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KNOWLEDGE MANAGEMENT:
STYLE, STRUCTURE, AND THE LATENT POTENTIAL OF DOCUMENTED
KNOWLEDGE

by

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M.S. University of Central Florida, 2012

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ABSTRACT

Despite the volume, growth, and accessibility of documented knowledge – the insights and experiences stored on paper and in electronic form - management research has yet to demonstrate the same usefulness for documented knowledge as that found in knowledge residing in human sources. This dissertation explores two areas of potential for documented knowledge, suggesting the efficacy of a piece of documented knowledge is contingent not only on content, but upon the *style* and *structure* associated with that content. Style, how cognitively 'concrete' and affectively 'memorable' documented knowledge is perceived to be, is hypothesized to affect how much attention it draws and, in turn, to impact its transfer to users. Structure, reflecting the level of parsimony and modularity in documented knowledge, is hypothesized to impact attention to and manipulation of knowledge such that it affects knowledge transfer and creation. Hypotheses were tested in two laboratory studies using scientific research as an exemplar of documented knowledge. Results indicated that style was associated with documented knowledge, but was not related to its transfer. Likewise, structuring documented knowledge for greater parsimony and modularity did not improve knowledge transfer or knowledge creation. Shortcomings of the empirical tests are evaluated and possibilities for future improvements are discussed.

Dedicated to my lovely wife Heather, and to the first scientist I knew, my brother Matt.

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CHAPTER ONE: INTRODUCTION

Knowledge that is 'tacit' is "unarticulated and tied to the senses, movement skills, physical experiences, intuition, or implicit rules of thumb" (Nonaka & von Krogh, 2009: 635). It can reside in unwritten, individual and organizational processes and practices (Teece, Pisano, & Shuen, 1997), can exist in collective, interpersonal organizational environments (Cook & Brown, 1999), and is even reflected in machinery and buildings. But management researchers and practitioners seek knowledge that is clearly articulable or can be reliably sourced for organizational benefit. *Knowledge management*, then, is the employment of purposeful organizational strategies to recognize, assimilate, produce, and disseminate insights and experiences (Alavi & Leidner, 2001; Nonaka, 1994). This dissertation proposes that established management research on one source of knowledge, human knowledge, provides the impetus for exploring an equally promising, but less examined source - documented knowledge.

Perhaps the most studied source of knowledge in management research is that found in humans; the unwritten yet articulable insights and experiences embedded in people and their social and professional networks with other people, groups and organizations. Due to advances such as the Internet and mobile technology, billions of people enjoy varied and growing communication connectivity. At the same time, humans are challenged by geographic, technological, political, chronological, monetary, and resource constraints limiting the successful diffusion of knowledge via this connectivity. As described later in this dissertation, understanding these challenges has constituted the primary focus of research on knowledge

management to date. Moreover, extant research has also highlighted the modest degree to which we utilize all human knowledge sources.

Consider human knowledge sources at the group or organizational level. Lahiri's (2010) study of organizational innovations created as a result of the transfer of knowledge across geographically dispersed team members found the average number of member locations accessed was less than two. Cummings and Keisler's (2007) study of cross-university research found the average number of disparate universities collaborating on a project was also two. Finally, in their analysis of innovation as a result of knowledge transfer via firm research and development (R&D) alliances, Duysters and Lokshin (2011) found that only 334 of nearly 1900 sample firms had any R&D alliances with competitors, suppliers, customers, or universities, while the average for firms with alliances was less than three.

The number of human knowledge sources accessed at the individual level is also limited relative to the human population. For example, Collins and Clark (2003) tested the performance implications of top management teams' social networks, finding average external networks were comprised of 73 individuals and average internal networks of 40 individuals. Meanwhile, Facebook's Dr. Cameron Maslow reported the average number of "friends" in a person's Facebook social network was 120, but each person actively traded emails, comments, and other information with only four to ten friends (Social Networks, 2009). In summary, though the connectivity offered by information technology has greatly expanded the *possibility* of tapping the living knowledge of billions of people, there remain limits to its transfer and utilization.

Less studied in management research is documented knowledge, defined here as knowledge stored in written or other recorded form for later access and utilization. Yet, the same

'information age' that precipitated greater connectivity among human sources of knowledge has also spawned an exponential increase in knowledge documentation and its accessibility through electronic means. Indeed, documented knowledge is often produced as a consequence of the constraints on humans' ability to store and transfer knowledge; writing down what we know allows us and others the opportunity to utilize knowledge at the right moment and in the right situation. As a result, we have at our disposal a vast, accessible, and growing volume of documented knowledge that reflects centuries of insight and experience across myriad domains.

For example, the Internet offers access to an estimated one trillion Web pages (Sutter, 2011), with this online content expected to quadruple from 2011 to 2015 (McMillan, 2011). Thomson Reuters' Web of Science platform alone contains more than 50 million scientific research documents for use by its subscribers worldwide (Thomson Reuters, 2012).   And the consulting firm Accenture estimated its own employees downloaded more than 4.8 million electronic documents in 2006 from their proprietary Knowledge Exchange system; a platform housing past consulting proposals, project estimates, and firm best practices (Accenture CIO Organization).

Due to its broad scope and ease of access, documented knowledge offers a viable alternative to human sources of knowledge for most organizations and individuals at almost any point in time. The amalgamated and distilled knowledge of humans that once required privileged access and considerable effort may now necessitate just a few clicks on a computer. However, management research emphasizes human sources as beneficial to individuals and organizations, while documented knowledge is overlooked or considered only marginally valuable (Kane & Alavi, 2007; Haas & Hansen, 2005, 2007). Rather than pit these knowledge

sources against each other, the present research takes the perspective that they are "mutually enabling" (Cook & Brown, 1999: 381) and agrees with Nonaka's (1994) prescription that productive knowledge management requires the ongoing integration of *both* mediums.

As reviewed below, research on knowledge outcomes related to human sources has greatly enhanced our understanding of knowledge management in organizations. This dissertation proposes the same richness of scientific study focused on documented knowledge will also prove beneficial. Indeed, the theoretical framework by which human knowledge sources have been explored suggests potential in documented knowledge is yet to be revealed.

Knowledge Residing in Humans

Early organizational research did not widely consider sources of knowledge embedded in human sources. According to mechanistic management structures (Burns & Stalker, 1961; Galbraith, 1974; Taylor, 1911), uniform task designs and monetary incentives were arranged by a finite number of organizational decision-makers to achieve maximum output and profitability. As a result, any advantages of informal and non-specific knowledge embedded among masses of employees and their external relationships remained largely unexplored. The result was a "knowledge bottleneck" which could prevent firms from capitalizing on latent, but powerful knowledge stocks residing outside of top management.

Knowledge embedded in human sources became more accessible and useful to firms and individuals only when management structures were adjusted to elicit them. For example, the configuration of job characteristics has been shown to impact knowledge transfer and creation

(Janz & Prasarnphanich, 2003; Hackman & Oldham, 1980) among employees and between employees and management. One facet of job characteristics, task variety, produced employees who were more likely to compare and contrast job processes and gain knowledge for their improvement. Another characteristic, autonomy, encouraged long-silent employees to share and apply knowledge that previously had no outlet.

Organizations have also learned that the configuration of individuals within a firm impacts knowledge transfer and creation. Burke, Fournier, and Prasad's (2007) study of medical innovations demonstrated that exposure to prolific "star" scientists brought about higher rates of production by non-star scientists who worked with them. Additionally, Song, Almeida, and Wu (2003) found acquiring experts from other firms was a means by which knowledge embedded in those experts could be assimilated by the focal firm. In each case, human capital was configured to elicit and support the transfer and creation of knowledge for individual and firm advantage.

An exhaustive review of the impact of human sources of knowledge on knowledge transfer and creation is beyond the scope of this dissertation, but the volume of work in this area is extensive and suggests promise for a commensurate increase in focus on documented knowledge. Beyond the facets highlighted above, research has shown that efforts to configure or otherwise optimize organizational climate (Smith, Collins, & Clark, 2005), goal setting (Shalley, 1995), and network position (Burt, 1992; Reagans & Zuckerman, 2001) have all been found to impact the transfer and creation of knowledge embedded in human sources. Likewise, heterogeneity in firm team members and partners, as well as heterogeneity in demographics (Gibson & Vermeulen, 2003; Reiter-Palmon & Illies, 2004), expertise (Van der Vegt & Bunderson, 2005), culture (Early & Mosakowski, 2000), function (Cummings, 2004), and

geographic location (Almeida, 1996; Leiponen & Helfat, 2006) also impact knowledge outcomes pertaining to human sources.

Though once viewed as limited in terms of knowledge transfer and creation, human knowledge sources within and across organizations are increasingly seen as a rich, nuanced, and varied source of beneficial knowledge transfer and creation. In the same way, this dissertation proposes documented knowledge may be configured to optimize its potential.

The Present Research

The full potential present in documented sources of knowledge may lie untapped due to factors unrelated to the knowledge itself. Today's organizations are increasingly information-intensive and beneficial knowledge often resides within a larger pool of information that may not apply to a given situation or need. As a result, the amount of organizational or individual *attention* required to search for, filter, and qualify the desired knowledge from all available information may actually suppress its acquisition, transfer and utilization. This attention-based view of the firm (Ocasio, 1997, 2011) highlights a different type of "knowledge bottleneck" than mechanistic organizational structures mentioned earlier. Today documented knowledge is both more abundant and more accessible than at any time in the past, but its use is constrained by rationale limits on the attention needed for individuals and organizations to consider a surplus of information.

Whereas studies of human sources of knowledge have tended to view knowledge management as *organizing people and their processes to act upon* existing sources of

knowledge, this research explores means by which *knowledge can be organized so that it becomes salient* to individual and organizational attention. Using the attention-based view (Ocasio, 1997, 2011), this research explores whether two facets of documented knowledge, *style* and *structure*, affect individual knowledge transfer and knowledge creation. First, building on the work of Heath and colleagues (Heath, Bell, & Sternberg, 2001; Heath & Heath, 2007; Sinaceur, Heath, & Cole, 2005) I introduce style, reflected here as how cognitively 'concrete' and affectively 'memorable' documented knowledge is perceived to be. I then propose that theory explaining how these aspects of style increase the transfer of ideas, thoughts and conceptions generally will also explain the transfer of complex information such as that found in documented knowledge.

Extending the work of Simon (1962, 2002; Simon & Ando, 1961) I introduce structure as a term for the manner in which knowledge is presented to prospective users. I then propose that theory related to structure explaining the proliferation of organizations and product development (Sanchez & Mahoney, 2002) will also explain the proliferation of documented knowledge. Specifically, I explore two facets of structure. Parsimony in documented knowledge involves purposefully limiting content to only the most central or critical components. Modularity in documented knowledge involves organizing knowledge so that individual components can be absorbed and utilized in isolation of the other components. Finally, given the demonstrated benefits of eliciting knowledge in *human sources*, I argue that an increased understanding of the style and structure of documented knowledge represents a cost-effective means by which the latent potential of this vast, accessible medium can be realized.

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The remainder of this research is divided into four parts. First, a literature review illustrates a recent history of knowledge management research focusing specifically on documented knowledge. Second, invoking Ocasio's (1997, 2011) attention based view of the firm, I hypothesize that variations in documented knowledge may "act" upon individuals using it. I hypothesize that aspects of documented knowledge rated high in factors of *style* will increase the likelihood that the underlying knowledge will be transferred and, as a result, will become more impactful in future knowledge. Further, knowledge associated with documentation *structured* to be more parsimonious and modular will prompt increased knowledge transfer and subsequent knowledge creation. Third, these hypotheses are tested in two empirical studies; one examining style and one examining structure. Fourth and finally, I elaborate on empirical results and discuss their implications on knowledge management research and practice.

CHAPTER TWO: LITERATURE REVIEW

As defined earlier, knowledge management is the employment of purposeful organizational strategies to recognize, assimilate, produce, and disseminate insights and experiences (Alavi & Leidner, 2001; Nonaka, 1994). Hansen, Nohria, & Tierney (1999) note many organizations have no knowledge management strategy at all, while others limit knowledge management to human resource or information technology functions. Hansen et al. propose that the benefits of knowledge management are greatest when CEOs and general managers incorporate it into a firm's a competitive strategy. In other words, knowledge management is central to strategic management. Though knowledge embedded in humans continues to be a prominent topic among scientists, the lack of analysis on documented knowledge highlights its underdevelopment.

Commensurate with the rise of modern information technology communication capabilities, more than 500 management journal research papers focused on human knowledge sources have been published since the start of the millennium[1]. Among many other advances, this research has proven beneficial in explaining various antecedents to and consequences of knowledge management topics such as knowledge transfer and knowledge creation. Despite the

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[1] The Social Sciences Index in Web of Science was searched from January 2000 through January 2013. For human capital-related terms, the following keyword string was queried: "human capital" OR "tacit knowledge" OR "expert network*" OR "knowledge network*" OR "executive network*" OR "social network*" OR "professional network*" OR "knowledge sharing network*" OR "communit* of practice". For documented knowledge the following was queried: "documented knowledge" OR "documenting knowledge" OR "electronic document*" OR "codified knowledge" OR "knowledge codification" OR "codifying knowledge" OR "knowledge documentation" OR "written knowledge" OR "knowledge repositor*" OR "document repositor*". These queries included thirteen well-regarded, general management publications such as *Journal of Applied Psychology, Academy of Management Journal, and Strategic Management Journal,* as well as the domain-specific journals *Human Resources Management, MIS Quarterly,* and *Information Systems Research*.

simultaneous rise in information technology document storage and retrieval capabilities, just thirteen management journal research papers exploring documented knowledge and related topics have been published over the same time period.

My review of the literature on documented knowledge sets the foundation for hypothesis development and testing and is organized into four sections. First, documented knowledge is described relative to other major classifications of knowledge. I next review research in support of documented knowledge and research questioning it. I then look at studies exploring variations in documented knowledge that I believe preface the formal consideration of documented knowledge *structure*. Finally, building on this review of the literature, I end the chapter with theory development and the introduction of my hypotheses.

<u>Documented Knowledge in Context</u>

Perhaps the most influential research incorporating concepts and processes pertinent to documented knowledge is Zollo and Winter's (2002) work on deliberate learning and dynamic capabilities. Zollo and Winter's seminal work frames the means by which firm operating routines evolve. Operating routines evolve as a result of firm dynamic capabilities, defined as "a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness" (p. 340). Dynamic capabilities, in turn, are created and evolve as a function of three firm learning mechanisms: organizational routines and experience accumulation, knowledge articulation, and knowledge codification.

The first learning mechanism, organizational routines and experience accumulation, encompasses tacit knowledge commonly associated with human knowledge sources; the processes developed through "experiential wisdom" (Gavetti & Levinthal, 2000: 113) and existing as 'quasi-automatic' responses that individuals and groups of individuals hone through trial and error. The second learning mechanism, knowledge articulation, involves more deliberate consideration through which individuals and organizations reflect on processes to establish the factors leading to success or failure for a given task. The third learning mechanism, knowledge codification, is the realm of documented knowledge studied in the present research. For this mechanism, "individuals codify their understandings of the performance implications of internal routines in written tools, such as manuals, blueprints, spreadsheets, decision support systems, project management software, etc." (Zollo & Winter, 2002: 342).

Notable to the purpose of the present research, Zollo and Winter (2002) argue that knowledge documentation is important for the "entire knowledge evolution process", but is also a "relatively underemphasized element in the capability picture" (p.342). More generally, the authors point out the historical tendency among organizational theorists to doubt the value of documented knowledge. This doubt, a reflection of the costs associated with documentation, the risk of enacting flawed routines due to poor documentation (Cohen & Bacdayan, 1994), and inflexible organizational inertia that may accompany the formalization of routines, may offer some rationale for the narrow exploration of this domain to date.

Building on Zollo and Winter's (2002) work, other research suggests somewhat equivocal benefit for knowledge documentation. This research includes five studies revealing benefits of documentation, three studies focused on organizational contingencies hampering the

success of knowledge documentation strategies, and three studies in which documentation proves limited when compared to human alternatives. Two of these three studies and one additional study reflect the growing recognition that documented knowledge, like human sources, is not one-dimensional. These studies introduce early consideration of the configuration of documented knowledge that serve as the unit of analysis for the present research.

<u>Research in Support of Documented Knowledge</u>

Zollo and Singh (2004) examined the manner in which banks go about firm integration following the acquisition of other organizations. Specifically, they found support for the hypothesis that a higher degree of knowledge documentation – including documents such as systems training manuals and quantitative models such as financial evaluation - developed over prior acquisitions would produce increased performance in the present acquisition. Further, this relationship was stronger as the complexity of the focal acquisition increased. Notably, their work also found that the tacit 'accumulation of experience' from previous acquisitions had no relationship with the performance of subsequent acquisitions.

In a theoretical paper, Spencer (2008) focused on the conceptual foundations behind knowledge spillovers of multinational enterprises in developing countries. She proposed that the knowledge most likely to diffuse to the local population would be the more discrete – the more codified – knowledge. In related work, Hong, Easterby-Smith and Snell's (2006) study of subsidiaries of Japanese firms in South China indicated that subsidiary access to firm documented knowledge repositories promoted the learning of firm values and technical

competences. Further collective learning was facilitated through ongoing interaction with dynamic, subsidiary-level knowledge repositories. Terlaak (2007) theorized that codification involved in certified management standards outlining socially desirable industry practices served to shape organizational behaviors where more tacit, unwritten industry norms were insufficient. Such codification is believed to be particularly beneficial in market environments where practices lack consensus, such as in newly emerging management domains and in cross-cultural interactions.

Last, Shulz (2001) explored organizational learning as a result of knowledge flows produced by collecting new knowledge, combining old knowledge, and codifying knowledge. Codified knowledge in Shulz's sample of organizations is consistent with documented knowledge used herein, reflecting "the extent to which knowledge was stored as 'numbers and codes,' 'words and text,' or 'pictures and images'" (p. 668). Human sources of knowledge such as emails, telephone calls, meetings and training encompassed firm exploration involved in collecting new knowledge and firm exploitation constituted combining old knowledge. Shulz's analysis demonstrated evidence that new knowledge collection was associated with vertical knowledge flows from the collecting unit to higher units in the organization for assessment. The combination of old knowledge was associated with horizontal knowledge flows to 'peer' units where the inferences of this more incremental information could be incorporated. Documented knowledge, however, was associated with both vertical *and* horizontal knowledge flows and corroborated earlier research suggesting similar potential for documentation (Szulanski, 1996; Zander & Kogut, 1995).

Research Questioning Documented Knowledge

Other research introduces contingent limitations to documented knowledge usefulness.

Bock, Zmud, Kim and Lee (2005) pointed out that even if an individual codifies knowledge, it

has limited impact unless and until the individual shares that encoded knowledge with others.

Their study found that a variety of employee behavioral processes, including favorable attitudes

toward sharing, greater anticipated reciprocation of sharing, and the extent to which

organizational climate was believed to be fair and innovative, all impact an individual's

willingness to contribute such knowledge. Kankanhalli, Tan, and Wei (2005) extended this

concept by specifically examining why organizational initiatives to employ knowledge

repositories commonly fail. They found that knowledge self-efficacy, one's belief that they offer

value to their organization, as well as enjoyment in helping others, both increased the utilization

of repositories. Organizational reward for contributing to repositories and reciprocity of

contributions also impacted knowledge repository utilization, but were contingent upon

environmental factors such as trust and pro-sharing norms.

Employing a game-theoretic framework to build a model of firm profits in different

hypothetical scenarios, Liu, Ray, and Whinston (2010) explored an alternative to the two

prevailing strategies typically examined in knowledge management. Instead of a singular focus

on knowledge codification or on human knowledge-sharing networks, Liu et al. analyzed the

interaction of the two. Results suggested that increased codification can impair existing network

sharing ties, prompting employees to hoard knowledge to maintain their ties. A critical

moderator to this phenomenon was sharing potential, the frequency with which employees

require each other's knowledge and the extent to which they value future sharing rewards. When sharing potential was high, Liu et al.'s model produced a hybrid strategy of codification *and* sharing that benefited the organization more than either strategy alone. Conversely, low sharing potential prompted the decay of knowledge sharing ties in reaction to increased codification.

Three empirical studies challenged the value of documented knowledge through comparative tests with human sources of knowledge. Haas and Hansen (2005) pitted expert networks in a consulting company of 10,000 employees against the firm's knowledge repository comprised of "industry-trend analyses, benchmarking data about clients' competitors, slide presentations from previous projects, standard pricing schedules for particular tasks, and detailed documentation of *[company]* best practices" (Haas & Hansen, 2005: 7). In terms of performance measured via the winning of consulting bids, Haas and Hansen found a main effect suggesting an increase in the utilization of documents from the repositories resulted in a *lower* likelihood of winning bids. Of importance to the present research, Haas and Hansen included no examination of the impact of the number of documents available, their length, format, or configuration, nor the means by which they were searched, filtered, or interpreted.

In testing moderating effects, Haas and Hansen (2005) also found that increased task experience on a proposal team lowered chances of winning bids when interacted with knowledge repository utilization *or* with personal knowledge networks. Additionally, teams that were inexperienced regarding the proposal task gained no positive benefit from documented knowledge, but did gain benefit from knowledge networks. Finally, when interacted with increasing numbers of competitors, use of documented knowledge by teams also decreased chances of winning bids, but using knowledge networks increased chances of winning bids.

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Haas and Hansen (2007) followed up on their 2005 study with another paper evaluating the same data. In this case, they analyzed the distinct impact documented knowledge and personal knowledge networks had on three dependent variables: time spent on proposals, work quality, and the signaling of competence to clients. Here they found that higher quality knowledge documents utilized from the repository resulted in time savings for preparing proposals. Yet, document quality had no bearing on ratings of team proposal quality or signaling competence to clients. Further, efforts expended by proposal teams to rework poorly documented knowledge from the repository had a negative impact on time savings sufficient in size to cancel the benefits of high quality documents. This research is significant in that it illustrates that variations among artifacts of documented knowledge exist, but does not distill what makes documented knowledge higher or lower in quality. Indeed, Haas and Hansen's measure of document quality was a quantitative response to a single statement reading, "Of what quality were the documents that the proposal team retrieved from the firm's database?" (p.1144).

Variations in Documented Knowledge

Hansen & Haas (2001) explored one particular variation pertinent to the use of documented knowledge. Their work demonstrated document suppliers in a crowded market segment (those segments of subject matter where numerous other providers also provided content) could *increase* user downloads of their documents by *reducing* the number of documents they made available. Alternatively, in un-crowded knowledge segments increasing the number of available documents increased the number of documents utilized. These results

are simultaneously promising and concerning. Though making content more or less scarce

impacted its utilization, the process reflects a mechanistic approach to knowledge management

in that a small group of decision-makers determined which documents were "useful" enough to

be offered to a larger, separate group of people. Such a strategy does not alleviate the

"knowledge bottleneck" to make all available knowledge is more accessible. Instead, the

"bottle" was shrunk to fit the neck.

Kane and Alavi (2007) also tested the relative contribution of repositories of electronic

documents versus human knowledge sources. Using a simulation to compare learning, results

indicated that the benefits of knowledge repositories and portals were short-term in nature and

reflected March's (1991) notion of exploitation of incremental knowledge. In contrast,

electronic communities of practice, where individuals corresponded via instant messaging and

email, prompted exploratory-learning that continued over the long-term.

Their study does not disclose the specific nature of the electronic documents with which

their sample interacts, but does provide important peripheral information on the process of

developing the repository in which they reside. Kane and Alavi outline a three step process

whereby (i) individuals contribute knowledge to the repository, (ii) team members synthesize the

knowledge, and (iii) electronic portals disseminate it. Rather than remove documents entirely as

Hansen and Haas (2001) did, Kane and Alavi describe a process of integrating contributions

where knowledge was "repackaged for consumption by a more general audience (e.g., project-

specific information was removed, keywords added, key points synthesized, etc.) and thus *[the*

knowledge] was explicitly and intentionally made more lean" (Kane & Alavi, 2007: 803). This

"repackaging" is essentially the process under investigation in the present research. Having

described documented knowledge relative to other forms of knowledge, reviewed research supporting and questioning its value to individuals and organizations, and highlighted studies exploring variations in its presentation, I will next develop theory and introduce my hypotheses.

<u>Theory and Hypotheses</u>

Despite the great variation in types of documented knowledge, which Zollo and Winter (2002: 342) suggest encompasses "written tools, such as manuals, blueprints, spreadsheets, decision support systems, project management software, etc.", little management research has assessed how differences in documentation itself affect outcomes related to its use. Knowledge embedded in documented knowledge differs from knowledge embedded in human sources in at least one significant way. While knowledge contained in humans and their networks is subject to change, documented knowledge may survive, intact and indefinitely, for future utilization. Survival, however, is necessary but not sufficient for knowledge transfer and knowledge creation to occur. Knowledge lying dormant in a dusty book or as one of tens of millions of web files listed in response to an Internet search is not yet aiding individuals or organizations.

Of interest to this research are those aspects which cause documented knowledge to not just survive, but to *thrive*. Specifically, this involves the extent to which documented knowledge is transferred and utilized in the creation of new knowledge. Knowledge transfer is the transmission of knowledge from one location to another and is typically measured by observing knowledge content or performance as a function of that knowledge (Argote & Ingram, 2000).

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Knowledge creation is the production of new knowledge and is reflected by the presence of knowledge in excess of an entity's typical stock of knowledge (Argote & Ingram, 2000).

Inspired by the success of the rich body of research explaining the complexities of human knowledge sources in relationship to knowledge management, I hope to make an initial contribution to our understanding of the relationship between our most accessible source of knowledge, documented knowledge, and knowledge outcomes. The remainder of the present research will focus on two such facets of documented knowledge; its *style* and *structure*.

Style

Evidence suggests style may increase the proliferation of documented knowledge in the same way it impacts the proliferation of ideas generally. But, what exactly is style? Style is defined as "a particular manner or technique by which something is done, created, or performed" (Style, 2013). Of primary importance both for ideas and for knowledge is the notion that style is adjacent to content; style does not refer to *what* is done, created, or performed, but to *how* it is done, created or performed. In this dissertation, then, I focus not on the content of documented knowledge, but on two facets of style associated with that content. Synthesizing research on the impact of style on the transfer of ideas, I investigate how cognitively 'concrete' and affectively 'memorable' documented knowledge might explain knowledge transfer beyond the impact of content itself.

Concrete style as it relates to documented knowledge involves the extent to which knowledge is presented in a manner that enhances its likelihood of being *understood*. For

example, Eisenhardt and Sull (2001) noted that Cisco once had a concrete rule for the type of firm they liked to acquire; "75 people, 75% engineers" (firms with less than 75 employees, 75% of whom were engineers). Cisco undoubtedly executed more sophisticated due diligence than just counting the number of employees and determining the ratio of engineers in a target organization, but this concrete slogan provided a simple embodiment of Cisco's interest in mid-sized firms with human capital focused on technology.

As another example of concrete style, Heath and Seidel point out the importance of sensory language. They cite Litwak's description of how the science-fiction movie thriller *Alien* was given the succinct metaphor "*Jaws* on a spaceship" (1986:73) to help set designers, costume designers and actors concisely understand the suspenseful, trapped (in space vs. at sea) sensation of the film they were working on. Finally, concrete style can also employ simple directives, like Kennedy's unambiguous promise to "put a man on the moon within the decade". In summary, documented knowledge with concrete style should concisely reflect a considerable amount of information in illustrative, yet unambiguous language.

Memorable style as it relates to documented knowledge involves the extent to which knowledge is presented in a manner that enhances its likelihood eliciting *affective response*. For example, Heath, Bell, and Sternberg (2001) found urban legends were more likely to be passed along if they evoked reactions such as interest, surprise, and disgust. Indeed, the truthfulness or even the accuracy of the urban legend was secondary; a legend thrived according to the degree to which it activated an emotional response in those exposed to it. Demonstrating just how divorced the literal interpretation of an idea may be from how memorable it is, Mark Twain (1918) notoriously said, "a lie will fly around the whole world while the truth is getting its boots

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on." Lies neither fly, nor wear boots, but Twain's use of humor nonetheless provided a reliable means by which people may remind themselves that a salacious rumor may precede the facts of any particular situation.

Highlighting another example of memorable style, Heath and Seidel (2006) point out individuals remember things better when they involve numerous sound cues, such as alliteration or rhyme (Rubin, 1995). Simple slogans such as "loose lips sink ships" or "look before you leap" are alliterative and invoke the senses, providing a memorable vehicle by which to transport underlying content. "Loose lips sink ships" is a World War II era line that expressed a complex concept about the risks of unwittingly revealing information about Allied forces that could result in the loss of life and supplies once in the hands of enemy spies. "Look before you leap" directly suggests avoiding the dangers of diving in water by determining what lies beneath the surface first. Indeed, "look before you leap" and "75 people, 75% engineers" are both memorable and concrete, resulting in brief descriptions that are both affectively pleasing and cognitively intuitive.

Demonstrating another example of style in the transfer of knowledge, a study of Mad Cow disease (a dangerous contamination of beef) in France (Sinaceur, Heath, & Cole, 2005) found that articles mentioning the disease by the emotive moniker "Mad Cow" significantly outnumbered articles mentioning the disease by its scientific names (CJD or BSE). Further, beef consumption in the population fell significantly following articles using "Mad Cow" and did not fall when the scientific terms were used. In contrast, government regulatory decisions pertaining to beef increased when the scientific terms were used, but not when 'Mad Cow' was used. Sinaceur et al. (2005) explain the variation in individual consumption of beef as an example of

the affect heuristic (Slovic, Finucane, Peters, & MacGregor, 2002). This heuristic indicates peoples' choices are impelled in persistent ways by their affect and interests, even usurping their more logical deliberative system (Kahneman & Frederick, 2002). In contrast, bureaucracies will respond in a more deliberative manner because they operate according to slower, more consensual rules and procedures.

The last example above suggests the affect evoked by the term "Mad Cow" impacted the proliferation of knowledge in real ways (consumers purchased less beef). For both urban legends and news story about Mad Cow, though, the content was produced for public consumption. It was designed to arouse readers or to sell newspapers. In environments exclusive of the need to create public uproar or personal appeal, the use of the term "Mad Cow", though ripe with affective heuristic related to style, did not impact subsequent regulatory action. So, what is the impact of style on descriptions that are not, as in the case of "look before you leap", self-referential? And what about titles intended to briefly describe broader knowledge such as those representing a non-fiction book, compliance manual, or scientific paper, rather than movies or political speeches?

Style and Documented Knowledge

Academic research, perhaps the largest repository of documented knowledge in the world, commonly urges scientific authors to hone their use of style. *That's Interesting* (Davis, 1971), a widely known paper in behavioral and social sciences, does not propose more efficient or accurate means by which to create, retain, and transfer knowledge in the form of academic

papers. Davis implores scientists to make their documented knowledge *interesting* enough to be

read and shared; to survive and thrive. But how or why is a scientific paper selected for reading

in the first place? Before documented knowledge is consumed and determined to be interesting,

disgusting, useful, or important, it must be chosen from among a population of potentially

millions of documents vying for reader *attention* (Ocasio, 1997, 2011). Indeed, it has been

suggested that "good authors" of scientific papers know that success is tied, at least in part, to

making the title and abstract of their papers "hook" a reader (Fulmer, 2012). As editor of

Academy of Management Review (AMR), Fulmer writes,

> It is a sobering thought, but the only parts of a published paper that most
> people will ever read are the title and abstract. Whether retrieved in long lists
> of search engine results or appearing in table of contents notifications, these
> either grab the readers' attention immediately or never (p. 327).

As a prerequisite to the transfer of knowledge, it must first be established that style is

both present and distinguishable among sources documented knowledge in the same way it is

distinguishable among urban legends, newspaper articles, and other mediums. As such, I

propose:

Hypothesis 1: Documented knowledge units will be distinct from each other in terms of
'concrete' and 'memorable' aspects of style.

Fulmer (2012) describes the essence of the two aspects of style studied in the present

research; the extent to which a title accompanying documented scientific knowledge is concrete

and the extent to which it is memorable. Fulmer suggests that the titles of the documented

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knowledge voted to be the *AMR* Best Articles from 2001 to 2010 had important stylistic aspects in common. For concrete style, Fulmer (p. 328) states, "What most of these articles' titles have in common is that they reference the core construct or idea of the paper in simple language". For memorable style, it is highlighted that authors of the Best Articles often "artfully begin to tell their story using some sort of image or metaphor ('Stealing Fire':…), while still being able to give clarifying information…". In both cases, the proposition is that the *way the subject matter is introduced,* in addition to the subject matter itself, plays a role in whether that knowledge is selected for further examination.

Empirical research and qualitative studies suggest that the style of written knowledge- whether or not it is later proven truthful- may affect its transfer, utilization, and further development because it is more salient to peoples' attention (Ocasio, 1997, 2011). It appears, though, that both the style and the audience may play a role in these processes. While information that is self-referential or designed to be sensational may find greater diffusion among general audiences if it is more concrete or memorable, Sinaceur et al.'s (2005) 'Mad Cow' study suggests a contingency. For the diffusion or use of knowledge pertinent to particular channels, style is discounted through more deliberate processing. Yet, at least in the behavioral sciences, style continues to be proposed as a means by which documented knowledge can be more or less successfully diffused.

Given that attention is at a premium in an information-intensive environment like academic research, an argument can be made that factors of style (concrete and memorable) aiding in the proliferation of ideas generally will also impact the proliferation of documented knowledge specifically. Moreover, documented scientific knowledge likely to capture the

attention and interest of a general audience is also likely to catch the attention and interest of a scientific audience because scientists, ultimately, are still people. To the contrary, limited research like that of Sinaceur et al. (2005) holds that increasing levels of deliberation involved with documented knowledge like that of scientific articles would nullify the impact style might otherwise have.

Although these competing perspectives suggest competing hypotheses, the latter perspective proposes a null effect; that the style associated with documented knowledge will have no impact on the transfer of the documented knowledge itself. As such, we propose the following sets of hypothesis related to style associated with documented knowledge. The first set of hypotheses pertains to a non-scientist audience. These test whether variations in style associated with documented knowledge impact an individual's interest in reading the underlying articles. The second set has a much higher standard and tests whether these variations in ratings of style have any relationship with the longitudinal proliferation of the documented knowledge as reflected by future citations in scientific journals. Specifically, we propose:

Hypothesis 2a: Documented knowledge rated more "concrete" will be positively related to interest in reading the knowledge associated with those documents.

Hypothesis 2b: Documented knowledge rated more "memorable" will be positively related to interest in reading the knowledge associated with those documents.

Hypothesis 3a: Documented knowledge rated more "concrete" will be positively associated with increased transfer of that knowledge.

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Hypothesis 3b: Documented knowledge rated more "memorable" will be positively associated with increased transfer of that knowledge.

<center>Structure</center>

The section above suggests that document knowledge perceived to be more concrete and/or memorable will have a greater chance of being selected for further examination by a user. The selection of documented knowledge from storage in a database, on the web, or in a book, however, is only the first step of knowledge transfer. While the knowledge transfer for slogans like "look before you leap" may be completed in one phrase, selection of an electronic document from a repository only introduces the knowledge. This is because documented knowledge commonly includes a trait Heath et al. (2001) found to play a significant role in *reducing* the proliferation of information; 'the incorporation of rich, complex plots'. Be it a manual describing the process for cleaning complex machinery or a scientific paper illustrating the relationship between organizational phenomena, documented knowledge is often rich and complex. Before knowledge can be successfully transferred, then, it must first be *structured* in a way that is accessible to the minds that encounter it.

Ocasio's (1997, 2011) attention-based view of the firm recognizes the limited ability of firms and managers to transfer and create knowledge if the prerequisite knowledge is not salient to them. One specific example of this premise is Hansen and Haas' (2001) study of document utilization. In this study, a *reduction* in the number of electronic documents made available to consulting company employees preparing sales proposals for potential clients actually resulted in

an *increase* in the number of documents accessed by employees. Instead of the organizational

members acting upon the documented knowledge, Hansen and Haas demonstrate how the

documented knowledge "acted" upon the organizational members.

This process required a reduction in potentially useful knowledge sources in order to

increase the chances of proliferation for the knowledge that remained. This is akin to Galbraith's

(1974) mechanistic structures for dealing with human knowledge sources in decades past; worker

tasks and autonomy were constrained in an effort to optimize established goals and competences

rather than to allow for the development of new goals and competences. Rather than sacrificing

knowledge sources, I propose that increasing the structure of information, making it more

parsimonious and modular, will improve individuals' ability to retain it.

Structure is defined generally as "the arrangement of particles or parts in a substance or

body" (structure, 2013). Like style, structure is not the content of something, but accompanies

content. Style, discussed earlier in this dissertation, is primarily cosmetic and operates by

directing user attention toward the content of documented knowledge. Structure, though,

involves the arrangement of the documented knowledge such that user attention is maintained

and supported to create the greatest opportunity for its comprehension and utilization.

Perhaps the most significant theoretical foundation for structure as it is used in this

research is Simon's (Simon, 1962, 2002; Simon & Ando, 1961) work on what he called complex

systems hierarchy. Simon offers a thought experiment demonstrating this hierarchy; an anecdote

that highlights high versus low levels of structure reflected through parsimony and modularity:

> Two watchmakers assemble fine watches, each watch containing ten thousand
> parts. Each watchmaker is interrupted frequently to answer the phone. The first
> has organized his total assembly operation into a sequence of subassemblies; each

subassembly is a stable arrangement of 100 elements, and each watch, a stable arrangement of 100 subassemblies. The second watchmaker has developed no such organization. The average interval between phone interruptions is a time long enough to assemble about 150 elements. An interruption causes any set of elements that does not yet form a stable system to fall apart completely. By the time he has answered about eleven phone calls, the first watchmaker will usually have finished assembling a watch. The second watchmaker will almost never succeed in assembling one- he will suffer the fate of Sisyphus: As often as he rolls the rock up the hill, it will roll down again (Simon, 1973:7-8).

Simon states the predominant form of successful organizations is that of the first watchmaker, which has the more modular and parsimonious structure than the second. Sanchez and Mahoney (1996) built on Simon's theorizing at the organizational level to explore the role of structure in terms of product development. Their research suggested the utilization of modular product architectures reduces required managerial oversight in the product development process. Here structure involves an ordering of product development processes into successive subsets in a hierarchic form where, for the sake of parsimony, any given subset includes only the facets and functions particular to that subset.

Further, these subsets should be modular, or loosely coupled (Weick, 1976), meaning that the operations of any one subset is only weakly tied to the functions of the others. In terms of product design, this means that problems encountered or innovations created for a particular subset of a product do not impact other subsets of the product. This modular use of structure represents a divergence from traditional engineering, in which products were designed to meet an overall performance function within given cost constraints and without particular regard to changes impacting any particular component of the product.

As perhaps a more practical example than Simon's description of parsimony and modularity in the watchmaker anecdote, consider the flexible schema for emergency room personnel or scientific researchers. Heath, Larrick, and Klayman (1998) found, for example, that emergency room personal were taught to follow "ABCs" in dealing with arriving patients, establish Airway, then Breathing, then Circulation. This schema allows medical employees to effectively function across a wide variety of emergency situations, be they car accident or choking victims. Similarly, scientific researchers share an integrated understanding of the meaning and use of terms like 'independent variable' and 'control variables'. Indeed, a physicist may not fully appreciate the nuance of variables used by a social scientist, but would easily understand the role of a variable in a given relationship if it is identified as an 'independent' variable.

Simon (1962) also describes the twin role of parsimony and modularity by noting the combinatorial power of the 26-letter English alphabet. With this rather brief set of letters, one can form tens of thousands of meaning-rich words, and far greater combinations of sentences, paragraphs, and papers. Indeed, to maintain parsimony letters have been routinely dropped from alphabets throughout history when they have become redundant or are easily represented by the modular combination of other letters. Only aggregate properties of these basic elements are necessary for a description of the interactions of those parts. In other words, you do not need constant reiteration of all the possibilities for letters of an alphabet to utilize their function in words.

The application of parsimony to knowledge involves removal of redundancies or peripheral information and focusing only on essential components of knowledge. Specifically,

retaining *state descriptions* and *process descriptions* can portray a system in its simplest form. State descriptions "characterize the world as sensed; they provide the criteria for identifying objects" and include definitions, pictures and blueprints. Process descriptions "characterize the world as acted upon; they provide the means for producing or generating objects" and include the description of relationships, as well as recipes and differential equations (Simon, 1962:479).

Comprehension of knowledge demands ongoing translation between state and process descriptions of a single reality. Stated simply, to solve a problem one needs to know or at least estimate the factors involved (state descriptions) and their known or expected relationships with each other (process descriptions). Consider preparing to assemble a bicycle and opening the directions. Parsimonious directions might include only state descriptions of the parts that came with the bicycle (e.g., ten three-quarter inch screws, ten washers, one flat head screwdriver, etc.) and a sequence of steps outlining their relationships with each other (e.g., screw in three-quarter inch screws in the holes located on the inside of the bicycle's back wheel hub). Information such as why certain parts for the bicycle were chosen over other parts not included, and from where and by what process the bicycle parts were made could add descriptive value to the directions, but do so at the risk of confusing and fatiguing the user who must distill the content to assemble a bike.

Structure and Documented Knowledge

How, then, does structure manifest itself in documented knowledge? Simon himself did not predict particular future forms of hierarchic structures. Using inductive logic based on

existing observations, he proposed that the reason most organizations reflect higher levels of structure is because such structure is more conducive to organizational survival relative to other forms. Likewise, Sanchez and Mahoney (1996) did not predict a specific product to be developed, but proposed that structure is a common element in product development efficacy. In turn, I will not attempt to create a single recipe by which all knowledge can or should be structured for reliable improvements in knowledge outcomes.

I do, however, seek to move beyond inductive reason alone. I propose logic that applies theoretical aspects of structure used by Simon (2002, 1962) and Sanchez and Mahoney (1996) to documented knowledge. In doing so, I seek to experimentally produce outcomes matching their observations. Inductive reasoning would hold that, if observations regarding structure in organizations and product development also apply to documented knowledge, documented knowledge structured for increased parsimony and modularity should survive (i.e., be transferred and used) at a higher rate than knowledge without such structure. As such, a piece of documented knowledge specifically configured for greater parsimony and modularity should enjoy greater subsequent proliferation than the same knowledge in a less-structured form.

Using this premise, I propose one schema for testing hierarchic structure on one type of documented knowledge. This is analogous to developing a lab test where, instead of a theoretical thought experiment, two watchmakers are *actually* tasked with making watches. One watchmaker could be expected to complete various watch subassemblies despite interruption because of the high structure they employ, while the other watchmaker is forced to restart the watch-making process after each interruption. By extrapolation, then, documented knowledge structured to allow a reader to comprehend individual components of the whole should facilitate

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greater transmission of knowledge than documented knowledge requiring a reader to comprehend all content in order to make use of any of the components.

Summarizing in Documented Knowledge

For rich, complex content like that of documented knowledge, issues of limited attention span and distractions endanger the likelihood knowledge on paper or a computer screen will be successfully retained and utilized. One practice to ameliorate this concern involves readers summarizing what they read, and methods by which published content is summarized via headings, topic sentences, and summaries (e.g., Vidal-Abarca & Sanjose, 1998). Individual summarizing connotes an approach by which users actively integrate documented knowledge into their own context by rewriting what they read in a format or language accessible to their utilization. Considered from an organizational perspective, this requires that each and every reader have the time, autonomy, and ability to reconfigure knowledge for their own purposes without losing the original fidelity of the content. Haas and Hansen (2007) found that this process, what they called document rework, cancelled the time savings benefit otherwise gained from using knowledge repositories.

To the extent possible, organizations may seek to structure knowledge *before* it is distributed to users so that users comprehend it easily in its original form or are able to comfortably 'rework' it. Vidal-Abarca and Sanjose (1998) found that manipulating documented knowledge through the addition of summarizing headings and the addition of opening and closing sentences helped readers acquire the main ideas of documents relative to papers without such summarizing factors.

Word Choice in Documented Knowledge

In other research there is evidence that challenging words force readers to use too much of their processing capacity and interferes with their ability to comprehend what they read. For example, Walmsley, Scott, & Lehrer (1981) tested reading comprehension levels on four different healthcare documents of varying lengths. The tests compared the documents in their original form against two simplified documents, one automated and one subjective. The automated version used a formula that replaced certain difficult words with easier ones and also reduced sentence complexity in places where critical meaning was not likely to be lost. The subjective version was the cumulative result of four researchers finding consensus on a version believed to be most clear to the reader. The automated readability formula offered no improvements on comprehension, while subjective rewriting increased comprehension only for the longest of the four documents. These results suggest increased volume of documented knowledge benefited from revision, but only due to the tacit skills of experts. Generalizable processes by which to structure documented knowledge, beyond automating word choice and sentence length, remained less clear.

Virtual Documented Knowledge

Research has also tested the impact of knowledge viewed virtually. Text that includes hyperlinks increases demands on working memory, the volume of information active in one's mind (Baddeley, 2003). Zhu (1999) found increasing from five hyperlinks per page to eleven per page hindered university-level student comprehension of articles about alternative energy.

This is thought to occur because additional hyperlinks call for a decision-making process ("click the hyperlink, or not?"), which decreases understanding of nearby text (DeStefano, & LeFevre, 2007). Others studies noted the impact of a different feature of hyperlinks. For example, inclusion of a brief description of the link's content when holding the mouse over the link increased retention of the text (Antonenko & Niederhauser, 2010). Another study found text embedded with hyperlinks linked hierarchically were easier for subject matter novices to comprehend than text hyperlinked semantically. In contrast, those familiar with the subject matter understood the content equally well in both types of organization (DeStefano & LeFevre, 2007).

Given that attention is at a premium in an information-intensive environment like academic research, I propose that documented knowledge more modular and parsimonious will be transferred more than knowledge that does not have these qualities. As such, I propose the following sets of hypotheses reflecting an extrapolation of the use of structure in organizations and product development to the management of documented knowledge. Namely, parsimony will dictate that only the most elemental aspects of an artifact of documented knowledge will be retained in a more structured version of that knowledge and non-critical aspects will be removed. Modularity will dictate that these elemental aspects of knowledge (or groups of them) will, to the extent possible, "stand on their own" and express insights and experiences independent of the rest of the content. Specifically, I propose:

Hypothesis 4: Increasing the structure of documented knowledge will be associated with an increase in knowledge transfer relative to the original version of the same knowledge.

Structure and Knowledge Creation

Above, I specified the impact that documented knowledge style and structure have on knowledge transfer. Evidence from research on creativity suggests the structure of knowledge may also affect knowledge creation. Torrance's research (1966) emphasizes different aspects of creativity, including the widely-known aspects called fluency and flexibility. Fluency refers to the production of a large number of ideas or alternate solutions to a problem. It implies understanding, not just remembering information learned. Flexibility refers to the production of ideas that show a variety of possibilities or realms of thought. It consists of the ability to see things from different points of view, to use many different approaches or strategies. Whereas fluency is focused on an individual's ability to compare, count, and describe (for example, "list things that are commonly red or contain the color red"), flexibility is focused on an individual's ability to extrapolate, distinguish, and interpret (for example, "how would you group ideas about 'red' into categories?"). Red, for example, can be associated with danger (e.g., STOP signs and fire alarm strobes), or passion (a red rose or red dress).

I propose that increasing the structure of documented knowledge essentially offers consumers of that knowledge a classification schema by which they can more easily extrapolate new ideas. To build upon Simon's (1973) thought experiment, looking at a row of 1,000 pieces that constitute a watch may not elicit a creative abstraction to other processes, but beholding the watch subassembly that focuses on turning gears may more easily lend itself to someone applying that subassembly to gears in the invention of the bicycle. Without the new

classification suggested by refined structure, though, such application requires that each reader "un-embed" themselves from knowledge they are consuming and consider new applications on their own. Traditionally, such processes have been considered only in terms of individual creative aptitude such lateral thinking (de Bono, 1992), where someone who is able to associate finer elements of a process or product with higher orders of structure is then be able to apply those elements in distant applications sharing the same structure. Presenting documented knowledge high in structure may not predict what elements a user will ultimately apply it to, but it may initiate creative flexibility in users who may not have otherwise considered the knowledge in a novel way.

Hargadon and Fanelli's (2002) research demonstrates an example of creative flexibility in parallel with the concept of structure. Hargadon and Fanelli chronicle a case in which IDEO, a design consulting firm, needed to develop a bicycle water bottle that would stay closed until squeezed by a thirsty rider. By considering the modular subassemblies that made up 'the need' of the client- for a liquid contain to remain closed until squeezed - in isolation of the linear development of a bicycle water bottle, engineers were able to use a subassembly from other items with a similar need. In this case, the "bi-stable valve" component selected was previously used in the production of a shampoo bottle and, before that, for designing an artificial heart valve required to open only when a heart-beat "squeezed" it. Because documented knowledge high in structure conveys knowledge in terms analogous to creative *flexibility*, knowledge structured in this way aids users in creating new knowledge from it.

In summary, the structure reflected by adding parsimony and modularity to documented knowledge doesn't just allow it to transfer more easily to the mind of the reader. Because the

knowledge is parsimonious- not encumbered by redundant or superfluous content- the user has

an increased likelihood for considering the knowledge in terms of their individual context.

Because the knowledge is modular, the user may be able to better combine an autonomous

component of the documented content with another purpose or application familiar to the user.

As such, I propose:

Hypothesis 5: Increasing the structure of documented knowledge will be associated with

an increase in knowledge creation relative to the original version of the same knowledge.

The remaining chapters of this dissertation include sections pertaining to the *style* and to

the *structure* of documented knowledge. Starting on the next page, I describe research design,

testing, analysis, and results related to hypotheses examining style: Hypotheses 1, 2a and 2b, and

3a and 3b. Then I describe research design, testing, analysis, and results related to hypotheses

examining structure: Hypotheses 4 and 5. I then close the dissertation with a general conclusion.

CHAPTER THREE: STUDY ONE METHODOLOGY

Research Setting

Hypotheses 1, 2a and 2b propose that the style associated with documented knowledge will positively impact someone's interest in reading the content of that knowledge. Further, Hypotheses 3a and 3b propose ratings of style will increase the future utilization of the documented knowledge, suggesting style plays a role in knowledge transfer.

Documented knowledge covers a vast spectrum of subject matter and includes various mediums of delivery. Indeed, knowledge is documented in every domain, from medicine to architecture to education to film production. In terms of delivery, knowledge is most commonly documented in two forms, on paper or electronically via computers or other devices. These forms are often interrelated and interchangeable. Paper documents can be scanned into electronic form, and written knowledge on a computer can be printed on paper. Testing the role of style across all mediums and all domains of knowledge in documented form exceeded the goal of this dissertation, but delivery and domain were considered in an effort to make the specific design used for Study 1 generalizable to a broad range of knowledge.

Given the rise in accessibility of documented knowledge due to computers and the Internet, users increasingly consume knowledge electronically. Commensurate with this trend, the presentation of documented knowledge and measurement of factors of style associated with it in this study was executed entirely through the use of computers equipped with web-based technology.

Next, the subject matter of documented knowledge used for Study 1 needed to be recognizable to a general audience, as participants unable to grasp any of the content of documented knowledge might find it difficult to consider aspects of style related to it. For this reason, particularly complex domains of knowledge such as physics were excluded from consideration for Study 1. Because of its broad-based relevance to individuals and organizations across a variety of topics, the documented knowledge chosen for utilization in this study was sourced from the Academy of Management Journal (AMJ). AMJ is a bi-monthly periodical publishing quality, peer-reviewed scientific articles on a broad range of subject matter relevant to strategic management, industrial-organizational psychology, and organizational behavior. This subject matter, though complex in many ways, involves many generally recognizable concepts such as leadership, job satisfaction, work performance, team work, firm growth and other areas germane to people working in different capacities and different industries.

Article *titles* associated with journal article published in AMJ in 2000 and 2001 were the specific unit of analysis for Study 1. Article titles were chosen as the unit of analysis for two reasons. Though an author's style is inextricably connected to the entire content of a journal article, assessing the style of significant sample of journal articles, each of which are commonly twenty to thirty-five pages long, would be difficult from a methodological perspective due to factors such as reader fatigue. Second, using the entirety of journal articles would increase the risk of confounding perceptions of style with other aspects of the documented knowledge, such as the rigor of analysis. As suggested by Fulmer (2012), an article title is a "hook" that has the potential to grab reader interest in exploring the associated content. This attention-grabbing facet of style is precisely the mechanism under investigation.

AMJ published 132 articles in 2000 and 2001. After the exclusion of one review article and two articles introducing "special issue" research topics, the final pool of article titles to be evaluated by participants was 129. The 129 AMJ journal article titles were drawn at random and placed in twelve pages containing nine titles each and three pages that contained eight titles each. The fifteen total pages of article titles were then organized in an electronic survey tool accessible to participants through a survey link. When accessed, each participant was presented with directions asking them to read each title and answer questions associated with it. Following the directions page of the electronic survey tool, two practice questions were presented to each participant so that they could familiarize themselves with the format and process of viewing titles and the associated survey questions. Following the practice questions, every participant was presented with the same initial page of article titles (nine titles published by AMJ in 2002) to serve as a learning effects control for participant learning. Upon completion of this "warm up" page, each participant was presented with a random ordering of five of the fifteen pages of titles, with the titles on each page appearing in random order. This resulted in each participant ratings 42 to 45 titles. Demographic data on the participants were gathered at the end of the survey.

Data for this study were collected via voluntary undergraduate student participation in the behavioral science research laboratory at a large university in the Southeastern United States. Students enrolled in several business school courses were offered an opportunity to earn extra credit in exchange for participation in behavioral science research. Students were offered an

opportunity to go to the research laboratory during a block of time on any of three available days to complete various electronic and paper and pencil studies, one of which was this study.

The total number of participants in this study was 219. Data associated with ten participants were removed from analysis due to incomplete or erroneous data, leaving usable data from 209 participants, or 95% of the original participants. This resulted in each title being rated by 68.72 raters on average. The average age of participants was 23.9 years, but ages ranged from eighteen to 52 years old. The percentage of males participating was 54.8%. Participants reflected a Caucasian majority of 62.2%, followed by a mix of minority respondents of Hispanic/Latino ethnicity, (16.3%), African American ethnicity (13.9%), Asian American ethnicity (2.9%), and other ethnicities.

The average work experience for participants was 5.5 years and ranged from zero to 25 years. While 7% of the participants indicated no work experience, 60% of the participants indicated four or more years of work experience. Participants in the sample worked in a variety of capacities, including finance (10%) management and administration (8%) and education and training (3%), but reflected a plurality in marketing, sales, and service or hospitality and tourism (42%).

Measures

Excluding demographic control variables, all measures utilized a 7-point Likert-type scale; 1 (*strongly disagree*) to 7 (*strongly agree*).

Article Title Style- Concrete

The 1-item measure developed for this study assessed the degree to which participants believed an article title was "concrete". Following each article title, participants read the statement, "The title describes the article in a way that is easy to understand" and were asked to indicate the extent to which they agreed or disagreed with the statement.

Article Title Style- Memorable

The 1-item measure developed for this study assessed the degree to which participants believed an article title was "memorable". Following each article title and the statement pertaining to "concreteness", participants read the statement, "The title is catchy, clever, intriguing, or otherwise memorable" and were asked to indicate the extent to which they agreed or disagreed with the statement.

As noted above, both Article Title Style- Concrete and Article Title Style- Memorable were measured with 1-item scales. Though multiple-item scales are common in social science research, single-item are appropriate in many cases (e.g., practical limitations such as space, Wanous, Reichers, & Hudy, 1997) and have been shown to demonstrate predictive validity commensurate with multi-item measures (e.g., Bergkvist & Rossiter, 2007). In the case of Study 1, participants were tasked with rating dozens of scientific journal article titles that described a variety of management topics and organizational practices. This was expected to be cognitively challenging to participants. The purpose of 1-item measures, then, was to facilitate the ease with

which participants could move among a list of titles and develop general reactions regarding the extent to which titles were Concrete or Memorable.

Article Title Style- Concrete and Article Title Style-Memorable were also portrayed as separate measures representing style rather than being combined as constituent components of style. This was done because of the potentially divergent nature of style in the minds of participants. For example, it was anticipated that, for some participants, the extent to which an article title was Memorable would be the primary driver of perceptions of style and the primary mechanism driving interest in reading the underlying article. For others, the degree to which a title was clever or catchy – Memorable – might be secondary to the extent to which the title conveyed a Concrete depiction of the underlying research paper.

<u>Participant Interest in Reading Article Associated With Each Title</u>

The 1-item measure developed for this study assessed the degree to which participants would be interested in reading the article associated with each title. Following each article title and the statements for "concrete" and "memorable", participants read the statement, "Based on the title above, I would read this article" and were asked to indicate the extent to which they agreed or disagreed with the statement.

<u>Forward Citations</u>

Forward citations were counted to proxy the diffusion of knowledge contained in each article associated with the rated titles. Using Web of Science's Social Science Index, initial

yearly citations were tallied for each article starting with the year of publication and ending

December 31st, 2012. Next, all self-citations attributed to any of the authors of the original

article were removed because they could not be expected to have been prompted by article title

style. Finally, citation counts were organized into three dependent variables for testing any

impact of the predictor variables over time: *2-3 year citations, 2-5 year citations, and 2-7 year*

citations. For articles published in the year 2000, the three dependent variables measured

citations from 2002 to 2003, from 2002 to 2005, and from 2002 to 2007 respectively. For

articles published in the year 2001, the three dependent variables measured citations from 2003

to 2004, from 2003 to 2006, and from 2003 to 2008, respectively. Citations occurring in the year

of an article's publication and the year immediately following publication were excluded from

analysis due to the high probability that diffusion of an article's knowledge in such a short time

span was the result of direct interaction between scientists or other advanced knowledge of

article content.

Control Variables

Interest in Article Subject

      Because a person's interest in reading an article is likely contingent upon the *subject* of

the article suggested by its title, Interest in Article Subject was used as a control variable. The 1-

item measure developed for this study assessed the degree to which participants believed the

subject of the article suggested by the title was of particular interest to them. Following each

article title and the statements pertaining to "concrete" and "memorable" and "interest in reading

article", participants read the statement, "The subject of the article itself is particularly interesting to me" and were asked to indicate the extent to which they agreed or disagreed with the statement. This control variable was utilized in tests for Hypotheses 2a and 2b.

Subject Citations

For testing Hypotheses 3a and 3b, it was important that any relationship between ratings of article title style and forward citations could be distinguished from forward citations due instead to the popularity of a given subject matter. For example, an article title referring to research on business ethics in 2003 may have garnered a number of forward citations due to broad scientific interest in ethics as a result of the bursting of the Internet bubble and allegations of fraudulent earnings reports by corporations who were, in fact, struggling financially. To extract the impact of the popularity of an article's subject matter from the impact of article title style, a distinct variable measuring *Subject Citations* was utilized.

First, a graduate business student read the 129 journal article titles and inferred key terms believed to represent the article subject matter. For cases where one or more article title key terms were difficult to identify, the article abstract was referenced to confirm the accuracy of the term utilized. Additional terms found in article abstracts but not suggested in the article title were not included as article title key terms. There was no limit on the number of key terms suggested in an article title. If an article title specified numerous variables analyzed, theories employed, and specific samples utilized, then article subject key terms were created for each.

Once this set of key terms was completed, I reviewed all terms for accuracy and appropriateness. For example, general terms in article titles such as "performance" were

researched to determine whether the "performance" considered in the article was specific to individuals, firms, teams, or some other unit of analysis. Once identified, the key term was adjusted to reflect the appropriate term (e.g. "team performance") and avoid using a term that was too broad in scope. In other cases, terms determined to be interchangeable with other terms in the management literature were also included as key terms for each article title. For example, the key term "multi-national" was added in cases where an article title used "multinational" to reflect the occasional use of a hyphen for this word in extant research. Because research phenomena may be written in terms of "organizations" in one article and in terms of "firms" in another, both terms were also included in a given article's key terms if either term was used in a title.

Automatic lemmatization, the grouping of different forms of a word so they can be analyzed together (e.g., lemmatizing the term 'entrepreneur', for example, would automatically include the related words 'entrepreneurial' and 'entrepreneurship') available in Web of Science could not be used in this study for two reasons. First, key terms usually involved more than one word and necessitated delineation by quotations (e.g., "organizational citizenship behavior"). Second, terms often specified a precise meaning in terms of management research and altering the term with lemmatization might change the meaning entirely. For example, the term "voice" has a specific connotation in management research that is not captured by a lemmatized terms such as "voices". Despite these limitations of automated lemmatization, it was important to capture term variations where possible. As a result, terms delineated by quotations were also fitted with asterisks to allow Web of Science to capture alternative variations of the key terms. For example, for an article title containing the term "organization performance", the key term

utilized for this control variable would be adjusted to "organization* performance" to capture

other journal articles that may have labeled the same phenomenon "organizational performance"

or even "organization's performance". In other cases, key article title terms had to be

substantively altered to capture distinct versions of the same subject. For example, articles title

words like "China" were reflected by the key term "Chin*" to capture other articles using the

term "Chinese".

Finally, article title key terms were evaluated for the addition of terms not specified or

directly extrapolated via the article abstract, but were determined to be intrinsically related to

another concepts. For example, one particular article title and abstract focused on the concept of

"job dissatisfaction" and particular outcomes related to it. The occurrence of this subject matter

in the literature overlaps with the occurrence of literature on "job satisfaction" (i.e., job

dissatisfaction being generally related to *low* job satisfaction). As a result, in the infrequent

instances where such a term existed, both terms were included as key terms associated with a

particular article title.

Having established a set of key terms associated with each of the 129 article titles, each

set was entered into the Topic query field in Web of Science and searched in the Social Sciences

Index for the year in which the article was published. Next, the list of articles produced by this

query was refined to include only articles in three Web of Science Categories: 'business',

'management', and 'applied psychology'. This was done to avoid erroneous inclusion of articles

captured by the key terms. For example, though the term "voice" has a generally understood

meaning in organizational research, "voice" may have been captured as related to the subject of

music theory journal articles or a variety of medical journal articles. Narrowing the Web of

Science categories applied to the article title key terms was designed to reduce the unintended capture of articles.

The number of articles reflected in Web of Science for the article title key terms in the 'business', 'management', and 'applied psychology' categories in the year of each focal article's publication represented an approximation of the popularity of the article subject matter. Because articles written on popular subjects could be expected to receive a larger number of future citations than articles written on less popular subjects, this variable served to control for variance related to article subject rather than the style of the article title.

Subject Citation Trajectory

In addition to measuring the popularity of an article title's subject matter in the year of publication, I also wanted to control for the trajectory of the subject matter popularity. For example, an article pertaining to subject matter for which there has been an increase in attention in recent years could be expected to have higher citations in the near future than an article pertaining to subject matter that has become less popular in recent years. To capture this phenomenon, the same process employed for the *Subject Citations* control variable was also run for the year three years prior to the year of article publication. As a result, articles published in the year 2000 had subject citations calculated both for the year 2000 and for the year 1997. Next, the number of citations three years prior to publication was subtracted from the number of citations in the year of publication to produce a numerical value reflecting the increase or decrease in the number of articles found in Web of Science over this time period.

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Top Author Past Citations

Because scientists may be more compelled to cite prior journal articles written by authors who are well-known or respected in their fields compared to authors who are new or otherwise less known, I also calculated citation counts for the authors of the 129 journal articles utilized in this study. As with *Subject Citations*, author citations were refined to reflect only citations in articles categorized by Web of Science as 'business', 'management', and 'applied psychology'. This was done as a safeguard against inflating author citations erroneously. The name J. Zhou, for example, indicates not only scientists who publish in management journals, but also distinct individuals publishing in medical journals and journals from other fields. Once a tally of past citations was calculated for all authors on each of the 129 article titles, only the citation count of the most-cited author on each article was used for this control variable.

CHAPTER FOUR: STUDY ONE FINDINGS

Table 1 displays the means, standard deviations, and correlations of all measures analyzed in Study 1. Appendix A shows average title ratings for Title Style: Concrete (C), Title Style: Memorable (M), Interest in Reading Article (R), and Interest in Article Subject (S).

Table 1: Means, Standard Deviations, and Correlations

Variable	M	SD	1	2	3	4	5	6	7	8	9
1 Title Style: Concrete	4.70	0.59									
2 Title Style: Memorable	4.01	0.57	.87**								
3 Interest in Reading Article	3.91	0.53	.88**	.89**							
4 Interest in Article Subject	3.88	0.53	.81**	.85**	.98**						
5 Subject Citations	100.03	100.51	.13	.05	.13	.13					
6 Subject Citation Trajectory	24.81	29.86	.14	.10	.19*	.21*	.80**				
7 Top Author Past Citations	279.79	457.11	-.01	.03	.03	.06	.17	.11			
8 2-3 Year Forward Citations	8.09	6.40	-.02	.03	.01	.02	.02	.07	.16		
9 2-5 Year Forward Citations	21.60	14.69	.05	.01	-.01	.00	.00	.11	.22*	.89**	
10 2-7 Year Forward Citations	39.88	27.89	.03	.02	.01	.02	-.01	.11	.20*	.86**	.97**

N = 129
* p < .05
** p < .01.

As shown above, correlations between concrete style, memorable style, interest in reading article, and interest in article subject were high and strongly significant. As such, before testing for a relationship between elements of article title style and participant interest in reading an article (Hypotheses 2a and 2b), paired-samples T tests were run to determine whether these variables were distinct from each other. Ratings for title style-concrete and title style-memorable had a difference in means of .69 and were statistically distinct from each other (p < .000). Likewise, title style-concrete and title style-memorable were each distinct from the dependent

variable Interest in Reading Article (p < .000) and from the control variable Interest in Article

Subject (p < .000). Consequently, Interest in Reading Article and Interest in Article Subject

were also distinct from each other (p < .001). These results suggest that the variables used in

Study 1, though related, are distinct. Thus, these data demonstrate support for Hypothesis 1.

Hypotheses 2a and 2b were tested simultaneously using regression analysis in SPSS.

Results are shown in Table 2. In Step 1 of the model, Interest in Reading Article was regressed

on the control variable Interest in Article Subject. Title style-concrete and title style-memorable

were added in Step 2 of the model. Results of Step 1 showed that Interest in Article Subject was

strongly related to Interest in Reading Article (β = .98, p < .001). Results of Step 2 found title

style-concrete positively related to Interest in Reading Article (β = .16, p < .001), as did title

style-concrete (β = .13, p < .001). The relationship between Interest in Article Subject and

Interest in Reading Article in Step two was still significant (β = .75, p < .001). Moreover, the

additional explanation of variance offered by the addition of title style-concrete and title style-

memorable to the model was also significant (β = .02, p < .001). In summary, the data support

Hypothesis 2a and 2b. Both title style-concrete and title style-memorable played a discernible

role in participants' interest in reading the research article associated with each title.

Hypotheses 3a and 3b were also tested simultaneously using regression analysis in SPSS.

Results are shown in Table 2. In Step 1 of the model, three versions of Forward Citations were

regressed on Subject Citations, Subject Citation Trajectory, and Top Author Past Citations. Title

style-concrete and title style-memorable were added in Step 2 of the model. The first version of

Forward Citations tested reflected citations of focal articles in the second and third year after

publication (labeled 'Yrs 2-3' in Table 2). The second and third versions of Forward Citations tested reflected citations of focal articles in the second through the fifth year after publication ('Yrs 2-5) and citations of focal articles in the second through seventh year after publication ('Yrs 2-7).

For Forward Citations Yrs 2-3, results of Step 1 reflected no relationship between the control variables and the dependent variable. Step 2 reflected no relationship between title style-concrete or title style-memorable and Forward Citations Yrs 2-3. For Forward Citations Yrs 2-5, results of Step 1 reflected a weakly negative relationship between Subject Citations and the dependent variable ($\beta = -.28$, $p < .10$), a positive relationship between Subject Citation Trajectory and the dependent variable ($\beta = .30$, $p < .05$), and a strong positive relationship between Top Author Citation Count and the dependent variable ($\beta = .24$, $p < .01$). Results of Step 2 reflected similar significance levels for the control variables and no relationship between title style-concrete or title style-memorable and the dependent variable.

For Forward Citations Yrs 2-7, results of Step 1 reflect a negative relationship between Subject Citations and the dependent variable ($\beta = -.30$, $p < .05$), a positive relationship between Subject Citation Trajectory and the dependent variable ($\beta = .33$, $p < .05$), and a positive relationship between Top Author Citation Count and the dependent variable ($\beta = .21$, $p < .05$). Results of Step 2 reflect a weak negative relationship between Subject Citations and the dependent variable ($\beta = -.28$, $p < .10$), a positive relationship between Subject Citation Trajectory and the dependent variable ($\beta = .32$, $p < .05$), and a positive relationship between Top Author Citation Count and the dependent variable ($\beta = .21$, $p < .05$). There was no relationship

detected between title style-concrete or title style-memorable and the dependent variable. In summary, the data reject Hypotheses 3a and 3b. Whether over a two-year, four-year, or six-year time span, neither title style-concrete or title style-memorable played a discernible role in the future utilization of an article as represented by forward journal article citations.

Table 2: Standardized Regression Results

| | Interest in Reading Article (H2a & H2b) | | Forward Citations (H3a & H3b) | | |
| | | | Yrs 2-3 | Yrs 2-5 | Yrs 2-7 |
Independent Variables	Step 1	Step 2	Step 2	Step 2	Step 2
Interest in Article Subject	.98***	.75***			
Title Style: Concrete		.16***	-.16	-.17	-.16
Title Style: Memorable		.13***	.15	.13	.14
Subject Citations			-.11	$-.26^{\dagger}$	$-.28^{\dagger}$
Subject Citation Trajectory			.15	.30*	.32*
Top Author Past Citations			$.15^{\dagger}$	.23**	.21*
F change		78.76***	.39	.48	.40
R^2		.98	.04	.09	.09
Change in R^2		.02***	.01	.01	.01

† p = .10
* p < .05
** p < .01
*** p < .001

CHAPTER FIVE: STUDY ONE DISCUSSION

Organizations and individuals, including academic researchers, are exposed to an ever-increasing volume of documented knowledge while in the process of their daily responsibilities. Ocasio's (1997, 2011) attention-based view of the firm states that, in such circumstances, individuals may not acquire and utilize knowledge from all available sources. Instead, they will work with the knowledge most salient to them given constraints on their attention. Empirical evidence shows that one way ideas and concepts successfully gain individual attention is due to their style. Facets of style reflected in legends (Heath, Bell, & Sternberg, 2001), news articles (Sinaceur, Heath, & Cole, 2005), political messages (Heath & Seidel, 1986), and rules of thumb (Eisenhardt & Sull, 2001) are believed to be related to increases in the diffusion of their content.

Study 1 tested three hypotheses to determine whether the relationship between style and the transfer of ideas generally also applied to the transfer of documented knowledge. Hypothesis 1 stated '*Documented knowledge units will be distinct from each other in terms of 'concrete' and 'memorable' aspects of style'*. Hypotheses 2a and 2b stated '*Documented knowledge rated more "concrete"* [H2a] *"memorable"* [H2b] *will be positively related to interest in reading the knowledge associated with those documents'*. Hypotheses 3a and 3b stated *'Documented knowledge rated more "concrete"* [H3a] *"memorable"* [H3b] *will be positively associated with increased transfer of that knowledge'*.

To facilitate testing, I measured two facets of style, the extent to which titles associated with the rich, complex plots found in scientific journal articles were cognitively 'concrete' and affectively 'memorable'. I compared these measurements with participant interest in reading the

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content of the scientific articles, and then compared the measurements with citations rates for each article in future scientific journal articles.

Results showed that individuals rate some article titles as having more style than others, and these differences impacted their intent to read the articles themselves. This suggests style persists even in the realm of scientific documented knowledge. I was unable, however, to substantiate any connection between style and the longitudinal transfer of scientific knowledge into future works of documented knowledge.

Due to the generally unsupported results of my empirical testing, I evaluated two critical aspects of this dissertation for possible explanations: theory and research design. To begin, I considered whether I used an appropriate theoretical mechanism for my analyses. I remain confident in the theoretical and empirical support for the role of style in the diffusion of non-scientific content demonstrated by Heath and colleagues (Heath, Bell, & Sternberg, 2001; Heath & Heath, 2007; Sinaceur, Heath, & Cole, 2005). Further, I am confident in the attention based view's (Ocasio, 1997, 2011) credibility in recent research on knowledge management (e.g., Laursen & Salter, 2006; Uzzi & Lancaster, 2003). I am less certain, however, if the attention based view of the firm was the appropriate theory to explain the phenomenon under investigation in this dissertation.

Ocasio (1997) describes the attention based view as the product of three interrelated premises. First, what decision-makers do is dependent on what they are focused on. Second, what they are focused on depends on the situation at hand. Third, the situation at hand is determined by existing rules, resources, and social relationships that they are subject to. In

retrospect, I believe I may have investigated only the third premise in the lab experiment I ran in Study 1.

Regarding the first premise, I did *not* factor in the pre-existing attention of my participants before or after the experiment to gauge the extent to which their focus dictated their responses. It could have been that certain personality types, for example, may have been more or less inclined toward concrete style or memorable style in evaluating article titles. Moreover, my undergraduate business student sample may not have had the requisite attention (interest) to discern among journal article titles. Regarding the second premise, I failed to measure the environments from which they came to determine the extent to which it may have explained their focus. Perhaps even well-intended participants could have been constrained for time such that their evaluation of article titles was less comprehensive than it might have otherwise been.

Last, pertaining to the role of 'rules, resources, and social relationships' described in Ocasio's third premise of the attention based view, I measured only the degree to which variations in one particular resource, journal article titles, could direct participants focus toward some articles and away from others. Given the limited exposure to this resource in my lab experiment – typically less than twenty minutes - it now seems probable that participant's pre-existing attention and environmental constraints could have played a significant role in their title ratings.

In hindsight, however, I did invoke a process in the development of my hypotheses which may have been more appropriate in explaining the phenomenon I was testing than the attention-based view of the firm (Ocasio, 1997, 2011). Specifically, Study 1 might most accurately have been described as a test of whether the transfer of fact-based scientific documented knowledge is

subject to the same *affect heuristic* (Slovic et al., 2002) that impacts the spread of ideas and stories such as sensational urban legends. The affect heuristic argues that peoples' choices are driven in enduring ways by their emotions and interests, even usurping their more rational thought processes. This process was demonstrated by Sinaceur et al. (2005), who showed that newspaper articles mentioning the affective label "Mad Cow" affected the consumption of beef by the population at large, while articles using the less emotive scientific term had no effect on consumption.

The null hypotheses, that reactions to the style of journal article titles would be diminished by considerations of the article content itself, was also explored by Sinaceur et al. In the same study, they found that mentions of "Mad Cow" had no bearing on the more deliberative actions of regulators, but articles focused on the formal titles associated with "Mad Cow" did related to regulatory action. Perhaps these two competing mechanisms should have been the central theoretical focus of the style-related hypotheses from the start. Through this lens, it may be heartening to many researchers that the diffusion of scientific thought rests not on affect - the whimsy of style. It might have been disconcerting if a clever title could explain the survival of knowledge wrought of insightful theorizing, careful data collection, and meticulous analysis.

Considerations of theory aside, the challenges faced in the design and empirical testing of my hypotheses proposed in this dissertation also represented a critical impediment. First and foremost, the dependent variable for Hypotheses 3a and 3b – knowledge transfer - was a particularly precise outcome for testing. Hypotheses 3a and 3b tested for a relationship between title style and future citations, but this relationship skips an intermittent step in the process. Presuming, for the sake of argument, that the evidence of Hypotheses 2a and 2b is generalizable,

readers can be expected to open and read scientific articles at an increased rate when titles

associated with those articles are considered high in style. Opening and even reading an article,

however, does not guarantee the utilization of its content in future documented knowledge (i.e.,

future citations).

Article titles are inherently brief. They cannot demonstrate the full breadth of the content

they introduce. At best, they welcome a reader to take the first step in considering the content.

Once a document is opened, the attention first won through the use of article title style may be

increased *or decreased* depending on the readers' assessment of its relevance, accuracy, or

sophistication. Either way, style *and* judgment of the content itself will determine its further

proliferation. Though this realization poses a considerable challenge to the measurement of

knowledge outcomes related to the style of documented knowledge, it also confirms a key facet

of style already demonstrated in research on non-knowledge related information. A high rating

of style associated with content is no guarantee of that content's truth, accuracy, or usefulness.

Despite these challenges, there are two reasons why future citations were selected as the

dependent variable of interest. First, future citations represented a specific construct, knowledge

transfer. As such, testing for a relationship between article title style and the mere opening of

documented knowledge associated with each title would not constitute knowledge transfer.

Second, the reading of documented knowledge associated with a title *might* constitute knowledge

transfer, but only if it could be reliably shown that the reader internalized knowledge. It could be

argued that reading documented knowledge must impact a reader, if only in small or even

subconscious ways. Unfortunately, there are few means by which to measure this transfer, short

of costly and complex neuroimaging tools to read brain responses to stimuli now used in some

management research (c.f., Salvador & Folger, 2009) or traditional metrics such as future citation counts.

Because of these limitations, the design utilized in this study required that research papers with titles rated high in style would be opened more, relative to papers with titles rated low in style. As a consequence of being opened more, they would be read more, relative to articles opened less frequently. Finally, as a consequence of being read more, they would have a better chance of being cited in future artifacts of documented knowledge relative to articles read less. Though such a link is plausible, the aggregate variance introduced by each step of this process makes accurate measurement increasingly difficult. A lab experiment producing content that could be directly examined for knowledge transfer may prove fruitful for future research exploring this research question, albeit facing its own challenges in terms of generalizability to scientists and other purveyors of knowledge.

In the following chapter I move from Study 1 to Study 2. While Study 1 focused on the role of documented knowledge style in the transfer of knowledge, Study 2 investigates the role of documented knowledge structure in the transfer and creation of knowledge.

CHAPTER SIX: STUDY TWO METHODOLOGY

Research Setting

Hypotheses 4 and 5, propose that documented knowledge high in structure will have a positive relationship with the knowledge transfer and knowledge creation of those individuals exposed to it. Testing these hypotheses involved four steps. First, I selected a scientific research article to serve as an original piece of documented knowledge. Second, I created a structured version of this original document that sought to be more parsimonious and modular than the original. Third, a lab experiment was orchestrated to gather responses related to the knowledge from participants in three conditions: one presented the documented knowledge alone, one presented with the documented knowledge with its traditional abstract, and one presented the documented knowledge in tandem with a structured version of the same knowledge created for this research. Fourth, responses were presented to a panel of management and entrepreneurship scholars who evaluated the extent to which participant responses demonstrated successful knowledge transfer and creation.

Documented Knowledge Selection

The scientific research article selected for this study was chosen according to multiple parameters. First, it was deemed important that the document be generalizable to a broad population of documented knowledge, be representative of valuable documented knowledge (i.e., a piece of knowledge that might be *worth* remembering or using), and be interesting enough to warrant people reading it to begin with. Further, to be considered the sample chosen would need

to be more complex and sophisticated than the urban legends and newspaper articles examined by Heath and colleagues (Heath, Bell, & Sternberg, 2001; Heath & Heath, 2007; Sinaceur, Heath, & Cole, 2005), while not involving content so esoteric that a typical lab study participant reading it would be unable to relate to it in any way.

Entrepreneurship research was chosen as a domain from which the sample of documented knowledge would be taken. Entrepreneurship research is defined as the study of "how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited" (Shand & Venkataraman, 2000: 218). Entrepreneurship as a subject has been of broad public interest recently, including the motion picture *The Social Network* describing the entrepreneurial adventure of Facebook's founder, as well as regular mention by politicians and economic experts who suggest entrepreneurship as a means by which the lagging economy in the United States can be improved upon. Further, entrepreneurship research has far reaching implications among social and behavioral sciences because it involves individual factors, social and environmental factors, and macroeconomic factors. Last, but not least, entrepreneurship is a process regarded as part of the cultural heritage of the United States; many people have a story of a friend or family member who found success by their own entrepreneurial means, while others hope for such success themselves.

With this subject matter in mind, a basket of general management and entrepreneurship journals published from 2002 through 2011 was queried (through Web of Science) for research papers pertaining to entrepreneurship. The 100 most-cited papers from the results of this query were then sorted by overall citations and average citations per year to isolate research deemed most relevant and useful by the scientific community. Review and meta-analysis papers were

removed from the list because they could already be seen as a type of structured knowledge (they each attempt to select and synthesize the most relevant papers on a particular subject and summarize or amalgamate their contributions). Finally, theory papers were removed from consideration to highlight only those papers that include the full spectrum of scientific development: theory, review, hypotheses, empirical testing, and results. The top-cited paper produced via this process was Davidsson and Honig's (2003) *The Role of Social and Human Capital Among Nascent Entrepreneurs,* which was cited an average of 29 times per year and a total of 261 times since its publication. By comparison, the average total citation count during this time period for the 100 most-cited papers was 79 citations.

In addition to the exemplary citation rate, several other features of the paper made it a sound candidate to be the sample piece of documented knowledge in this research. First, the variables considered in this paper, though numerous, did not require fluency in social science terms and included simple predictor variables such as 'years of work experience' and 'close friends or neighbors who own a business'. Further, the paper did not require statistical or research design fluency that might have been a prerequisite for papers involving structural equation modeling models like SEM or tests of mediation or moderation. Instead, the primary statistical test used in Davidsson and Honig's paper was binomial logistic regression, which provided that outcomes of hypothesis testing could be distilled into modular, parsimonious statements referring to commonly understood terms and concepts. These included, for example, "Each year of work experience increased the likelihood that the individual *[in the sample tested by Davidsson and Honig]* was an entrepreneur by 8%" and "Having close friends or neighbors

who own a business increased the likelihood that the entrepreneur *[in a subset of Davidsson and Honig's sample]* had achieved any sales by 54%".

Developing a Structured Artifact of Documented Knowledge

To use a simplified metaphor, the structured version used in this study resembled something of a "Goldilocks" version of documented knowledge relative to the body of the original Davidsson and Honig (203) paper on one hand and its associated abstract on the other. This Goldilocks metaphor deserves further consideration. In the story of Goldilocks and the Three Bears, readers are familiar with the idea that one bowl of porridge was too cold for Goldilocks' preference, one bowl of porridge was too hot, and the third bowl was "just right". This might suggest that the only factor determining taste preference for porridge is temperature. Chefs, of course, might disagree. While temperature can certainly prompt pleasure or discomfort (e.g., food that burns one's lips is generally undesirable), that is by no means its only impact. Temperature actually serves as a means by which chemical reactions in food can be manipulated to accentuate flavors of an entrée's component parts such that they are identifiable to the taste while remaining in harmony with other flavors. The creation of a structured version of documented knowledge sought a similar balance.

First, all of the content in Davidsson and Honig's (2003) paper was divided into two categories. One category consisted entirely of content *imminently* related to the hypotheses and empirical testing contemplated in the paper. This category included state descriptions defining variables actually tested in the paper and process descriptions defining how the variables should

relate (a statement of the theory employed and its definition) and ultimately did relate (uniformly presented results for hypothesized relationships) in the research. The second category included redundancies in content of the first category, as well as all content not imminently related to hypotheses and testing. Specifically, this category included any surplus mention of study purpose or outcomes in the introduction and discussion sections, literature review describing other research done in the focal domain and peripheral domains, and discussion section content focused on interpreting results and suggested future directions. Content in the second category was removed from inclusion in the structured version of the artifact.

It is important to point out that exclusion of content from the structured version does not indicate judgment of that content. Indeed, in the case of documented knowledge in the form of scientific research, it would be impossible for each and every paper to comprehensively include the entirety of each and every other paper that influenced or guided its intent. As a result, scientists already routinely choose the portions of past research they deem most pertinent to the development of the present research and leave the rest for readers to explore on their own. On the subject of parsimony and modularity, Simon quipped, "Mother Hubbard did not have to check off the list of possible contents to say that her cupboard was bare" (1962:478). Likewise, creating a structured version of the artifact did not necessitate explanation of all past research in the domain to be able to explain the immediate cause for and components of the research at hand. The process outlined above reduced the original document containing approximately ten thousand words into a draft document containing a few hundred.

Second, the original abstract associated with the published paper by Davidsson and Honig (2003) was inspected for comparison with a draft of the structured version described

above. At a length of 127 words, the original abstract referenced various terms that it did not define and indicated relationships among terms not directly tested in the paper. In this way, the abstract served not as formulaic snapshot of the overall work, but as an exhibit sample of content necessitating examination of the underlying paper before certainty about the research could be attained.

For example, the original abstract mentions, but does not define, at least six terms related centrally to the paper: 'nascent entrepreneurship', 'nascent activities', 'bridging social capital', 'bonding social capital', 'strong ties', 'weak ties', 'human capital' (by comparison, terms *not* centrally related to the paper included terms like 'profit', which has a widely accepted definition extending beyond the bounds of this specific research paper subject matter). As another example, the abstract suggests human capital predicts nascent entrepreneurship, but examination of the paper proves that to be potentially misleading. In the paper the moniker 'human capital' references only a *subset* of all variables which might be considered human capital, of which only a smaller subset was actually tested for a relationship with nascent entrepreneurship, and of which only a smaller subset were truly related to nascent entrepreneurship. Finally, while only one of the relationships highlighted in the abstract was empirically tested in the paper, there are more than fifty relationships specifically tested in the paper not conveyed at all in the abstract.

In summary, the structured or "Goldilocks" version of the documented knowledge utilized for this research encompassed a more comprehensive set of information than the original abstract, while including less peripheral information than the entire paper. Relative to the original abstract, the structured version sought to provide definitions of all variables and theories

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essential to the research being investigated. It also sought to provide a concise recounting of all

of the outcomes pursuant to the scientists hypothesizing.

Relative to the entire paper, the structured version focused not on the past research from

which the current research came, nor on the direction it might take in the future, but only on the

immediate impetus prompting analysis and the resultant findings of that analysis. Through

multiple revisions seeking to incorporate all state and process definitions central to the original

paper, but exclusive of redundant and superfluous content, the final structured artifact shown in

Appendix B was produced. Appendix C reflects the abstract for the original documented

formatted to match the structured artifact shown in Appendix B.

Sample and Procedures

Participant Reactions to Documented Knowledge

Data for this study were collected via voluntary undergraduate student participation in the

behavioral science research laboratory at a large university in the Southeastern United States

(these data were gathered from a different sample than the sample in Study 1). Students enrolled

in several business school courses were offered an opportunity to earn extra credit in exchange

for participation in behavioral science research. Students were able to go to the research

laboratory during a block of time on any of three available days to complete various electronic

and paper and pencil studies, one of which was this particular study.

The total number of participants in this study was 203. Data associated with incomplete

or erroneous data was retained for later testing to determine whether participant condition was

related to the failure to complete some or all of the survey. This resulted in the first, second, and third conditions having 66, 65, and 72 participants, respectively. The average age of participants was 22 years, but ages ranged from eighteen to 44 years old. The percentage of males participating was 51%. Participants reflected a Caucasian majority of 62%, followed by a mix of minority respondents of Hispanic/Latino ethnicity, (16%), African American ethnicity (13%), Asian American ethnicity (2%), and other ethnicities.

The average work experience for participants was 3.9 years and ranged from zero to 26 years. While 11% of the participants indicated no work experience, 43% of the participants indicated four or more years of work experience. Participants in the sample worked in a variety of capacities, including finance (6%) management and administration (11%) and education and training (4%), but reflected a plurality in marketing, sales, and service or hospitality and tourism (39%). Seven percent of the sample indicated that they had or were working toward a major or minor degree in entrepreneurship.

Upon clicking a link to initiate the electronic survey, participants were thanked for their participation and then directed to the survey introduction. All participants experienced the same research introduction, which stated:

> Entrepreneurship, the process by which opportunities to create new goods and services are discovered, evaluated, and exploited, has become a popular subject in recent years.

> Company founders like Steve Jobs of Apple and Mark Zuckerberg of Facebook are widely recognized for their successful innovations. Shark Tank, The Apprentice, and other TV shows, movies, and books highlight aspects of entrepreneurship that result in individual success or failure. Further, political figures including presidents Obama and Bush have emphasized entrepreneurship as critical to the creation of jobs and growth of our national economy.

University researchers also study entrepreneurship in an effort to increase the benefits of successful entrepreneurship and reduce the costs of failed entrepreneurship.

We are interested in your response to entrepreneurship research. To assist you with your answer to the questions below, we have provided a link to the most influential research paper on entrepreneurship over the last ten years.

Following this introduction was an electronic link embedded in the survey that opened an Adobe PDF file commensurate with one of three conditions being analyzed. The first condition, which I called the *baseline* condition, produced a PDF file containing Davidsson and Honig's (2003) paper without the original abstract normally found at the start of the document. Instead of the abstract, the *Journal of Business Venturing* logo found at the top corner of the journal paper was enlarged and placed over the abstract. The second condition, which I call *baseline plus abstract,* included the same PDF as in the first condition with the addition of a new page containing the text of the original abstract. The third and final condition, *baseline plus structure,* included the same PDF as condition one with the addition of the newly created two-page, 576-word structured version of the paper. The pages added for conditions two and three were formatted in the same manner to control for participant responses influenced by paper formatting rather than the structure of the knowledge itself.

Below the link to the PDF file associated with one of the three conditions, all participants were asked to respond to three statements. The first statement assessed knowledge transferred from the electronic document to the participant. The second statement assessed the extent to which the participant built upon the content of the electronic document with their own input (knowledge creation). The third statement assessed the extent to which knowledge transferred to

participants impacted their reaction to document content *not* found in *original plus abstract* condition or the *original plus structure* condition.

The first statement was "Considering this research paper and your own knowledge, please write a paragraph or two that describes the characteristics predicting entrepreneurial action and entrepreneurial success." The goal of this question was *not* merely to measure knowledge transfer via indications of reading comprehension, but to assess the extent to which the structure of the documented knowledge presented to participants compelled them to utilize its content in tandem with, or in place of, their own knowledge.

After entering their text response, participants clicked to the next page and were presented with the statement assessing knowledge creation. The statement read, "In the space below, please write a few CREATIVE suggestions in response to the research paper provided. For example, given the research paper provided, what other factors regarding entrepreneurship do you think need to be researched? How do you think this research might help you or someone else start a successful business? Or, how could this research paper help lawmakers improve the economy? Be specific and give any examples that come to mind."

On the following page, participants were presented with the third and final statement. The statement read, "In the space below, please describe what is meant by "weak ties" in the research paper. Next, suggest one or more "weak ties" that you believe might be useful to study in future research. Explain why you chose them." Following this statement, participants were asked to specify demographic information, including their gender, age, work experience, ethnicity, and involvement with entrepreneurship as a major or minor degree track.

Management Scholar Evaluation of Participant Responses

Using Amabile's (1982) consensual assessment technique as a model, participant responses to the three statements associated with Davidsson and Honig's (2003) entrepreneurship research paper were subjected to blind rating by multiple academic professionals who assessed the responses for thoughtfulness, knowledge transfer, and knowledge creation. In addition to myself (I was blind to the condition of the responses), twenty management research professionals were invited to participate as expert raters in Study 2 and allowed 45 days in which participate. Twelve of these professionals ultimately took part in the study, for a participation rate of 60%. The average age of the expert raters was 37 years and ages ranged from 24 to 54 years. The expert raters included four PhD students, three PhD candidates, three assistant professors, one associate professor and two full professors. Eight of the nine PhD candidates and professors were scholars of entrepreneurship, one of whom co-authored the artifact of documented knowledge used in this research (Davidsson & Honig, 2003).

Expert raters were informed of the study's goal of assessing knowledge transfer and creation pursuant to the individual use of documented knowledge, but were not privy to the different structural conditions of the knowledge presented to the study's participants. Next, they were provided with the original Davidsson and Honig (2003) paper and asked to familiarize themselves with its purpose and findings. Finally, expert raters were asked to read a set of participant responses to each of the three statements outlined above and rate them based on their knowledge of entrepreneurship research and the Davidsson and Honig paper. To avoid rater

fatigue, expert raters were next presented with three pages of 12 responses, randomly drawn from across the three conditions, for each of the three statements answered by the participants.

Measures

Excluding demographic control variables, all measures utilized a 5-point Likert type scale; 1 (*not at all*) to 5 (*to a great extent*).

Knowledge Transfer

The 1-item measure developed for this study assessed the degree to which participant responses reflected knowledge from the Davidsson and Honig (2003) paper presented to them. The item asked expert raters to indicate a response to the following statement, "The response accurately reflects the content of the research paper".

Knowledge Creation

The 1-item measure developed for this study assessed the degree to which participant responses creatively extrapolated upon or otherwise applied the knowledge presented in the Davidsson and Honig (2003). The item asked expert raters to indicate a response to the following statement, "The response applies, extends, modifies, or appraises the content of the research paper".

<u>Control Variables</u>

Response Thoughtfulness

As outlined in Amabile's (1982) consensual assessment test for judging creativity, it was important that judgments of knowledge transfer and knowledge creation were not confounded with more general judgments of participant effort or writing ability. To aid in this distinction, for each participant response expert raters were also asked to respond to the following statement before responding to the statements pertaining to knowledge creation or knowledge transfer, "The concepts in the response are thoughtful or well-developed".

Other Controls

To further delineate participant responses as a function of the three documented knowledge conditions, two additional control variables were utilized. These variables, survey completion time and participant response word count, were intended to account for participant conscientiousness.

CHAPTER SEVEN: STUDY TWO FINDINGS

Table 3 displays the means, standard deviations, and correlations of all measures analyzed in Study 2.

Table 3: Means, Standard Deviations, and Correlations

Variable	M	SD	1	2	3	4	5
1 Survey Completion Time	23.20	14.10					
2 Knowledge Transfer Response Word Count	103.70	56.20	.02				
3 Knowledge Transfer Rating	2.15	1.13	.01	.28**			
4 Knowledge Creation Response Word Count	80.10	47.50	.00	.39**	.24**		
5 Knowledge Creation Rating	2.05	1.07	-.08	.15	.19*	.26**	
6 Documented Knowledge Structure	1.53	0.50	-.01	.07	.07	.11	-.04

N = 165 to 192 due to missing data, except for '6', N = 117 to 137, comparison of 1st & 2nd condition.
* $p < .05$
** $p < .01$.

Before testing for a relationship between documented knowledge structure and knowledge transfer (Hypothesis 4) and knowledge creation (Hypothesis 5), paired-samples T tests were run to determine whether expert ratings of knowledge transfer and knowledge creation were statistically distinct from expert ratings of response thoughtfulness. Expert ratings of participant responses regarding knowledge transfer and regarding thoughtfulness had a difference in means of .86 and were statistically distinct from each other ($p < .000$). Likewise, expert ratings of participant responses regarding knowledge creation and regarding thoughtfulness had difference in means of .36 and were statistically distinct from each other ($p < .000$).

Hypothesis 4 was tested using regression analysis in SPSS. Results are shown in Table 4. In Step 1 of the model, knowledge transfer was regressed on the control variable survey completion time and word count for responses to statement one. The binary condition of the documented knowledge with the original abstract versus the structure version of the knowledge was added in Step 2 of the model. Results of Step 1 showed time was unrelated to expert ratings of knowledge transfer, but word count was positively related to knowledge transfer ($\beta = .21$, $p < .05$). Step 2 suggested that increasing the structure of documented knowledge had no relationship with expert ratings of knowledge transfer ($\beta = .12$, $p < .20$) and added no significant explanation of variance. In summary, the data reject Hypothesis 4.

Hypothesis 5 was tested using regression analysis in SPSS. Results are shown in Table 4. In Step 1 of the model, knowledge creation was regressed on the control variable survey completion time and word count for responses to statement two. The binary condition of documented knowledge with the original abstract versus the structure version of the knowledge was added in Step 2 of the model. Results of Step 1 showed time was unrelated to expert ratings of knowledge creation, but word count was positively related to knowledge transfer ($\beta = .39$, $p < .000$). Step 2 suggested that increasing the structure of documented knowledge had no relationship with expert ratings of knowledge creation ($\beta = .11$, $p < .20$) and added no significant explanation of variance. In summary, the data reject Hypothesis 5.

Table 4: Standardized Regression Results

Independent Variables	Knowledge Transfer (H4)		Knowledge Creation (H5)	
	Step 1	Step 2	Step 1	Step 2
Survey Completion Time	.01	.02	-.07	-.06
Knowledge Transfer Word Count	.21*	.20*		
Knowledge Creation Word Count			.39***	.37***
Documented Knowledge Structure		.12		.11
F change		1.64		1.67
R^2		.06		.17
Change in R^2		.01		.01

* p < .05

*** p < .000

CHAPTER EIGHT: STUDY TWO DISCUSSION

Simon (1962, 2002; Simon & Ando, 1961) proposed that organizations configured into complex hierarchic structures were the most commonly occurring organizational form because they had the greatest propensity to sustain changing environments. Sanchez and Mahoney (2002) extended Simon's theorizing to product development, noting the advantages of being able to change component parts of a product without detrimentally impacting other parts of the same product. Study 2 of this dissertation asserts that the advantages of structure are not limited to organizations and products, but extend to the root source of both; knowledge itself.

By this extension of existing theory, I proposed that an increase in the structure of documented knowledge –increasing its parsimony and modularity- would result in an increased chance of capturing the limited attention of users who are already inundated with information to consider. This application of the attention based view of the firm (Ocasio, 1992; 2011) holds that salience is not necessarily a function of the best or most accurate knowledge, but of the knowledge *most likely to transfer* to a reader for use and manipulation. In essence, knowledge must survive before it can thrive. Parsimony, one aspect of structure involving the removal of all but the most critical content of an artifact of documented knowledge, reduces the volume a reader must consider. Modularity, the other aspect of structure, involves the organization of content into component parts that may be transferred alone *or* with other parts, thus improving the likelihood that at least some aspects of knowledge will survive for future use.

Based on this theoretical mechanism, I proposed two hypotheses. Hypothesis 4 stated *Increasing the structure of documented knowledge will be associated with an increase in*

knowledge transfer relative to the original version of the same knowledge. Hypothesis 5 stated *Increasing the structure of documented knowledge will be associated with an increase in knowledge creation relative to the original version of the same knowledge.*

I prepared an example of documented knowledge reflecting greater parsimony and modularity relative to its original form to test whether structure affected the transfer and creation of knowledge. Testing carried out in Study 2 failed to substantiate a connection between increased structure and knowledge transfer exhibited by users of documented knowledge. Study 2 also failed to substantiate a connection between increased structure and knowledge creation exhibited by users of documented knowledge.

Upon consideration of the theory and testing employed, the challenges facing this research are at least two-fold. First, my use of Ocasio's attention based-view of the firm (1997, 2011) may have been flawed in Study 2 in a manner similar to Study 1. Namely, I empirically explored only one of the three premises of Ocasio's framework. I failed to explore the impact on the use of documented knowledge due to (i) the pre-existing focus of attention of my lab participants and (ii) the role of the environments from which they came in determining their attention. Instead, I focused narrowly on the impact of variations in the resources presented to the participants to see if the nature of those resources would affect their responses to it. Perhaps this is simply an issue of excessive theorizing. With the benefit of hindsight, Simon's theory regarding complex hierarchic systems already offered an explanation of why increasing the structure of documented knowledge would result in an increase in its transfer and utilization.

As with the hypotheses tested in Study 1, research design also proved challenging in testing hypotheses in Study 2. Study 2 is the only one I am aware of that takes the inductive

observation that lead to the concept of 'structure' and applies it using deductive reasoning in an experimental design. The work of both Simon (1962, 2002) and Sanchez and Mahoney (2002) is theoretical and makes propositions regarding scientific observations, but does not attempt to produce those observations experimentally. Research that has empirically tested factors related to structure (e.g., Argyres & Bigelow, 2010; Puranam, Singh, & Chaudhuri, 2009) have done so with non-experimental studies utilizing archival data that make it difficult to control for alternate explanations.

Inductive theorizing or archival analysis might have been practicable for establishing the plausibility of a relationship between documented knowledge structure and knowledge transfer and creation. One need only consider the present abstracts found in almost all scientific research papers, the summaries printed in the book jackets of popular novels, and the sound bites announced via Twitter to conclude that *some* manner of structuring larger pieces of information into mobile, modular forms is nearly ubiquitous. Indeed, while considering the selection of a journal article for use in Study 2, my analysis revealed that nearly one-third of the most cited papers in management research were not new contributions to knowledge, but review papers that attempted to reduce a more extensive body of work into a parsimonious summary and classify that body of work by the modular similarities of its component parts. Perhaps a study formally outlining these observations would be important for research on documented knowledge, if only to establish a foundation for the domain.

The second challenge to this research was the creation of a research design and a sample artifact to test the transfer and creation of documented knowledge. Despite the increasing body of research exploring the impact of word choice in written documents (Walmsley et al., 1981)

and the implications of web hyperlinks and "fly-overs" (Antonenko & Niederhauser, 2010; DeStefano & LeFevre, 2007) there is no clear standard for the configuration of written knowledge. This dissertation faced the considerable challenge of establishing such a standard.

Moreover, there were considerable challenges in measuring the impact of documented knowledge high in structure versus its original form. Study 2 utilized business students to create responses to both forms of documented knowledge and utilized domain experts, management and entrepreneurship scholars, to evaluate those responses. Analysis revealed significant and somewhat surprising findings for both.

The student participant sample, clearly a convenient population for a university researcher, was also appropriate sample for a study of documented knowledge. I considered having management scholars respond to the documented knowledge, but was concerned about the potential biases due to their existing and varied knowledge of the entrepreneurship domain and the scientific process. In contrast, a non-college educated sample may have proven unable to sufficiently comprehend the materials in any of the tested conditions. Business students seemed to offer a happy medium between the two, but also came with a variety of issues.

Regardless of the testing condition, there was widespread non-response or minimal response to the survey by the student participant sample. Additionally, knowledge transfer across any of the conditions was a low base rate phenomenon, suggesting participant apathy, poor survey directions, poor incentives to prompt active participation, or all of the above. Two remedies might improve the response quality of participants in future research. In Study 2, participants earned extra credit for showing up and completing surveys, but not for the quality of their work. The creation of some competitive comparison among participant responses and a

reward for the top responses might have incentivized participants to work harder in crafting their responses. Then, perhaps, the conditions presented by the variations in the documented knowledge provided may have played a measurable role in the process.

Second, the questions asked of participants in Study 2 were, by design, open-ended. The expectation was that, without rigid parameters to limit participant responses, those exposed to documented knowledge high in structure would more easily latch onto and expand upon its content. Participants exposed to the longer, more linear documented knowledge in its original form would have difficulty finding subject matter of the paper to expand upon and would instead rely on their own knowledge and experience alone to answer the questions. In fact, the open-ended question may have prompted a significant number of participants to neglect the research altogether. Student responses to the survey highlight this possibility. Rather than respond to the statement in the survey, a few students entered personal comments in the space provided. Two of these students suggested that in lieu of lengthy paper, I should have provided participants with a shorter, targeted digest of the paper and its findings instead. Ironically, both of these students were in the condition provided with the two-page, 576 word structured artifact placed in front of the original paper. This suggests students observed the length of the document, but failed to read enough to realize they *had* been provided with the summary they requested.

Once student participant responses were gathered, volunteer expert raters – scholars in entrepreneurship and management domains - reviewed and rated them in random subsets. I anticipated that brief responses to basic questions regarding a single entrepreneurship research paper would elicit similar ratings from scholars familiar with the entrepreneurship domain. This was not the case. The average within group correlation (rwg) for expert ratings of all responses

to all survey items was .55, substantively below acceptable limits. Further, of the twelve

scholars involved in rating, two raters appear to be responsible for nearly 20% of the

disagreement in evaluating participant responses. On the presumption that scholars with doctoral

training would have an appreciation for the importance of data integrity for a dissertation, further

consideration regarding the clarity of the grading survey directions and the possibility of rater

fatigue is due.

The directions for raters, like the statements posed to participants for their response, were

open-ended. Rather than creating a specific criteria by which expert raters would judge

knowledge transfer and creativity, I let the raters interpret the extent to which they believed

participant responses reflected the documented knowledge used in the paper and constituted a

creative application or extension of the documented knowledge. As a result, it could be that the

low correlation among raters reflects "frog-ponding" (e.g., McFarland & Buehler, 1995). With

open parameters by which to rate responses, each expert rater may have made comparisons with

the types of responses they were typically exposed to in their own "pond". For example, raters

representing U.S. and Canadian universities from different regions and with varying emphasis on

research versus teaching may have had different schema for evaluating participant responses.

This research design choice regarding open-ended ratings was made purposefully.

Testing responses according to narrowly defined rules for knowledge transfer risked reducing the

study to an exercise in reading comprehension rather than an examination of the autonomous use

of documented knowledge. In turn, a predetermined rule set defining knowledge *creation* would

have been more difficult to establish and, in my estimation, would have been counter-productive

in light of the indeterminate nature of creativity.

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Yet, in this effort to preserve the integrity of the constructs I sought to measure, the integrity of the measuring process itself may have been jeopardized. Multiple studies show persistent and significant disagreement among scientist reviewers in their ratings of paper submissions by *fellow* scientists. With the benefit of hindsight, if scientists are unable to consistently agree on the validity of the documented knowledge produced by similarly trained colleagues, perhaps I should have anticipated significant disagreement in the grading of responses of student participants.

CHAPTER NINE: CONCLUSION

This dissertation makes a case for more research on documented knowledge commensurate with that pertaining to human sources of knowledge. Specifically, research on human sources of knowledge have evolved from a mechanistic (Galbraith, 1974), top-down environment that limited the potential for individuals and their networks to apply their insights and experiences. Accompanying the recent exponential growth in communication connectivity, human knowledge sources are now increasingly utilized as a rich, dynamic source for individual and organizational knowledge transfer and creation.

In tandem with the flourishing of email, cellular phones, and networking applications, documented knowledge -the papers, websites, blueprints, manuals and other written record of our individual and organizational insights and experiences- continues to grow in both volume and accessibility. And since the introduction of knowledge management as a formal domain of management inquiry, Nonaka (1994) and others (e.g., Cook & Brown, 1999) have argued that both human sources and documented sources of knowledge play an important role in organizations. Nonetheless, the insights gained about human sources of knowledge have dwarfed that of documentation and failed to highlight its benefits, particularly in terms of the transfer and creation of knowledge.

The present research proposes not only that human sources of knowledge have enjoyed a disproportionate share of attention in the literature, but that the scientific exploration of human knowledge sources have "paved the way" for the study of documented knowledge. While not the central focus of the present research, parallels between research on human sources and

documented sources of knowledge deserve mentioning to demonstrate their shared meta-theoretical foundation. For example, Burt's (1992) seminal work on structural holes in human networks has proven groundbreaking in revising the way human knowledge networks are assessed and constructed. Instead of considering two entities that are each networked with ten other entities to be equal in terms of access to knowledge, research now shows that a network with indirect, weak ties may be more likely to prompt the acquisition of new knowledge transferred to the focal entity. Conversely, an entity linked directly with all of its network "nodes" may find advantages in terms of exploitative, rather than explorative knowledge acquisition, particularly if its nodes are also linked to each other.

This research on network structure has largely been considered a human phenomenon. On closer inspection, though, the "unit" of analysis need not be interpreted this narrowly. For example, in an effort to find out how high-impact scientific research papers differ from less groundbreaking research, Schilling and Green (2011) measured the search scope, search depth, and atypical connections *not* of a human knowledge network, but of the documented knowledge network represented in the reference sections of top-cited papers.

As it turns out, the network configuration normally associated with human sources of knowledge producing differentiated, creative performance is *the same* configuration found by Schilling and Green (2011) to explain why papers capitalizing on various sources of explicit knowledge were more ground-breaking than those failing to do so. Essentially, the more disparate the array of scientific domains cited in a research paper, the more impactful the work tended to be. Schilling and Green even describe components of documented knowledge networks as nodes, just as in Burt's (1997) seminal work on human social networks. In further

parallel, the authors state "breakthrough idea generation is likely to be the result of bridging deep pools of knowledge with an atypical connection" (Schilling & Green, 2011:1322).

In closer proximity to the present research, mechanisms involved in knowledge management pertaining to virtual teams also parallels the management of documented knowledge. For example, Tzabbar, McMahon, and Vestal (working paper) found that variations in the geographic dispersion of patent teams did not uniformly impact the novelty of their patent innovation. At initial levels of geographic dispersion, scientists were able to manage the challenges of distance and asynchronous communication and increase innovation novelty relative to collocated teams. More was not always better, however, as further increases in geographic locations resulted in a reduced rate of innovation novelty.

The literature on team member dispersion attributes this eventual reduction in innovation to an increase in interpersonal coordination and conflict inhibiting the successful transfer and creation of knowledge held among team members (e.g. O'Leary & Mortensen, 2010; Polzer, Crisp, Jarvenpaa, & Kim, 2006). At a more elemental level, though, it could be argued that it was the increasing cognitive demands required to distill critical information from a larger number of knowledge sources that resulted in coordination challenges and conflict. With just this slight adjustment in framing, Hansen and Haas' (2001) study on documented knowledge summarized in the introduction of this dissertation becomes quite similar in concept to research on management of knowledge in human teams.

Hansen and Haas (2001) found that utilization of documented knowledge was lower in situations of crowded markets- markets where there was glut of information sources- but could be increased by reducing the number of documents made available. Conversely, in markets with

a scarcity of information, the utilization of documents increased if the supplier made more documents available. This curvilinear relationship between the volume of knowledge requiring management and successful knowledge transfer and creation is, at its foundation, identical for human sources and documented sources. This is particularly promising for our understanding of documented knowledge, as a program of research has already been mapped.

As one novel exhibit of the opportunity for this new conceptualization of documented knowledge, the focus of this dissertation was the relationship of two factors, *style* and *structure,* on knowledge transfer and knowledge creation. Though my results were insubstantial, my hope is that the theoretical propositions outlined in this research will incite testing that corrects for the shortcomings of my work. Documented knowledge is a long-standing, rapidly expanding, and integral component of knowledge management. In light of its parallels to human sources of knowledge, a greater understanding of documented knowledge may benefit organizations and individuals relying on insights and experiences to guide future success. Both share the same reality that survival often relies not on content, but on the composition and configuration of the medium over which the content is transmitted- be it human or electronic, voice or written word.

Bookmarks

APPENDIX A: ARTICLE TITLE RATINGS DISTRIBUTIONS

Ratings Distributions for Title Style: Concrete

Chart showing # of Titles (y-axis, 0 to 70) vs Average Rating on 1 to 7 Scale (low to high Style) (x-axis). Bars: 1-1.99: 0; 2-2.99: 0; 3-3.99: ~23; 4-4.99: ~65; 5-5.99: ~41; 6-7.00: 0.

Ratings Distributions for Title Style: Memorable

# of Titles

Average Rating on 1 to 7 Scale (low to high Style)
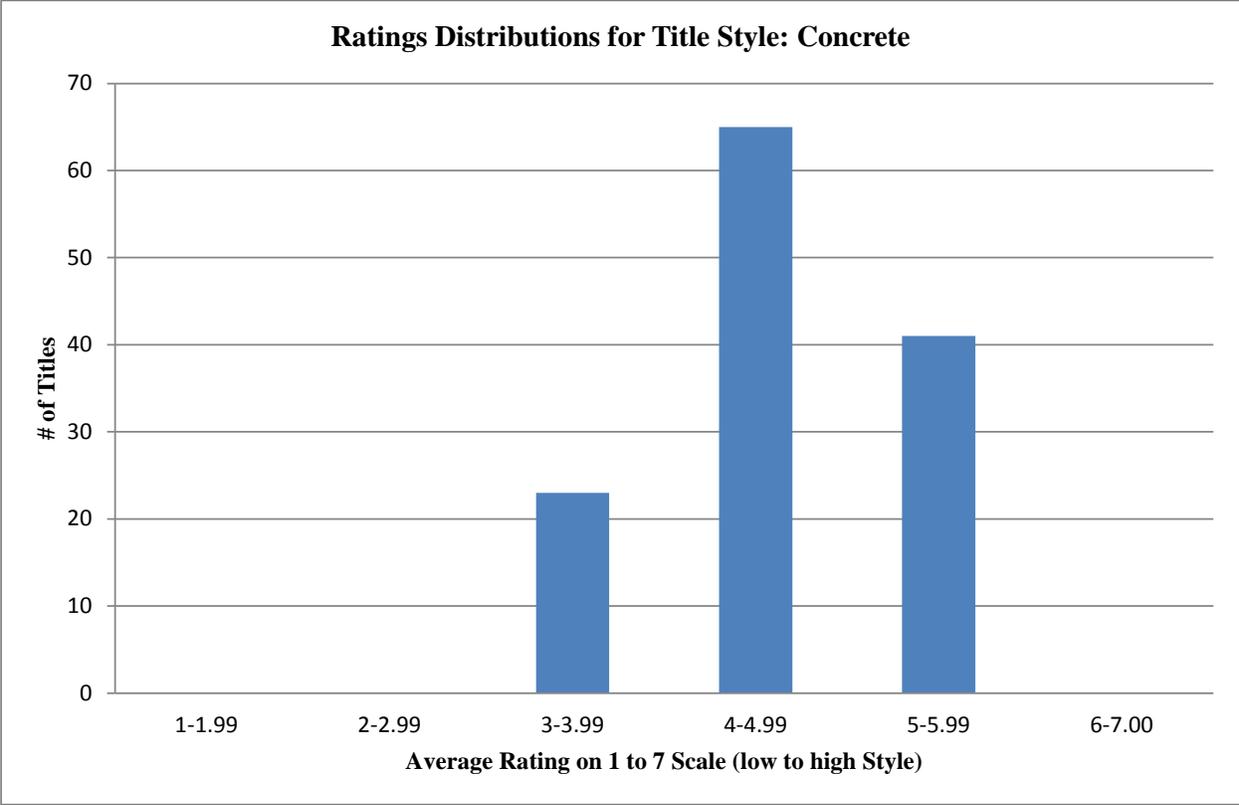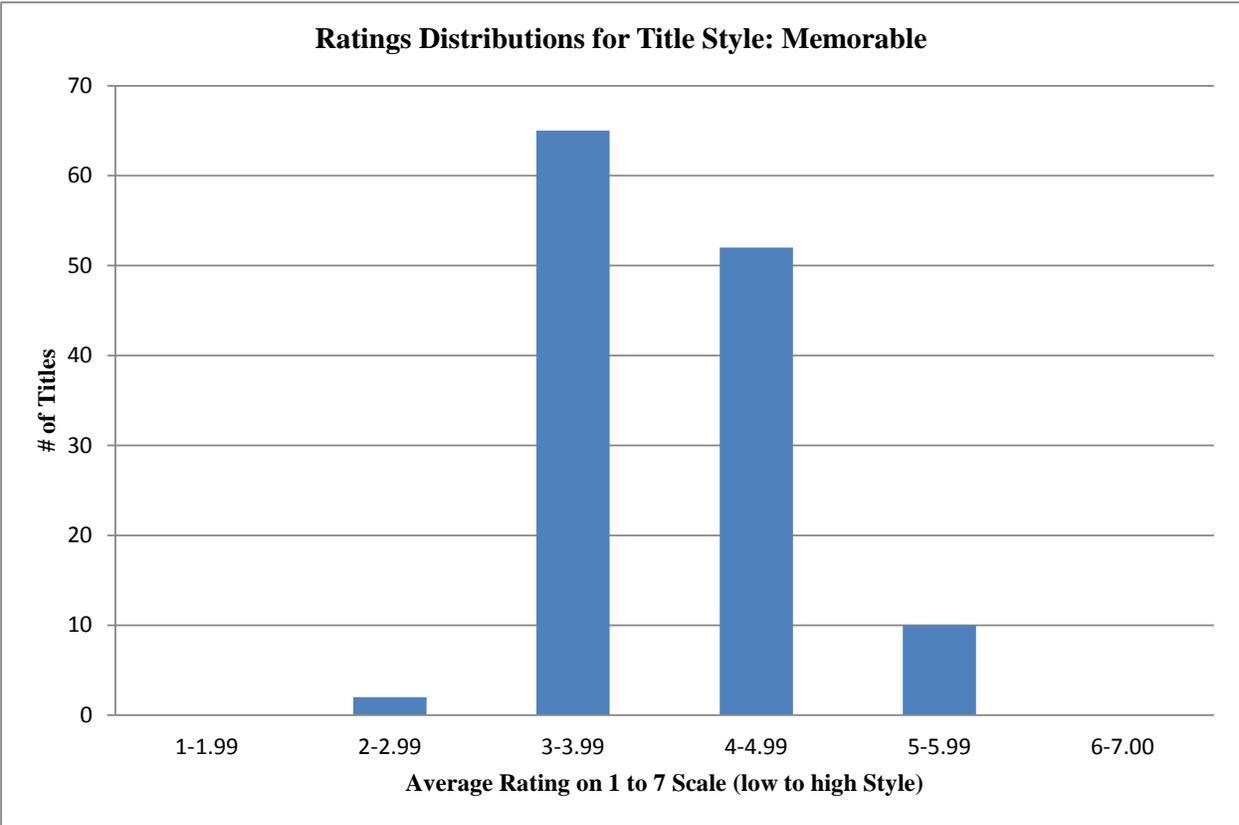
APPENDIX B: ARTICLE TITLES AND ASSOCIATED RATINGS

C = Concrete; M = Memorable; R = Interest in Reading Paper; S = Interest in Subject Matter

Title	C	M	R	S
When job dissatisfaction leads to creativity: Encouraging the expression of voice	5.45	**5.32**	5.01	4.96
When others retire early: What about me?	5.71	**5.32**	4.61	4.61
Why companies go green: A model of ecological responsiveness	5.86	**5.30**	4.89	4.74
Learning from academia: The importance of relationships in professional life	5.79	**5.20**	5.00	5.09
So close and yet so far: Promotion versus exit for CEO heirs apparent	5.15	**5.20**	4.76	4.66
Change in the presence of fit: The rise, the fall, and the renaissance of Liz Claiborne	5.69	**5.12**	3.99	3.66
Service with a smile: Emotional contagion in the service encounter	5.43	**5.09**	4.77	4.72
Consequences of abusive supervision	5.81	**5.06**	5.00	4.75
Going up? Do traits and informal social processes predict advancing in management?	5.40	**5.03**	4.61	4.46
Social networks and the performance of individuals and groups	5.78	**5.01**	5.31	5.40
Is CEO pay in high-technology firms related to innovation?	5.78	**4.99**	5.04	5.03
The science and practice of team development: Improving the link	5.17	**4.86**	4.42	4.32
Understanding human competence at work: An interpretative approach	5.43	**4.81**	4.96	4.86
Network destruction: The structural implications of downsizing	5.49	**4.79**	4.38	4.16
A social capital theory of career success	5.14	**4.68**	4.62	4.56
Moves that matter: Issue selling and organizational change	4.94	**4.65**	4.25	4.14

How the packaging of decision explanations affects perceptions of trustworthiness	4.93	**4.64**	4.54	4.51
A panel study of coping with involuntary job loss	5.47	**4.60**	4.32	4.22
Toward a greater understanding of how dissatisfaction drives employee turnover	5.41	**4.58**	4.51	4.59
Does leadership matter? CEO leadership attributes and profitability under conditions of perceived environmental uncertainty	5.40	**4.57**	4.69	4.69
How relevant is university-based scientific research to private high-technology firms? A United States-Japan comparison	5.13	**4.56**	4.18	4.03
Racial diversity, business strategy, and firm performance: A resource-based view	5.23	**4.54**	4.30	4.24
Country institutional profiles: Unlocking entrepreneurial phenomena	4.73	**4.53**	4.06	4.17
Can good citizens lead the way in providing quality service? A field quasi experiment	4.76	**4.49**	4.12	4.24
Differential effects of incentive motivators on work performance	5.04	**4.49**	4.62	4.61
Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave	5.06	**4.49**	4.41	4.31
Added benefits: The link between work-life benefits and organizational citizenship behavior	5.33	**4.46**	4.36	4.31
Frederick W. Taylor's 1899 pig iron observations: Examining fact, fiction, and lessons for the new millennium	4.90	**4.45**	3.97	3.81
The role of family ties in agency contracts	5.09	**4.42**	4.06	3.86
Navigating the competitive landscape: The drivers and consequences of competitive aggressiveness	4.90	**4.42**	4.25	4.28
The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance	4.82	**4.40**	4.19	4.22
Continuous morphing: Competing through dynamic capabilities, form, and function	4.38	**4.39**	3.81	3.77
Effects of age at entry, knowledge intensity, and imitability on international growth	4.85	**4.37**	4.30	4.24

Performance and satisfaction in conflicted interdependent groups: When and how does self-esteem make a difference?	5.41	**4.36**	4.58	4.62
Getting it together: Temporal coordination and conflict management in global virtual teams	4.77	**4.35**	4.07	3.97
Business groups in emerging economies: A resource-based view	5.23	**4.34**	4.20	4.23
Labor market mobility and cash compensation: The moderating effects of race and gender	5.13	**4.33**	4.58	4.51
Effects of a dissolved workplace romance and rater characteristics on responses to a sexual harassment accusation	4.96	**4.33**	4.28	4.16
Behavioral responses of CEOs to stock ownership and stock option pay	5.41	**4.32**	4.68	4.64
Dynamic boundaries of the firm: Are firms better off being vertically integrated in the face of a technological change?	5.21	**4.31**	4.41	4.42
Serving multiple constituencies in business schools: MBA program versus research performance	5.11	**4.29**	4.41	4.34
Survival and profitability: The roles of experience and intangible assets in foreign subsidiary performance	5.13	**4.28**	4.38	4.32
Collaboration and performance in foreign markets: The case of young high-technology manufacturing firms	5.06	**4.27**	4.18	4.23
The future of business groups in emerging markets: Long-run evidence from Chile	5.27	**4.27**	4.10	4.15
Downsizing in privatized firms in Russia, Ukraine, and Belarus	5.88	**4.25**	3.56	3.24
Location matters: A cross-level analysis of the effects of organizational sex composition on turnover	4.52	**4.25**	4.06	4.04
Export strategies and performance of firms from emerging economies: Evidence from Brazil, Chile, and Mexico	5.06	**4.22**	4.18	4.13
Creating hybrid team cultures: An empirical test of transnational team functioning	4.71	**4.22**	3.72	3.70
High-involvement work practices, turnover, and productivity: Evidence from New Zealand	5.00	**4.19**	3.99	3.90
Exploratory learning, innovative capacity, and managerial oversight	4.70	**4.15**	4.13	4.12

Rules versus discretion: The productivity consequences of flexible regulation	4.53	**4.13**	3.90	3.81
Integrating justice and social exchange: The differing effects of fair procedures and treatment on work relationships	4.87	**4.13**	4.10	4.13
Why people stay: Using job embeddedness to predict voluntary turnover	4.56	**4.12**	3.85	3.87
Understanding the influence of environmental standards on judgments and choices	5.09	**4.09**	4.07	4.06
Competition, capabilities, and the make, buy, or ally decisions of Chinese state-owned firms	5.18	**4.07**	4.12	3.99
The moderating role of hostility in the relationship between enriched jobs and health	4.90	**4.06**	4.30	4.26
A multidimensional model of venture growth	4.72	**4.04**	3.61	3.55
Marginal mentoring: The effects of type of mentor, quality of relationship, and program design on work and career attitudes	4.83	**4.03**	4.20	4.35
Environmental ethical decision making in the US metal-finishing industry	5.32	**4.03**	3.80	3.75
Product innovation strategy and the performance of new technology ventures in China	5.52	**4.03**	4.49	4.58
Downside risk implications of multinationality and international joint ventures	4.97	**4.03**	4.20	4.16
Leadership in the shaping and implementation of collaboration agendas: How things happen in a (not quite) joined-up world	4.58	**4.00**	3.91	3.88
Determinants of incentive intensity in group-based rewards	4.69	**3.99**	4.06	4.03
Working in retirement: The antecedents of bridge employment and its consequences for quality of life in retirement	4.96	**3.99**	3.82	3.78
The uncertain relevance of newness: Organizational learning and knowledge flows	4.59	**3.97**	3.72	3.74
Work-family human resource bundles and perceived organizational performance	4.63	**3.96**	3.63	3.54
Effects of best practices of environmental management on cost advantage: The role of complementary assets	4.67	**3.96**	3.87	3.86

The influence of national culture on the formation of technology alliances by entrepreneurial firms	4.81	**3.96**	4.10	4.12
Top management teams, global strategic posture, and the moderating role of uncertainty	4.56	**3.96**	3.84	3.88
Seeing another viewpoint: Antecedents and outcomes of employee perspective taking	4.22	**3.96**	3.72	3.79
Doing research that is useful to practice: A model and empirical exploration	4.67	**3.90**	3.52	3.32
Human resource strategy and career mobility in professional service firms: A test of an options-based model	4.46	**3.89**	3.91	3.83
Individual environmental initiative: Championing natural environmental issues in US business organizations	4.61	**3.88**	3.77	3.83
The sources and accuracy of job applicants' beliefs about organizational culture	4.87	**3.88**	4.17	4.20
Organizational and HRM strategies in Korea: Impact on firm performance in an emerging economy	4.66	**3.85**	3.70	3.45
The relationship of team goals, incentives, and efficacy to strategic risk, tactical implementation, and performance	4.93	**3.84**	4.29	4.26
The use of modular organizational forms: An industry-level analysis	4.45	**3.84**	3.39	3.39
Structuring change: Familiarity and formal interventions in problem-solving groups	4.72	**3.84**	3.75	3.71
The roles of departmental and position power in job evaluation	5.09	**3.83**	3.90	3.78
Sources of work-family conflict: A sino-US comparison of the effects of work and family demands	4.51	**3.80**	3.97	4.03
The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change	3.96	**3.79**	3.41	3.48
Caregiving decisions, well-being, and performance: The effects of place and provider as a function of dependent type and work-family climates	4.64	**3.77**	3.96	3.94
Industry self-regulation without sanctions: The chemical industry's Responsible Care Program	4.77	**3.77**	3.57	3.26
Cross-functional project groups in research and new product development: Diversity, communications, job stress, and outcomes	4.71	**3.73**	3.91	3.94

The effect of perceived technological uncertainty on Japanese new product development	4.99	**3.72**	3.74	3.72
Partner selection in emerging and developed market contexts: Resource-based and organizational learning perspectives	4.43	**3.72**	3.67	3.73
Knowledge representations and knowledge transfer	4.19	**3.71**	3.44	3.47
Responses to informal accommodation requests from employees with disabilities: Multistudy evidence on willingness to comply	4.73	**3.69**	3.70	3.59
National culture, networks, and individual influence in a multinational management team	4.81	**3.68**	3.70	3.70
Gainsharing and organizational learning: An analysis of employee suggestions over time	4.65	**3.68**	3.74	3.74
Architectural innovation and modular corporate forms	4.31	**3.67**	3.29	3.28
Organizational paradigms of reduced-load work: Accommodation, elaboration, and transformation	4.21	**3.66**	3.43	3.32
Economic performance of group-affiliated companies in Korea: Intragroup resource sharing and internal business transactions	4.66	**3.66**	3.70	3.47
Team structure and performance: Assessing the mediating role of intrateam process and the moderating role of task type	4.35	**3.66**	3.69	3.80
The influence of demographic heterogeneity on the emergence and consequences of cooperative norms in work teams	3.92	**3.65**	3.64	3.48
The dynamics of collective leadership and strategic change in pluralistic organizations	4.52	**3.64**	3.33	3.07
The impact of employee communication and perceived external prestige on organizational identification	4.75	**3.64**	3.99	3.88
Total quality management implementation and competitive advantage: The role of structural control and exploration	4.66	**3.63**	3.59	3.56
Ecological embeddedness	3.56	**3.62**	2.95	2.94
The influence of activism by institutional investors on R&D	4.61	**3.59**	3.28	3.10
Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy	3.99	**3.55**	3.39	3.40

Resource partitioning and the evolution of specialist organizations: The role of location and identity in the US wine industry	4.30	**3.52**	3.84	3.91
Pollution reduction preferences of US environmental managers: Applying Ajzen's theory of planned behavior	4.57	**3.47**	3.58	3.69
Cross-cultural cognitions and the venture creation decision	3.75	**3.46**	3.35	3.43
The impact of subordinate disability on leader-member exchange relationships	4.45	**3.45**	3.55	3.64
Direct and moderating effects of human capital on strategy and performance in professional service firms: A resource-based perspective	4.13	**3.42**	3.42	3.54
Capital investment as investing in organizational capabilities: An empirically grounded process model	3.79	**3.41**	3.55	3.76
Managerial ties and firm performance in a transition economy: The nature of a micro-macro link	3.99	**3.41**	3.57	3.53
The relationship of internal and external commitment foci to objective job performance measures	3.91	**3.36**	3.36	3.33
The impact of collectivism and in-group/out-group membership on the evaluation generosity of team members	4.00	**3.35**	3.48	3.55
Organizations unfettered: Organizational form in an information-intensive economy	3.85	**3.34**	3.31	3.42
Organizational context as a moderator of theories on firm boundaries for technology sourcing	3.61	**3.31**	3.07	3.11
The impact of cultural values on job satisfaction and organizational commitment in self-managing work teams: The mediating role of employee resistance	4.50	**3.31**	3.46	3.44
Bundling human capital with organizational context: The impact of international assignment experience on multinational firm performance and CEO pay	3.93	**3.29**	3.33	3.38
Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective	3.80	**3.29**	3.19	3.09
Resource commitment, entry timing, and market performance of foreign direct investments in emerging economies: The case of Japanese international joint ventures in China	4.41	**3.29**	3.32	3.16
Emerging structural patterns within multinational corporations: Toward process-based structures	3.97	**3.26**	3.33	3.30

The role of locus of control in reactions to being promoted and to being passed over: A quasi experiment	3.68	**3.26**	3.16	3.32
Fairness perceptions as a moderator in the curvilinear relationships between job demands, and job performance and job satisfaction	4.06	**3.26**	3.46	3.44
On the performance of technology-sourcing partnerships: The interaction between partner interdependence and technology attributes	4.16	**3.24**	3.63	3.59
The incident command system: High-reliability organizing for complex and volatile task environments	3.65	**3.22**	3.09	2.96
A case for procedural justice climate: Development and test of a multilevel model	3.50	**3.16**	2.99	2.93
The roles of supervisory support behaviors and environmental policy in employee ecoinitiatives at leading-edge European companies	3.71	**3.13**	2.99	3.07
Interactions among actual ease-of-movement determinants and job satisfaction in the prediction of voluntary turnover	3.91	**3.12**	3.21	3.25
Academic-practitioner collaboration in management research: A case of cross-profession collaboration	3.80	**3.10**	3.03	3.13
The evolution of intraindustry firm heterogeneity: Insights from a process study	3.35	**3.09**	2.99	3.06
Interpersonal and interaction influences on informal resource exchanges between R&D researchers across organizational boundaries	3.70	**3.08**	2.93	2.83
Organizational change as discourse: Communicative actions and deep structures in the context of information technology implementation	3.64	**2.97**	2.99	3.06
Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance	3.64	**2.88**	3.00	3.15

APPENDIX C: DOCUMENTED KNOWLEDGE STRUCTURED FOR GREATER PARSIMONY AND MODULARITY

Research Paper Summary:
Davidsson, P., & Honig, B. 2003. The role of social and human capital among nascent entrepreneurs. Journal of Business Venturing, 18: 301–331.

Introduction: "Our knowledge about individuals who navigate various obstacles at the very earliest stages of entrepreneurial activity remains limited" (p. 301). In fact, research in entrepreneurship "is dominated by studies based on samples of existing business firms (Davidsson & Wiklund, 2001[1])" (p. 303), which means conclusions are drawn only from successful firms rather than all attempts at entrepreneurship. Other research focuses on entrepreneurial 'intentions' rather than actual behavior (Bird & Jelinek, 1988[2]), but the relationship between intentions and actual behavior "has been shown to be weak in many cases (Foxall, 1984[3])," (p. 304).

Purpose: "The purpose of our research is to provide methodologically sound empirical longitudinal observations leading to a better understanding of aspects of human and social capital that may be influential during the emergent phases of the entrepreneurial process" (p. 304).

Hypotheses:
The authors predict that increases in an individual's *human* and *social capital* will be positively associated with **entrepreneurial discovery** and **entrepreneur successful exploitation**.

Theoretical/Conceptual Foundations:
- *Human Capital Theory:* Human capital theory states that "knowledge provides individuals with increases in their cognitive abilities, leading to more productive and efficient potential activity (e.g., Mincer, 1974[4])" (p. 305).
- *Social Capital Theory:* Social capital theory "refers to the ability of actors to extract benefits from their social structures, networks and memberships (e.g., Portes, 1998[5]). Social networks provided by extended family, community-based, or organizational relationships are theorized to supplement the effects of education, experience and financial capital (e.g., Coleman, 1990[6])" (p. 307).

Definitions:
- **Entrepreneurial Discovery** was represented by status as an entrepreneur, which required initiating "at least one **gestation** activity *[from among 46 activities listed in Appendix B, including completion of a business plan, business licenses obtained, classes completed, employees hired, etc.]* for a current, independent start-up at the time of the" initial interview. However, "a business was regarded as already started if 6 months or more before the study (a) money was invested, (b) income exceeded expenses and (c) the firm was already a legal entity" (p. 313).
- **Entrepreneur Successful Exploitation** is represented by three outcomes by the time of the follow-up interview 18 months later: the number of **gestations** completed, the achievement of **sales**, and the achievement of **profitability**.

Method: Using an initial telephone interview and a follow-up interview 18 months later, human and social capital characteristics were gathered for 380 nascent entrepreneurs and a control group of 608 non-entrepreneurs from a population of 30,427 Swedish adults.

Analysis: Binomial logistic regression was used to test the likelihood of a relationship between human and social capital factors and entrepreneurial discovery, sales and profitability. Multiple linear regression was used to test for a relationship between human and social capital factors and the number of business creation gestations completed.

Results of the study on are the following page

REFERENCES: [1]Davidsson, P., Wiklund, J., 2001. Levels of analysis in entrepreneurship research: current research practice and suggestions for the future. Entrepreneurship Theory Practice 25, 81–100 (Summer). [2]Bird, B., Jelinek, M., 1988. The operation of entrepreneurial intentions. Entrepreneurship Theory Practice 13, 21–29 (Winter). [3]Foxall, G., 1984. Evidence for attitudinal–behavioural consistency: implications for consumer research paradigms. J. Econ. Psychol. 5, 71–92. [4]Mincer, J., 1974. Schooling, Experience and Earnings. Columbia Univ. Press, New York. [5]Portes, A., 1998. Social capital. Annu. Rev. Sociol. 23, 1–24. [6]Coleman, J., 1990. Foundations of Social Theory. Belknap Press, Cambridge.

Research Paper Summary:
Davidsson, P., & Honig, B. 2003. The role of social and human capital among nascent entrepreneurs. Journal of
   Business Venturing, 18: 301-331.

Results: *Please read each* **Predictor Variable** *statement below with its associated outcomes and values to the right. The term "Unrelated" means there was no relationship found between the* **Predictor Variable** *and the associated outcome.*

Type of Capital	Predictor Variable	Entrepreneurial Discovery	Entrepreneur Exploitation		
	Pair the statements below with each outcome to the right.	"...increased the likelihood that the individual was an entrepreneur by..."	Gestations Completed "...was associated with the following increase in the number of business creation gestations completed by the entrepreneur."	Any Sales "...increased the likelihood that the entrepreneur had achieved any sales by..."	Profitability "...increased the likelihood that the entrepreneur had achieved profitability by..."
Social	"Involvement in a business network..."	not tested	13.3	335%	323%
Social	"Having close friends or neighbors who own a business..."	103%	3.2	54%	Unrelated
Human	"Having previous startup experience..."	118%	4.8	Unrelated	Unrelated
Social	"Having encouragement from friends & family to start a business..."	90%	4.2	Unrelated	Unrelated
Social	"Having a parent who had ever owned a business ..."	39%	Unrelated	Unrelated	Unrelated
Human	"Each year of education..."	18%	Unrelated	Unrelated	Unrelated
Human	"Each year of work experience..."	8%	Unrelated	Unrelated	Unrelated
Human	"Each business class taken..."	not tested	3.9	Unrelated	Unrelated
Social	"Being part of a startup team as opposed to a solo startup..."	not tested	3.8	Unrelated	Unrelated
Social	"Being married..."	Unrelated	3.7	Unrelated	Unrelated
Social	"Having business agency assistance..."	not tested	Unrelated	Unrelated	Unrelated
Human	"Each year of management experience..."	Unrelated	Unrelated	Unrelated	Unrelated
Control	"Each year of age..."	-10%	Unrelated	Unrelated	Unrelated
Control	"being female..."	-53%	Unrelated	Unrelated	Unrelated

Discussion: "Apparently, while human capital factors can explain discovery and, to some extent, progression of the exploitation process, it is only when applied within the context of a relevant social structure that such qualities can help achieving successful outcomes" (p. 323). "None of the human capital variables were associated with obtaining a first sale or being profitable during the study" (p. 321), while social capital factors like "memberships in business networks appear to provide consistently strong results over the life of a nascent activity" (p. 324).

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APPENDIX D: TRADITIONAL JOURNAL ARTICLE ABSTRACT

Research Paper Abstract:

Abstract: This study examines nascent entrepreneurship by comparing individuals engaged in nascent activities ($n = 380$) with a control group ($n = 608$), after screening a sample from the general population ($n = 30,427$). The study then follows the developmental process of nascent entrepreneurs for 18 months. Bridging and bonding social capital, consisting of both strong and weak ties, was a robust predictor for nascent entrepreneurs, as well as for advancing through the start-up process. With regard to outcomes like first sale or showing a profit, only one aspect of social capital, viz. being a member of a business network, had a statistically significant positive effect. The study supports human capital in predicting entry into nascent entrepreneurship, but only weakly for carrying the start-up process towards successful completion. © 2002 Elsevier Science Inc. All rights reserved.

APPENDIX E: EXPERT RATER RATINGS DISTRIBUTIONS

Ratings Distributions for Knowledge Transfer

Ratings Distributions for Knowledge Creation

# of Responses

Average Rating on 1 to 5 Scale (low to high Creation)
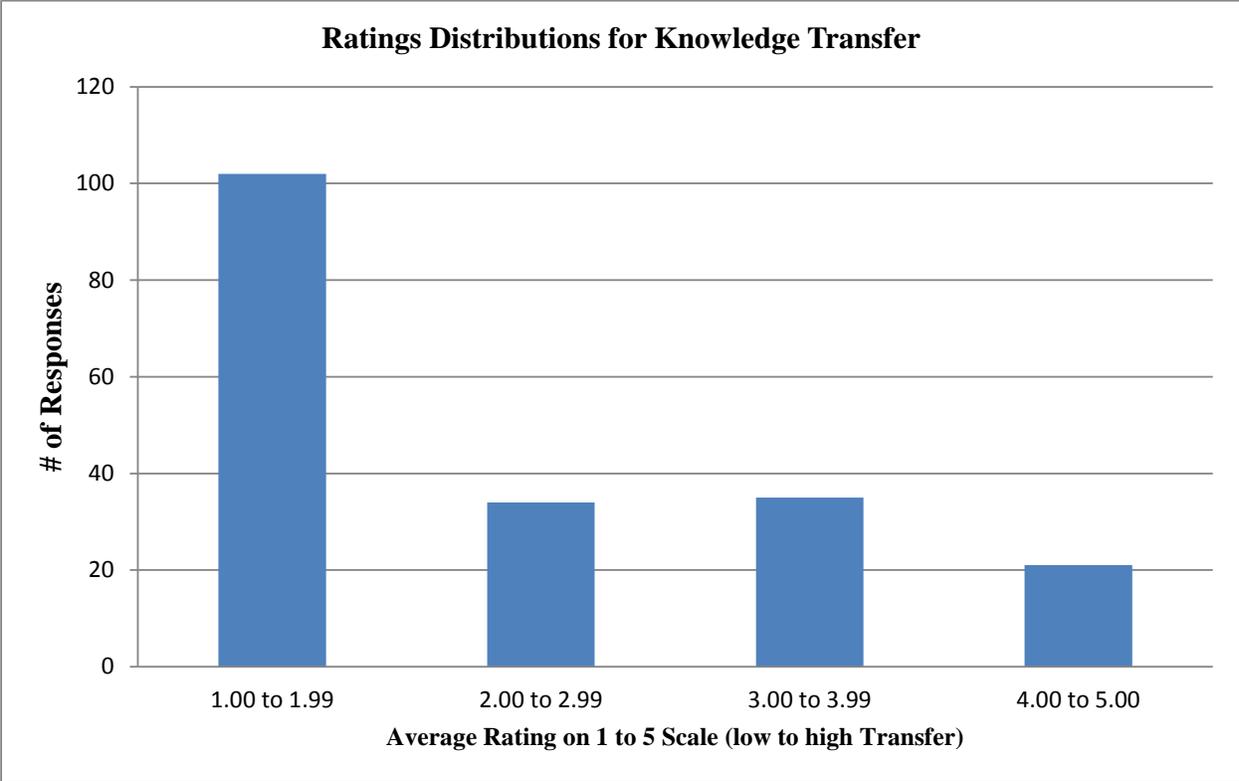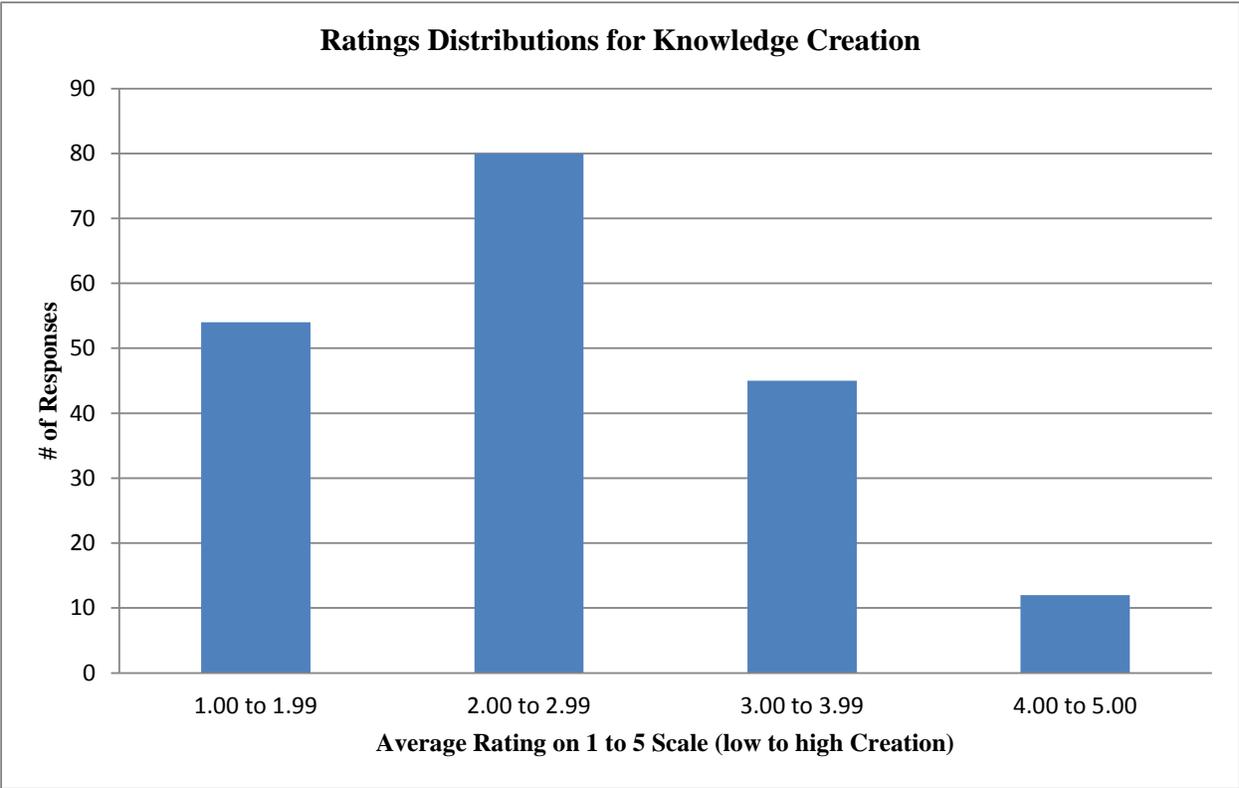
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