt 2008).

Discursively Exploiting Market Changes. The firms we observed additionally sought to explain how their marketplace model positioned them for future industry changes more favorably than their rivals. AdBrite, for example, highlighted the potential of their marketplace to help bring brand advertising spending into the display advertising arena. ADSDAQ made a similar argument about the importance of the long tail to the brand advertiser:

If you look at the proliferation of The Long Tail of content publishers (in the millions) and how 75% of site entry is a deep dive thru search (regardless of publisher size), the consumer is connecting with her passions by going directly to the pages of content that matter to her. Exchanges are one way to make this phenomenon addressable to markets. In particular, at the ADSDAQ exchange, we contextualize each and every page and provide a level of control for the brand advertiser not commonly seen in exchange or network models.

(Sears 2008)

Such statements outline how AdBrite and ADSDAQ intended to contribute to the growth of the industry and enable large brand advertisers to take advantage of niche content. Right Media, however, presented its long-term goal as obtaining a significant portion of the large brand budget allocated to network television by selling premium inventory. Consequently, this firm focused on building trust, even at the expense of efficiency. Finally, AdECN emphasized how its business model might apply to other media forms such as mobile devices or television, thus taking a different approach to market expansion.

Summary. As they engaged in positioning, the online ad exchanges manipulated specific versions of the financial market analogy to advance their particular offerings. Each of the firms we studied attempted to position its offering as the most faithful implementation of the financial exchange model but established different evaluation criteria for this claim by advancing a focus on flexibility and openness, neutrality, control, or transparency. As organizational actors engaged in positioning, such activities exposed selectivity in their interpretations of the financial market analogy. For example, AdECN highlighted the property of neutrality and positioned itself as an exchange, leaving itself open to critique from alternate exchanges that it had forsaken transparency because of its reliance on ad networks as brokers and middlemen, much like the NYSE. While these innovators thus used the financial market analogy to articulate their particular business models, their models were evaluated against each other, compelling these firms to differentiate on the particular criteria that aligned with their stretching and bending activities.

Discussion

The notion of financialization has been at the center of a growing stream of studies that aim to understand various phenomena in the transformation of the industrial landscape, and many observers consider financialization “the defining characteristic of the world economy of the last twenty-five years” (Milberg 2008, p. 423). However, we still lack an understanding of how organizations may collectively transform nonfinancial industries based on a financial market model. Our study of online advertising exchanges adds a new perspective by showing the role of analogy work in successfully reshaping an industry based on a financial exchange model. Specifically, our findings shed light on the processes by which organizational actors made the financial market analogy work by stretching and bending while simultaneously positioning themselves for advantage.

Our findings carry several implications. Regarding the strategic use of analogy, prior work emphasizes the importance of consistent structural parallels between source and target, primarily focusing on the process of analogy selection (Gentner 1983, Holyoak and Thagard 1997, Gavetti et al. 2005, Cornelissen et al. 2011). This stream of research suggests that the central challenge for those using analogies is to distinguish superficial and deceptive similarities from deep structural ones; accordingly, “the difficulty that faces the analogizing manager is that there are innumerable dimensions along which one can form a representation and some dimensions may be misleading” (Gavetti et al. 2005, p. 695). Our work extends this existing account of the strategic use of analogies in two important ways.

First, our study shows that organizational actors can stretch an analogy from a source domain to a target domain even when little similarity exists between the two. Whereas researchers previously theorized that this application of an analogy should cause problems for organizational actors (Gavetti et al. 2005), the case of financial market analogies suggests that organizational actors can address this misfit by adjusting the entities, features, and relationships of the target domain to better resemble those of the financial market domain. In this regard, we have conceptualized similarity as a continuum ranging from surface similarity (the sharing of a set of superficial entities or features that are not essential to the activities at hand) to deep structural similarity (the sharing of relationships between entities or features that are essential to the activities at hand). We have shown that organizational actors engage in bending to construct an initial degree of superficial fit (i.e., surface bending) and deepen the correspondence (i.e., structural bending) over time. Actors further reshape the target domain through generative bending by introducing novel, nonindigenous concepts and practices that further increase similarity with the source domains. Thus, we have illustrated how the process of analogical mapping between two domains

achieves convergence through an active construction to “make” the analogy work.

Second, our research highlights the collective nature of analogy work associated with the emergence of a new phenomenon. In our case, multiple strategic actors invoked a similar analogy at the same time. As a result, the actors we observed asserted their particular and differentiated models while collectively aiming to legitimize the financial market model. As Aldrich and Fiol (1994) noted, entrepreneurial organizations face a dual process of cooperation and competition, as they must not only convince potential customers and critics of their model, but also differentiate themselves from other organizations offering largely similar products and services (Carroll et al. 1993, Swaminathan and Wade 2001). However, while two phases typically have been assumed in prior literature—with the collective effort of establishing a new model preceding individual differentiation attempts (Kennedy 2008)—we observed competitive positioning from the beginning, during the collective process of analogical construction, where the choices of one actor enabled or constrained those of other actors.

As we have argued, our study speaks to behavioral strategy research, and particularly recent work that has examined how managers develop appropriate presentations of the world and how associative thinking (especially in the form of analogical reasoning) plays a key role in both discovering market opportunities and convincing others of their value (Kaplan 2008, 2015; Gavetti 2012; Garbuio et al. 2015; Gavetti and Ocasio 2015; Haas and Ham 2015). The arguments advanced here—that organizations may construct the structural fit of an analogy rather than select an analogy with an inherent structural fit—extend this work by showing how organizations actively manipulate the nature of an analogy itself by continually modifying their dynamic, unfolding, and materialized interpretations of the analogy. In particular, our dynamic perspective on analogies suggests that organizations and strategists consider other properties of an analogy in addition to the structural similarity between the source and target domains. Since analogical fit can be not only identified, but also constructed, different factors such as an analogy’s cultural resonance or interpretive viability may determine the effectiveness of analogy work. This insight resonates with a perspective advanced by Holyoak and Thagard (1997, p. 36), who suggested that the constraints of using and interpreting analogies “function more like the various pressures that guide an architect engaged in creative design, with some forces in convergence, others in opposition, and their constant interplay pressing toward some satisfying compromise that is internally coherent.”

Our arguments also speak to the growing literature on performativity and the social construction of markets (MacKenzie and Millo 2003, Callon and Muniesa 2005, Beunza et al. 2006, MacKenzie et al. 2007).

Similar to this approach, we see analogy work as a political-cultural project that is both collective and individual in trying to shape and reshape social action so it can operate as a market. In particular, our study demonstrates that the process of constructing a market based on a financial exchange template need not rely on the self-fulfilling nature of theories as its underlying mechanism, a criticism of the performativity thesis that has been raised from a scientific realist perspective (e.g., Felin and Foss 2009). In contrast, what we observed is better understood as the deliberate use of analogy work by actors to reshape social action so it more closely resembles a financial exchange model. Our study thus emphasizes the role of particular mechanisms such as analogies that are used to transfer practices from one domain to another. Such a view complements other research from a performativity perspective that explains how concepts such as rationality (Cabantous et al. 2010, Cabantous and Gond 2011), theories of organizational design (D’Adderio and Pollock 2014), routines (D’Adderio 2008), and organizational values (Gehman et al. 2013) are constructed through concrete organizational practices. In the form of bending, this purposeful analogy work included the reconfiguration of existing roles and relationships, such as seats on an exchange, as well as the construction of tangible “calculative devices” (Callon and Muniesa 2005), such as trading technologies and algorithms. As such, our study contributes to recent work aimed at advancing the performativity debate by integrating the role of social relationships and material artifacts into accounts of market creation (Beunza and Ferraro 2015).

Finally, our study carries implications for the growing literature on business models (e.g., Zott et al. 2011). In particular, scholars have examined how firms may engage in business model innovation and how barriers to the creation and implementation of new business models can be overcome (e.g., Chesbrough 2010). Our current study contributes to this literature—particularly studies that highlight the performative nature of business models (e.g., Doganova and Eyquem-Renault 2009)—by providing a detailed analysis of how the four firms we studied aimed to implement and gain support for a novel way to “do business,” suggesting that the business model literature may benefit from paying close attention to the role of analogy in business model innovation.

Limitations and Directions for Future Research

There are several limitations of this study of financial market analogy work. The cases we selected reveal how organizations made the market analogy work, but this focus comes at the expense of insights that can be gleaned from similar careful study of how earlier innovators were unsuccessful at transforming this industry. Before the collapse of the dot-com bubble, several companies unsuccessfully tried to establish market-inspired

models for buying and selling online advertising. Our study would suggest that these earlier innovators did too little to stretch the market analogy beyond the arguably quaint conception of markets as venues for back-and-forth haggling. In contrast, the later wave of innovators we studied complemented their stretching by bending their respective activities to resemble the automated systems and trading programs now used extensively in modern securities markets. To be sure, later innovators also benefited from technological advances along with the ability to learn from prior failures, and a closer examination would be needed to tease apart these different processes.

Further, while we have aimed to develop a general account of analogy work, we note several boundary conditions of our theoretical contribution. First, it would appear that the processes we describe here are more likely to be effective when an industry is emerging or entering period of transition, that is, during “unsettled cultural periods” (Swidler 1986) when relationships are being wired and rewired. Second, the functioning of a financial market model is premised on the presence of sufficient liquidity to allow for a two-sided auction process (Carruthers and Stinchcombe 1999). Indeed, the failure to achieve such liquidity presented one of the key reasons why a market for weather derivatives failed to emerge (Huault and Rainelli-Weiss 2011). Third, given our view of analogy work as a political-cultural project, its success would appear to be premised on a sufficiently low degree of cultural resistance to using financial markets as a model (Zelizer 1979, Chan 2009), thus limiting the potential for countermobilization. While we recognize these scope conditions for where our framework in principle and the construction of a financial market analogy in particular may be applicable, it is not clear that these are insurmountable conditions. In fact, a fundamental argument we make here is that analogies can be made to work when it would appear that they should not.

Our study also suggests several potential avenues for future research. First, researchers can investigate the applicability of our theory to other nonfinancial market contexts. For example, Thornton et al. (2012) describe how entrepreneurs such as J.C. Penney, John Sperling, and Richard Prentice Ettinger leveraged analogical concepts from other institutional orders in the retail, post-secondary education, and higher education publishing industries, respectively. Additionally, nascent markets such as cryptocurrency (Surowiecki 2011) leverage the use of nonfinancial market analogies. Second, we believe that behavioral strategy research would benefit from a comparative analysis of successful and unsuccessful attempts to perform analogy work. While it is of course only possible to determine the processes leading to a positive outcome in the presence of such an outcome, an in-depth analysis typically trades off deeper insights of how analogies are made to work for the ability to explore

several settings. For example, how much stretching is possible before an analogy completely breaks down and cannot be bent back into shape? One might argue that a certain degree of parallel connectivity and one-to-one correspondence is needed, but the boundaries of the plausible association between a source and target domain remain unclear. Third, in a similar fashion, one might ask how much bending is sufficient for analogy work to be successful. Prior work on cognition suggests that structural consistency is an essential aspect of successful analogies (Gentner and Markman 1997, Eliasmith and Thagard 2001), yet insights from institutional theory would indicate that formal structure may at times be decoupled from activity (e.g., Meyer and Rowan 1977). As such, more research is needed to gain a full understanding of the nature and limitations of bending as an activity.

Conclusion

What are the limits to financialization and its associated spread of financial market-based concepts and business models? Our dynamic view of analogies may provide some theoretical insights into the boundaries of self-reproducing structures like markets. Over time, the spread of market analogies has coincided with a shift in the meaning of markets; markets are no longer seen as place-based venues where buyers and sellers haggle. Instead, markets are abstractions that feature impressive, complex networks of diverse organizational actors. The complexity of markets leads to the development of activity systems that are opaque to all but a very few. In recent years, this lack of transparency has created opportunities for self-interested market manipulation that are anathema to the original market concept. This ironic cycle suggests that the very appeal that fuels the use of an analogy to spread a powerful idea may eventually stretch the original concept past its breaking point. We hope that taking a dynamic view of how actors make analogies work will offer a way to understand how using concepts from one domain to explain an innovative new one can not only help an innovation progress, but also change how we understand the domain that inspires the analogy.

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