Disentangling novelty and usefulness

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Disentangling novelty and usefulness: Essays on creativity in the arts and sciences

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Disentangling novelty and usefulness:

Essays on creativity in the arts and sciences

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For Chi.

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So long, and thanks for all the fish.

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GENERAL INTRODUCTION

Concerns that sophisticated algorithms and autonomous machines are replacing human labor have driven a recent interest in creativity as a key factor for maintaining innovation and economic growth (Baron & Tang, 2011; Bilton, 2007; Sarooghi, Libaers, & Burkemper, 2015). Indeed, work that involves creativity has remained relatively future-proof and protected from automation (Bakhshi, Frey, & Osborne, 2015), and creativity has been highlighted as "the lifeblood of entrepreneurship" (Ward, 2004: 174) given its key role in the creation, recognition, and exploitation of entrepreneurial opportunities (Dimov, 2007; Shane & Nicolaou, 2015).

Within management and entrepreneurship research, the dominant definition of creativity is that it entails the generation of ideas or products that are both novel *and* useful (Amabile, 1996; see also: Runco & Jaeger, 2012, who call this the "standard definition of creativity").[1] Novelty—being new, unique, or different, relative to central practices or views (e.g., McKinley, Mone, & Moon, 1999: 637)—and usefulness—being appropriate, correct, or valuable to the task at hand (Amabile, 1996: 35)—are therefore each necessary conditions for an offering to be classified as creative. In spite of its importance, a major obstacle to the study of creativity has been the translation of this simple two-criterion conceptual definition into an operational one to be utilized in empirical study (Amabile, 1982; Lee, Walsh, & Wang, 2015). For example, some prior work interested in measuring creativity has taken it to be unidimensional in nature (Gong, Huang, & Farh, 2009; Oldham & Cummings, 1996; Zhou & George, 2001), measuring creativity as the (weighted) sum of novelty and usefulness while assuming that novelty and usefulness are uncorrelated in nature. In so doing, this approach thus takes novelty and usefulness to each be

[1] Others, such as Boden (2004) also require surprise, while the U.S. Patent Office requires nonobviousness (see also Simonton, 2012). Though the importance of surprise or nonobviousness is an interesting criterion to explore in future work, I adopt the most widely accepted definition and focus on usefulness and novelty in this dissertation.

sufficient conditions for creativity, rather than the necessary conditions that they represent in their original conceptualization (Amabile, 1996). However, there is mounting evidence that novelty and usefulness do shape one another (Fleming, Mingo, & Chen, 2007; Lee et al., 2015).

Others have placed a greater emphasis on usefulness at the expense of novelty, taking the attainment of awards (Hollingsworth, 2004; Zuckerman, 1967), financial and artistic success (Uzzi & Spiro, 2005), or publications and citations (Simonton, 1999, 2004) as an indication of creativity. Yet, such an approach clearly runs the risk of classifying useful or impactful, yet wholly unoriginal, efforts as creative. Others see creativity as emerging predominantly from novelty, focusing for instance on the number of generated ideas (Gielnik, Frese, Graf, & Kampschulte, 2012) or emphasizing being new compared to the relevant standard (Pirola-Merlo & Mann, 2004), thus overlooking the need for these novel offerings to actually be useful in order for them to be truly creative.

In light of the limitations of these various approaches, this dissertation aims to take a step back and answer the question of *whether, how, and under what conditions novelty is related to usefulness*. In so doing, this dissertation follows recent advances in the study of creativity emphasizing that, although creativity may be jointly composed of the novelty and usefulness, these are distinct concepts that should best be considered as such (Diedrich, Benedek, Jauk, & Neubauer, 2015; Lee et al., 2015; Uzzi, Mukherjee, Stringer, & Jones, 2013). By elaborating upon how novelty shapes usefulness, in particular, this dissertation contributes to research on creativity, management, and entrepreneurship by providing new insights into the conditions under which creativity emerges. Focusing on the conditions under which novelty does and does not affect usefulness, new insights emerge as to why some novel offerings see widespread use whereas other ostensibly similar offerings linger in obscurity.

This dissertation consists of four essays that address the overarching research question from a variety of theoretical lenses, such as cognitive psychology and international business (Chapter one), strategic management and institutional theory (Chapter two), and innovation studies and the sociology of science (Chapters three and four). Each essay is centered on a setting where creativity is of particular importance: university students who are close to starting knowledge-intensive and skilled work (Chapter one), the creative industries (Chapter two), and academia (Chapters three and four). Taken together, these studies confirm the complex nature of creativity: novelty sometimes increases usefulness in substantial ways, yet this effect varies widely under different conditions. The next paragraphs outline the four chapters that form the core of this dissertation more in-depth. As the contributions of each chapter to their specific literatures are discussed at length within these chapters, I focus here on briefly summarizing each chapter and how these fit within the research question of this dissertation. I then touch upon definitional issues to which I return more in-depth in the final section of the dissertation.

Chapter one—*Does foreign language liberate or limit creativity? An experimental study of foreign language use's effects on divergent and convergent thinking*—takes an experimental approach to study how foreign language use changes the ability of individuals to engage in divergent and convergent thinking. Divergent thinking and convergent thinking are both important for the production of novelty, being related to the generation of new ideas and their integration into the best solution, respectively (Amabile, 1988; Guilford, 1967). We draw a parallel between these two creative thinking processes and the Type 1 and Type 2 processes (Evans, 2008; Evans & Frankish, 2009) explored in studies on the effects of foreign language use (Urbig, Terjesen, Procher, Muehlfeld, & Van Witteloostuijn, 2016; Volk, Köhler, & Pudelko, 2014). We enrich our theory by exploring the emotional nature of foreign language use through

the anxiety that one feels about using a foreign language (Horwitz, 2001; Scovel, 1978). Results from a replicated experiment among two Dutch student samples show that individuals who are highly anxious about operating in the English language perform worse in terms of convergent thinking when placed in a foreign language condition, compared to high English language anxiety-individuals in the native Dutch language condition, and vice versa. In contrast, results from one sample show that individuals with high English language anxiety perform *better* in terms of divergent thinking when placed in the English language context, compared to high English language anxiety-individuals who are put in the native Dutch language condition. This chapter, as such, contributes to the research question of this dissertation by exploring the conditions under which novelty emerges as a result of different processes. Figure I.1 provides an illustration of the concepts underlying this chapter.

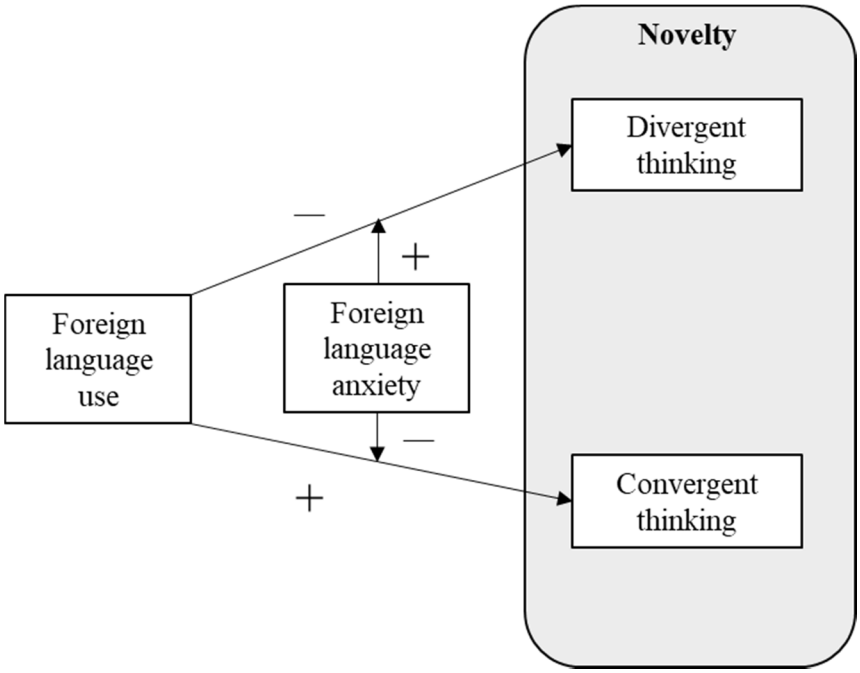


Figure I.1: Overview of central concepts in Chapter 1.

In **chapter two**—*When everyone is different, no one is? Effects of distinctiveness on performance in homogeneous and heterogeneous creative industries*—I build on work on optimal distinctiveness (Deephouse, 1999; Zhao, Fisher, Lounsbury, & Miller, 2017; Zuckerman, 2016), where the central thesis is that organizations gain the most in terms of their financial performance if they are moderately different or novel compared to others in their category. I build the argument that there is insufficient evidence for *one* such level of optimal distinctiveness, as the relative strengths of two primary driving forces of distinctiveness' effects on performance, being delegitimation and competition reduction, determine whether an inverted U-shape or a U-shape is observed. I focus on one salient contingency altering these relative strengths: heterogeneity in the positioning of the others in one's category. Results from the Dutch creative industries confirm a U-shaped effect in homogeneous categories that flattens out into a linear positive and even a weak inverted U-shaped effect as heterogeneity increases. This chapter adds to the research question of this dissertation by showing how being different from central norms (that is, being novel: McKinley et al., 1999) has widely differing effects on how this novelty is valued, contingent on the behavior of industry peers. As such, it emphasizes the need to accounting for others not just in determining what is novel, but also in evaluating the subsequent effects of novelty. Figure I.2 shows the conceptual model underlying this chapter.

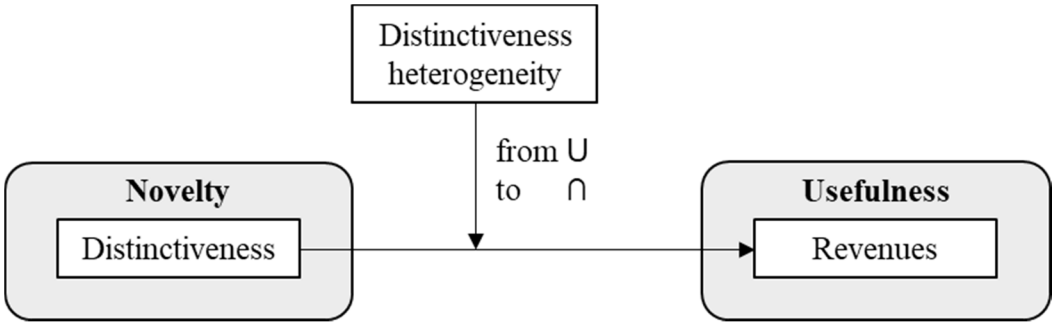


Figure I.2: Overview of central concepts in Chapter 2.

Chapter three—*Regional stickiness of novel ideas in the scholarly International Business community: A founding topic model and geographic usage regression of the Journal of International Business Studies, 1970-2015*—investigates how new topics that were introduced in the Journal of International Business Studies spread across the world in terms of articles using the topic. This chapter investigates whether novelty in the field of international business is regionally sticky or whether it sees use independent of geographic constraints. Topic founding represents an important type of novelty in academia, and results show that this novelty tends to be regionally sticky, with ideas seeing a disproportional degree of local use after their publication rather than spreading evenly across the world. Yet, these patterns also differ between regions and over time. This study therefore addresses the research question of this dissertation by showing that even similarly novel contributions see widely different use, predominantly because they emerge in a specific location of the world. Figure I.3 shows the basic model underlying this chapter; as this chapter is exploratory, no signed effects are shown in this figure.

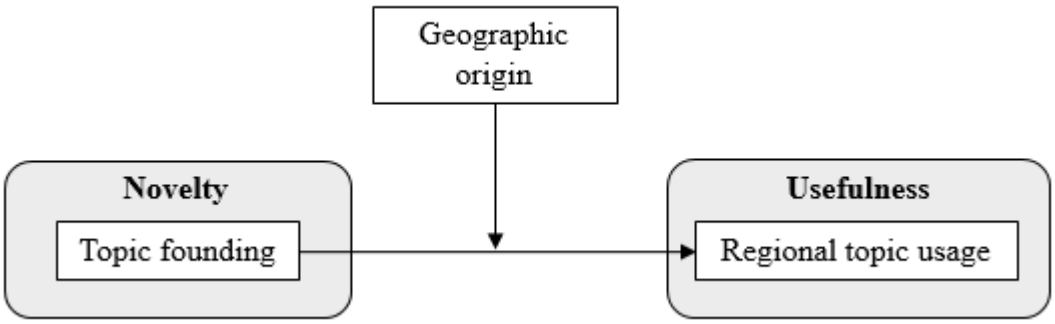


Figure I.3: Overview of central concepts in Chapter 3.

Whereas chapter three focuses only on novel articles, **chapter four**—*Does it pay to be novel in strategy research? Topic founding, topic recombination, and the role of top affiliation in achieving impact*—investigates whether there is a usefulness premium associated with novelty, more generally. In addition to investigating topic founding articles, we also theorize and test whether or not articles that recombine topics in more novel ways accrue a greater number of citations. Moreover, we reason that fellow researchers rely on author affiliation as a quality cue to decide what to read, cite, and build upon—particularly when they face novel contributions. Results combining a topic model of all articles published in the *Strategic Management Journal* between 1980 and 2010 with citation data confirm that topic founding and topic recombination both strongly increase impact for articles written by top affiliated authors, while neither raises impact for articles written by authors lacking such an affiliation. This chapter therefore shows that otherwise similarly novel contributions see significantly different use, contingent on the affiliations of their authors and confirms that, though novelty and usefulness are, on average, intertwined, this relationship is complex and deeply contingent on other factors. Figure I.4 provides an overview of the relationships between the central concepts of this chapter.

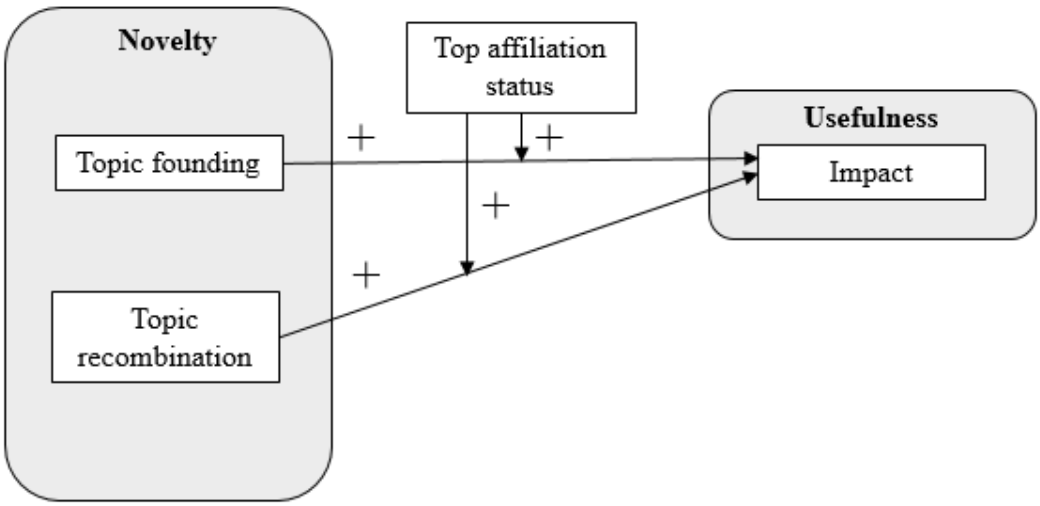


Figure I.4: Overview of central concepts in Chapter 4.

Here, it is worth briefly touching upon how each of the chapters in this dissertation fit within an important organizing perspective of creativity research: the 4P model (Rhodes, 1961). This perspective identifies four cornerstones: person, process, press, and product. Person regards "information about personality, intellect, temperament, physique, traits, habits, attitudes, self-concept, value systems, defense mechanisms, and behaviour" (p. 307); process applies to "motivation, perception, learning, thinking, and communication" (p. 308); press concerns "the relationship between human beings and their environment" (p. 308), and; product "refers to a thought which has been communicated to other people … When an idea becomes embodied into tangible form it is called a product" (p. 309).

The focal point of this dissertation is the product (I have sometimes used "offering" in previous paragraphs for the sake of generality), as it is only the product that I can observe to be novel and/or useful (see also: Plucker, Beghetto, & Dow, 2004: 91). In Chapter 1, the "product" is the observed divergent and convergent thinking behavior: the number of ideas generated (for divergent thinking) and the number of correct responses given to a convergent thinking task. In Chapter 2, it is the communication about the individual or organization and its products and services on its website. In Chapters 3 and 4, academic articles are what is produced. Nevertheless, the other three Ps play important roles in each of the chapters. For instance, the concept of foreign language anxiety from Chapter 1 is clearly related to the person, while much of the theorizing that takes place within this chapter is concerned with the learning, thinking, and communication aspects of the creative process. In Chapter 2, the introduction of distinctiveness heterogeneity implies a consideration of the relationship between the producer and her or his environment, as captured by the practices of others within one's industry and thus representing the press in the 4P model. The geographic environment plays a central role in Chapter 3, while

one's affiliative position in a status hierarchy is crucial in Chapter 4. As both capture producer characteristics (producer location and producer affiliation, respectively) and are fundamentally related to the producer's environment, both person and press are considered in these two chapters.

This dissertation advances our understanding of the two pillars of creativity: novelty and usefulness. Novelty tends to increase usefulness, but various contingencies shape this effect. This shows the need to disentangle novelty and usefulness, and has important implications for the unidimensional view of creativity: since a wide variety of contextual forces condition how much use a novel offering sees, then how sensible is it to consider only offerings that are both useful and novel as creative? Put differently, if two similarly novel contributions see widely different use largely due to differences in different moderating variable unrelated to either novelty or usefulness, can one really claim that the offering that sees widespread use is the only one that is truly creative? I return to these issues in the general discussion and conclusion of this dissertation, after having presented the different empirical chapters of this dissertation.

CHAPTER 1:

Does foreign language liberate or limit creativity?

An experimental study of foreign language use's effects on divergent and convergent thinking

ABSTRACT

This study investigates the effects of foreign language use on individuals' ability to engage in creative behavior. We expect foreign language use to hamper the ability to engage in divergent thinking and strengthen the ability to engage in convergent thinking. Because emotional responses to language differ, we explore how foreign language anxiety moderates these relationships, dampening both the negative effect on divergent thinking and the positive effect on convergent thinking. A repeated experiment in two student groups shows that foreign language anxiety strongly dampens positive effects of foreign language use on convergent thinking, even turning the effect negative at high levels of foreign language anxiety. The moderation hypothesis regarding divergent thinking is supported in one sample. These findings have implications for international business studies, creativity research, and practice.

This chapter is the result of joint work with Arjen van Witteloostuijn.

Introduction

Although English has become the dominant language in many international business environments, it is not the native language for most individuals working in these environments (Brannen, Piekkari, & Tietze, 2014; Ehrenreich, 2010). A burgeoning literature interested in this phenomenon has emerged in international business, showing far-reaching effects of foreign language use on individual behavior and organizational outcomes. For instance, operating in the English language makes non-native speakers less likely to contribute to public goods (Urbig et al., 2016) and less likely to cooperate (Akkermans, Harzing, & van Witteloostuijn, 2010), yet also reduces decision-making biases (Keysar, Hayakawa, & An, 2012). Language barriers influence multinational team members' perceived trustworthiness and intention to trust (Tenzer, Pudelko, & Harzing, 2014), while asymmetries in language fluency contribute to 'us versus them' dynamics in such teams (Hinds, Neeley, & Cramton, 2014). Language is thus a crucial factor for knowledge transfer and integration in multilingual settings (Brannen et al., 2014).

In spite of its influence on individuals and organizations alike, research has only recently started to study the intraperson effects of foreign language use (see Volk et al., 2014, for a theoretical model). In the current paper, we focus on one type of individual behavior with especially important implications for both the individual and the organization: creativity, the generation of novel and useful ideas (Amabile, 1996). We create a novel theoretical link between the dual process theories highlighted in recent research on foreign language use (Evans, 1989; Evans & Stanovich, 2013; Urbig et al., 2016; Volk et al., 2014), on the one hand, and the divergent and convergent thinking processes that jointly underpin creative behavior, on the other hand. Building on this theoretical bridge, we predict that operating in a foreign language reduces the ability to engage in divergent thinking yet increases the ability to engage in convergent

thinking behavior by lowering reliance on intuitive and automatic processes (crucial for divergent thinking) while rationalizing thinking (crucial for convergent thinking).

We enrich our theory by incorporating the effects of foreign language anxiety (Horwitz, Horwitz, & Cope, 1986) into these two causal chains. Feelings of language-related anxiety are an important emotional factor shaping behavioral responses to the use of a foreign language (Horwitz, 2000, 2001; Scovel, 1978), and we expect these feelings to attenuate both the specific benefits and downsides of foreign language use. We test our predictions using a multi-sample experimental lab design among native Dutch students on the verge of starting their professional lives. This approach enables us to get closer to causal effects through the random assignment of language (here: the native Dutch language versus English as the foreign language), minimizing endogeneity and reverse-causality concerns associated with the study of language use in the field. Our results confirm that the English language fundamentally alters individual creative behavior, and that English language anxiety plays an especially important role in this process—with its effects being especially consistent for the ability to engage in convergent thinking behavior.

Our study offers three major contributions to international business research and practice. First, we extend work interested in foreign language use by focusing on a crucial factor in knowledge *generation*, rather than the knowledge transfer or integration that has been the focus of prior studies (Kroon, Cornelissen, & Vaara, 2015; Piekkari, Vaara, Tienari, & Säntti, 2005; Welch & Welch, 2008). Focusing on creativity is particularly valuable, as this is one of the most important drivers of organizational success, and even of human society as a whole (Bilton, 2007). Our study shows that language shapes how individuals are (not) able to engage in specific

types of creative behavior due to foreign language use and, subsequently, how new knowledge may or may not be generated in when individuals have to work in non-native language settings.

Second, we provide one of the first quantitative studies in international business of language's effects on individual behavior, adding to the limited stock of prior work (see, e.g., Akkermans, Harzing, & van Witteloostuijn, 2010). Although theoretical advances have yielded important insights in this regard (Bordia & Bordia, 2015; Volk et al., 2014), we provide a step forward by establishing the causal effects of language and addressing the challenge to further illuminate this 'forgotten factor' in international business (Brannen et al., 2014; Marschan, Welch, & Welch, 1997). We extend prior work introducing a dual process framework to the study of language in international business (Volk et al., 2014) by creating a link to dual process perspectives in creativity research (Guilford, 1950, 1967; Sowden, Pringle, & Gabora, 2015). Because creativity also has direct implications for performance at higher levels, such as the team and the organization (Gong, Kim, Lee, & Zhu, 2013), this link enables us to offer a stepping stone for insights into the effects of language use on outcomes at other levels of analysis.

Third, by highlighting countervailing language effects that are moderated by individuals' foreign language anxiety, we add new understanding to the discussion on whether language standardization is preferable to individualization, where the choice of language is left to the individuals involved (Marschan-Piekkari, Welch, & Welch, 1999; Volk et al., 2014). Our findings suggest that standardization may help in some areas, yet equally harm in others—contingent on how comfortable employees feel about operating in the language. In all, we provide a deeper understanding of the effects of foreign language use on the workforce (Janssens & Steyaert, 2014; Neeley, 2013), offering guidelines that may enable firms to manage the consequences of language more effectively.

Theory and hypotheses

The dual process framework and creativity

Recent advances in international business and cross-cultural studies (Urbig et al., 2016; Volk et al., 2014) have utilized psychology's dual process theory of higher cognition as a framework to develop general theory about the effects of foreign language use on individual behavior. Dual process theory argues that there are, fundamentally, two types of thinking processes underpinning human behavior (Evans, 2008; Evans & Stanovich, 2013). On the one hand, Type 1 processes are intuitive, automatic, and autonomous in nature—yielding rapid, non-conscious decisions, and having only limited value when logical thinking is required or when multiple simultaneous stimuli need to be integrated or responded to (Kahneman, 2011). On the other hand, Type 2 processes are more reflective in nature, slow, require higher cognitive functions and mental effort, and result in controlled, conscious decisions. Each type has different behavioral consequences, and both interact and conflict with one another to yield observed human behavior (Evans, 2008; Evans & Stanovich, 2013).

Three core models of the relationship between automatic Type 1 and analytical Type 2 thinking exist (Evans, 2008): in the pre-emptive conflict resolution model, either one of the two types is theorized to be chosen at the beginning of a given task or in response to a stimulus and is subsequently not changed. However, this model is inconsistent with evidence that Type 1 thinking is never truly switched off (Kahneman, 2011). In the parallel competitive model, both types of thinking operate in parallel to produce a response, which sometimes leads to conflict or contradiction in the response that emerges from each thinking type. Probably the most dominant model, the default interventionist model, poses that Type 1 thinking continuously generates automatic responses that can be altered by Type 2 thinking if the situation calls for analytic

reasoning (though such reasoning takes costly mental effort, such that often the automatically generated response persists; Kahneman, 2011).

Historically, much work on creativity—the generation of novel and useful ideas (Amabile, 1988)—has also built on a dual process perspective, originally set out in Guilford's (1950, 1967) seminal work on the Structure of Intellect.[2] This perspective distinguishes between two types of thinking processes, which jointly result in creative behavior. Divergent thinking, the generation of multiple answers or ideas from available information, emerges from the associative application of information from the current context, analogical reasoning, and abstraction in a state of defocused attention (Gabora, 2010; Mumford, 2003). It tends to be intuitive, emotional, and even effortless in nature (Cropley, 2006; Ueda, Tominaga, Kajimura, & Nomura, 2016). On the other hand, convergent thinking (the derivation of the most correct solution to a clearly defined problem or question) requires active information acquisition, critical evaluation and refinement, logical search, and focused effort—being highly rational, analytic, and resource-intensive in nature (Cropley, 2006; Guilford, 1967). Though there is ongoing debate whether or not one of these two is more important for creativity, and whether or not these processes occur sequentially or in parallel (Cropley, 2006; Mumford, 2003), it is widely accepted that, in order to exhibit creative behavior, individuals need to not only generate multiple original responses to a problem through divergent thinking but *also* must have the ability to combine and filter these responses to come to the best answer through convergent thinking (Amabile, 1988; Guilford, 1950, 1967). In other words, both divergent thinking and convergent thinking are necessary for

[2] Other dual process models of creativity, such as the Blind-Variation-and-Selective Retention model (Campbell, 1960; Simonton, 1999, 2011), the Genoplore model (Finke, Ward, & Smith, 1992), and work on ideation-evaluation cycles (Basadur, Graen, & Green, 1982) clearly harken back to this distinction as well, with idea generation or ideation versus selective retention, idea exploration, and evaluation, respectively, corresponding to divergent thinking and convergent thinking (see also Sowden, Pringle, and Gabora, 2011).

creative behavior, although each fundamentally builds on distinct, even opposing, underlying processes.

Recent advances in the study of creativity have noted the many parallels between the two types of thinking processes highlighted in the dual process theory of higher cognition and the dual process theories of creativity (Allen & Thomas, 2011; Sowden et al., 2015). These integrative efforts have highlighted that dual process models of creativity "frequently appeal to the language of dual-process models of cognition" (Sowden et al., 2015: 43), and that "divergent thinking and convergent thinking appear to map neatly onto typical correlates of Type 1 and Type 2 processes" (Sowden et al., 2015: 44). Though a simple one-to-one mapping of the two types of processes is likely an oversimplification, as both Type 1 and Type 2 processes are likely involved to differing degrees in each stage of creative thinking (Allen & Thomas, 2011), there is nevertheless substantial evidence that each type plays a significantly more dominant or important role in one of the two types of creative thinking.

For divergent thinking, there is mounting evidence that Type 1 processes are more dominant than Type 2 processes. For example, Gabora (2010) and Martindale (1999) emphasize how divergent thinking especially comes about when items encoded in memory are combined with information from the current context in a state of defocused (that is: automatic) attention. Supporting this, Baird and colleagues (2012) show how individuals generate a greater number of ideas when their mind is allowed to wander. Similarly, preconscious experiential styles of thinking (associated with Type 1 processes) have been found to be positive related to the ability to complete divergent thinking tests, in contrast to more rational systems that maps onto Type 2 processes (Epstein, 2003; Norris & Epstein, 2011). Ueda *et al.* (2016) provide a neurological explanation for these effects, finding that individuals with higher spontaneous blink rates (related

to levels of dopamine in the brain and indicating deactivation of the attentional network and activation of a default-mode network in the brain; cf. Cohen & Servan-Schreiber, 1992; Nakano, Kato, Morito, Itoi, & Kitazawa, 2013) during the completion of a divergent thinking task generate a greater number of ideas. Although engaging in divergent thinking can certainly involve processes that are effortful and deliberate (Ward, 1994)—thus also engaging Type 2 processes (Frankish, 2010)—the above studies suggest that Type 1 processes are most conducive to and aligned with divergent thinking.

The effortful and analytic nature of convergent thinking suggests that Type 2 processes are most aligned with it. Indeed, individuals with lower spontaneous blink rates both during rest (Chermahini & Hommel, 2010) and during the completion of a convergent thinking task (Ueda et al., 2016) perform better on such tasks, indicating that more focused state of mind is required for convergent thinking. This is further supported by a study by Barr and colleagues (2015), who find that performance on a remote associates test of convergent thinking is aided by engaging Type 2 processing. Similarly, Sowden *et al.* (2015: 45) note how the identification of attributes of structures and their potential function in different contexts "is consistent with Type 2 processes alone." This idea is further supported by Ball and Stevens (2009) and Schooler, Ohlsson, and Brooks (1993), who show that convergent thinking relies heavily on working memory by requiring individuals to engage in Type 2 thinking (Sowden et al., 2015). Therefore, though Type 1 processes can potentially be sufficient when only very simple relationships need to be identified and brought together (Kahneman, 2011), more complex convergent thinking consistently seems to require the activation of conscious Type 2 processes in order to come to the best solution (Barr et al., 2015).

In sum, though it is likely that both Type 1 and Type 2 processes operate to some degree during divergent and convergent thinking (Allen & Thomas, 2011; Sowden et al., 2015), recent evidence shows that Type 1 processes are particularly aligned with divergent thinking (which gains from a more intuitive, automatic thinking style), whereas convergent thinking relies heavily on focused and effortful Type 2 processes. In the following, we build on these parallels to construct hypotheses on how foreign language use shapes individuals' ability to engage in divergent and convergent thinking by altering whether or not individuals rely on Type 1 and Type 2 processes.

Foreign language use and divergent thinking

Although, to the best of our knowledge, there is no prior research establishing foreign language usage effects on creative behavior, a rich body of work has emerged in cognitive psychology studying the effects of foreign language use on the engagement of Type 1 and Type 2 processes and on outcomes that are the result of these processes. For instance, foreign language use reduces individuals' reliance on decision-making biases (Keysar et al., 2012), indicating a reduced role of intuition in decision-making processes (see also Hadjichristidis, Geipel, & Savadori, 2015). Similarly, Harris, Ayçiçegi, and Gleason (2003) report that taboo words are experienced more vividly in native than in second languages, while Hsu, Jacobs, and Conrad (2015) show that reading emotion-laden texts in the native language provides a more emotional experience than in a second language. The leading account in this body of research is therefore that foreign language use engages emotions and intuition—and thus Type 1 processes—less than a native tongue does (see Hayakawa, Costa, Foucart, & Keysar, 2016, for a review).

Extending this line of reasoning, the use of a foreign language seems to be harmful to the ability to engage in divergent thinking. Intuition and emotion foster a brain state conducive to

divergent thinking (Ashby, Isen, & Turken, 1999; Russ & Schafer, 2006), being associated with dopamine levels in the brain (Ueda et al., 2016) and inducing a state of defocused attention (Gabora, 2010; Martindale, 1999) beneficial to divergent thinking. As foreign language use reduces the reliance on such intuitive and emotional Type 1 processes, individuals working in a foreign versus native language setting can be expected to be less able to engage in divergent thinking processes. An illustrative example of this effect in business practice is the finding by Kroon and colleagues (2015) that employees in a recently merged Dutch-French firm experienced significant reductions in their level of expressive fluency (a key aspect of divergent thinking; Guilford, 1967) after having an English lingua franca imposed upon them.

> **Hypothesis 1:** *Compared to a native language, foreign language use reduces individuals' ability to engage in divergent thinking.*

Foreign language use and convergent thinking

Regarding Type 2 thinking, the converse of the above is often theorized: foreign language use induces rational or analytical thinking. Several studies report evidence consistent with this claim, with individuals in a foreign versus native language setting being more inclined to free ride (an individually rational outcome: Urbig et al., 2016) and more likely to respond to an ethical dilemma in a rational, utilitarian manner (Costa, Foucart, Hayakawa, et al., 2014)—indicating a switch to a more deliberate thinking mode (Cipolletti, McFarlane, & Weissglass, 2016; Urbig et al., 2016). More generally, foreign language use has been shown to induce Type 2 thinking and subsequently reduce a wide variety of decision making biases that emerge from blind reliance on Type 1 processes (Kahneman, 2011) such as gain-loss asymmetries in risk preferences and hot hand effects in gambling (Costa, Foucart, Amon, Aparici, & Apesteguia, 2014; Gao, Zika, Rogers, & Thierry, 2015; Keysar et al., 2012).

In international business, Hinds, Neeley, and Cramton (2014: 546) provide evidence consistent with such a rationalization process, with informants indicating listening more carefully and being "painstakingly careful in their communication" when faced with language asymmetries—indicating that individuals were required to actively engage Type 2 processes to prevent misunderstandings emerging from miscommunication. In another study, an employee of a French high-tech company switching to English noted how he was unable to communicate in English unless he was "perfectly focused" (Neeley, Hinds, & Cramton, 2012: 237). Similarly, Kroon and colleagues (2015) report how both low and high-level speakers responded with rationalizing processes in reaction to foreign language use. Whereas the former group employed time-consuming and effortful processes of communication, the latter consciously simplified difficult, uncertain, and complex circumstances. This all suggests that foreign language use tends to move individuals towards a more rational, analytic Type 2 mode of thinking, forcing them to slow down their thought processes (Kahneman, 2011). As such a focused state of mind is conducive to successful engagement in convergent thinking (Barr et al., 2015; Chermahini & Hommel, 2010; Ueda et al., 2016), foreign language use should foster convergent thinking.

> **Hypothesis 2:** *Compared to a native language, foreign language use increases individuals' ability to engage in convergent thinking.*

It is worth noting, however, that several recent studies (Costa, Foucart, Amon, et al., 2014; Geipel, Hadjichristidis, & Surian, 2015; Hadjichristidis et al., 2015) observe no language effect on thinking tasks that require participants to suppress intuitive yet incorrect responses, challenging the idea that foreign language use induces Type 2 thinking. For instance, Takano and Noda (1993) even report a temporary decline in thinking ability during foreign language processing. These mixed findings have led some to conclude that there may be important

contingencies altering the effects of language use (Lazar, Stern, & Cohen, 2014; Turula, 2016). In the following, we turn our attention to what Lazar, Stern, and Cohen (2014: 2185) suggest to be "the main explanation" for mixed results: foreign language anxiety (see also Turula, 2016: 231).

Foreign language anxiety

Accounts of the introduction of foreign languages in business are rife with stories of language-related anxiety, stress, and unrest. For instance, Hinds and colleagues (2014) find a central recurring theme in a German multinational's introduction of English as its lingua franca to revolve around communication anxieties and frustration. Kroon et al. (2015) identify the emotional strain and anxiety resulting from English as the language of communication in a Dutch-French merger as a key theme, with one sales manager stating he has "never seen such a social unrest" (p. 789). Such language-related anxiety is observed across a variety of industries and countries (Neeley et al., 2012), and has far-reaching implications for employees, such as lowered status, morale, and interpersonal trust (Horwitz et al., 1986; Neeley, 2013; Neeley et al., 2012; Tenzer et al., 2014). Thus, a call for a greater emphasis on "the emotional and psychological impact of working under a mandated language, both for nonnative and native lingua franca speakers" has recently emerged (Neeley et al., 2012: 237).

Foreign language anxiety, "the feeling of tension and apprehension specifically associated with second language contexts" (MacIntyre & Gardner, 1994: 284), captures the essence of the emotional impact that foreign language use has on individuals and has been isolated as a key contingency for foreign language usage effects (Lazar et al., 2014; Turula, 2016). About one third of American college learners have moderate to severe levels of foreign language anxiety (Horwitz, 2000), and the potential of anxiety to interfere with behavior is "one

of the most accepted phenomena in psychology and education" (Horwitz, 2000: 256; see also MacIntyre, 1995a, 1995b; Spielberger, 1966). In spite of its widely recognized influence on individual behavior, it is nevertheless worth briefly discussing foreign language anxiety's relations to general trait anxiety and foreign language ability here, as these have been the subject of much debate within the literature (Horwitz, 2000; Sparks, Ganschow, & Javorsky, 2000).

General trait anxiety and foreign language anxiety share many characteristics—both being related to subjective feelings of tension, nervousness, and worry associated with arousal of the limbic system (the set of brain structures closely related to emotion) and the autonomic nervous system (Lamendella, 1977; Spielberger, 1983). The main difference between general trait anxiety and foreign language anxiety is that the former is typically seen as a trait, and thus a stable personality characteristic, whereas the latter is conceptualized as a situation-specific anxiety which is persistent in nature yet activated only as a response to a particular anxiety-provoking stimulus (foreign language use, cf.: MacIntyre & Gardner, 1991; Spielberger, 1983). Indeed, foreign language anxiety has been shown to only marginally correlate with or to be independent to other types of anxiety (see Horwitz, 2010, for a literature overview), such as trait-anxiety (Horwitz, 1986; MacIntyre & Gardner, 1989), fear of negative evaluation (Watson & Friend, 1969), and communication apprehension (McCroskey, 1970).

Regarding its relation to foreign language ability, the main question is whether or not ability precedes both foreign language anxiety and language-specific outcomes, or whether foreign language anxiety can occur independent of ability deficits (see Horwitz, 2000, for a more in-depth discussion of this question). While proficiency often negatively correlates with anxiety (Sparks et al., 2000), the number of people who experience foreign language anxiety appears to be far greater than the rate of language disabilities (Horwitz, 2001), and foreign language anxiety

is prevalent even amongst highly advanced and skilled language users. For instance, studies identify English language anxiety in English majors in Hungary (Tóth, 2010), Hong Kong (Mak, 2011), mainland China (Liu, 2006), and even amongst English language teachers (Horwitz, 1996). Similarly, prior work frequently identifies higher rates of foreign language anxiety amongst women, who were not less skilled than men (Bailey, 1983; Mejias, Applbaum, Applbaum, & Trotter, 1991; Price, 1991). Consistent with this, we find that women in our samples (discussed below) report higher levels of English language anxiety than men, but that the two groups do not differ in their self-reported English language ability.[3] Moreover, foreign language anxiety primarily operates through its effects on the limbic system (Lamendella, 1977; Scovel, 1978; Spielberger, 1983), which is neurally independent from the ability to communicate and "probably more important for creativity" (Flaherty, 2005: 148). Therefore, the dominant view in the literature is not that there is a unidirectional relationship between foreign language ability and foreign language anxiety, but rather that they are reciprocally related while having independent and specific effects on other outcomes (Horwitz, 2000, 2001; MacIntyre & Gardner, 1991).

Foreign language anxiety and divergent thinking

Foreign language anxiety is "clearly an emotional state" (Scovel, 1978: 134). Work on foreign language anxiety in language education shows that individuals who have high levels of anxiety related to a foreign language experience heightened levels of stress, fear, or general arousal (Horwitz, 2000, 2001; Scovel, 1978). For these individuals, operating in a foreign

[3] Two-sample *t*-tests with unequal variances show that the average English language anxiety for women (31 participants, average equals 3.50, standard error 0.18) is lower than for men (71 participants, average equals 3.11, standard error equals 0.15); $t = -1.71$, $p = 0.092$. Average values for self-reported ability equal 4.81 (s.e. 0.18) and 4.99 (s.e. 0.16) for women and men, respectively; $t = 0.75$, $p = 0.456$.

language activates the limbic system through a dopaminergic response (Lamendella, 1977; Scovel, 1978), which triggers a variety of physiological effects through the autonomic nervous system, such as sweating, increased pulse rates, and increased forearm tension (Scovel, 1978). In a business setting, Tenzer and Pudelko (2015) reveal how highly anxious individuals feel distress, mental strain, and other emotions in response to language barriers in multinational teams, and Hinds, Neeley, and Cramton (2014) similarly report how German speakers who lacked confidence in the English lingua franca of their firm became overwhelmed by this requirement, opting to remain silent at English-language meetings or switching to German to alleviate their anxiety.

This points towards a weakening of the dominant effect of language use on divergent thinking, where foreign language use engages emotions and intuition less than a native language (Hayakawa et al., 2016). In particular, foreign language anxiety stimulates individuals' limbic system when these individuals are placed in a foreign language setting (Lamendella, 1977; Scovel, 1978), the activation of which is directly related to the engagement of immediate Type 1 processes (Evans & Stanovich, 2013; McClure, Laibson, Loewenstein, & Cohen, 2004). Activation of the limbic system has been argued to operate primarily in a dopaminergic manner (Flaherty, 2005), with dopamine levels also being positively related to the ability to engage in divergent thinking (Ueda et al., 2016). As the anxiety induced by the foreign language is therefore positively related to dopaminergic activity or transitory high levels of dopamine (Mathew, Coplan, & Gorman, 2001; van der Wee et al., 2008), foreign language anxiety should increase reliance on Type 1 processes and, in turn, increase the ability to engage in divergent thinking when the more anxious individual is placed in a foreign language setting compared to a native language environment.

Hypothesis 3: *Foreign language anxiety weakens the negative foreign language use effect on the ability to engage in divergent thinking.*

Foreign language anxiety and convergent thinking

In contrast to divergent thinking, convergent thinking requires a strongly constrained search process and concentrated effort through Type 2 processes (Chermahini & Hommel, 2012; Cropley, 2006), thus demanding substantial cognitive resources and focus for successful completion (Baddeley, 2003). Although evidence points to foreign language use activating rationalization processes, we expect that foreign language anxiety attenuates these benefits by increasing dopamine levels and, subsequently, deactivating the brain's attentional network while activating reliance on default-mode Type 1 processes (Cohen & Servan-Schreiber, 1992; Nakano et al., 2013; Ueda et al., 2016). Put differently, foreign language anxiety increases the likelihood that individuals rely only on the, often wrong, intuitive insights emerging from Type 1 processes, as the inherent discomfort associated with the use of the foreign language pushes them away from critical and careful reflection (Kahneman, 2011).

Neeley, Hinds, and Cramton (2012) provide one such an account of how English language anxiety overwhelmed employees, with speaking English being especially draining for more anxious individuals. In line with this, Spielberger (1966) proposes that high anxiety leads to decrements in performance for tasks that require more cognitive resources in particular. More specifically, Soane, Schubert, Lunn, and Pollard (2015) reveal how task-related anxiety reduces the tendency to seek information relevant to the task—a process particularly important for convergent thinking (Hommel, 2012)—while low levels of task-related anxiety actually stimulated information seeking. Other experimental evidence shows that anxiety results in a lowered ability to filter out irrelevant stimuli for the task at hand, but only under conditions of

significant mental load (Wood, Mathews, & Dalgleish, 2001). Because convergent thinking requires both focusing on relevant and excluding irrelevant information (Chermahini & Hommel, 2012), foreign language anxiety should therefore hamper the ability to engage the Type 2 processes crucial for convergent thinking when a more anxious individual needs to use the foreign language.

> **Hypothesis 4:** *Foreign language anxiety weakens the positive foreign language use effect on the ability to engage in convergent thinking.*

Data and methods

Experimental approach

We conducted lab experiments among Dutch undergraduate students in order to study our research question, an approach which has been dubbed the "gold standard for evidence" regarding causal effects, also in the international business literature (e.g., van Witteloostuijn, 2015; Zellmer-Bruhn, Caligiuri, & Thomas, 2016: 400). Several considerations drive this choice. First, studying the effect of language in the field is problematic because of reverse causality and endogeneity concerns. Not only do managers have economic incentives to allocate employees to language in a non-random way, but employees also likely self-select into multilingual firms based on comfort with different languages (Bordia & Bordia, 2015). Moreover, foreign language is often introduced in a standardized manner (e.g., Kroon et al., 2015; Marschan-Piekkari et al., 1999) such that all employees tend to be 'treated', in an experimental sense, by the language condition.

Our choice for a student sample was driven by our interest in fundamental human processes (i.e., language and its effects on individual creativity, moderated by foreign language

anxiety), rather than proximate considerations (Bello, Leung, Radebaugh, Tung, & van Witteloostuijn, 2009; van Witteloostuijn, 2015). Indeed, the study of language was recently isolated as a prime candidate for experimental international business work using student samples (Akkermans et al., 2010; see also Bello et al., 2009: 362). Our research question also favors students samples over employees for economic and practical considerations, as students are more homogeneous in their language qualifications, age, and human capital while being more accessible as subjects (Bello et al., 2009; Zellmer-Bruhn et al., 2016). In addition, student samples are very common in the (experimental) study of creativity (e.g., Chermahini & Hommel, 2010; Lee, Huggins, & Therriault, 2014; Ueda et al., 2016), foreign language use effects (Akkermans et al., 2010; Costa, Foucart, Hayakawa, et al., 2014; Hayakawa et al., 2016; Urbig et al., 2016), and foreign language anxiety (Gargalianou, Muehlfeld, Urbig, & van Witteloostuijn, 2016; Liu, 2006; Tóth, 2010; Young, 1990).

The key question is "whether the results found from a given sample can generalize to the broader population" (Zellmer-Bruhn et al., 2016: 400; see also Bello et al., 2009). We propose that the answer to this question is in the affirmative, as these students are only a few years removed from skilled, knowledge-based work. Not only will many be exposed to foreign language settings and a need to be creative, given their educational qualifications, but their linguistic and creative skills will also likely not change dramatically as they have already entered adulthood (Feist & Barron, 2003; Hahne, 2001). Thus, these students offer a reasonable sample of future employees who could soon be faced with the use of a foreign language in the performance of creative tasks.

Sample and experimental design

We conducted our experiment in two distinct student samples: undergraduate Business Economics students, and undergraduate Public Administration students. All students have the Dutch nationality, and both programs take place in Dutch, although some parts of the programs use English textbooks or academic articles. These samples enable us to study individuals who have affinity with the English language yet who did not self-select into an English-dominated program. The highly diverse nature of the programs simultaneously fosters the generalizability of our results. Both experiments were completed during the 2015-2016 academic year as part of the groups' coursework.

The key experimental requirement—random assignment to treatments—is introduced in both groups. However, teaching-related practical necessities changed the exact experimental set-up in each group. Table 1.1 summarizes these differences and commonalities. In terms of commonalities, to separate the measurement of control variables and our moderating variable, both groups completed a questionnaire one week before the experiment. By default, this questionnaire was presented in Dutch, but students were given the option to switch to English at any point if so desired. During the experiment, both groups first completed a convergent and then a divergent thinking task on a computer. Both were given 15 and 20 minutes, respectively, to ensure that students could comfortably complete the tasks (compare, for example, with Chermahini & Hommel, 2012, who provide five minutes for a 30-item convergent thinking task). The treatment language was always English, selected given students' affinity with the English language (Akkermans et al., 2010), combined with the role of English as the dominant language in international business (Brannen et al., 2014; Neeley, 2013).

Table 1.1: Experimental design

	Student group 1	**Student group 2**
Origin	Dutch	Dutch
Stage	Undergraduate	Undergraduate
Pre-experimental questionnaire	One week before	One week before
Sequence	Convergent, Divergent	Convergent, Divergent
Platform	Computer	Computer
Time for convergent thinking	15 minutes	15 minutes
Time for divergent thinking	20 minutes	20 minutes
Treatment language	English	English
Study	Business Economics	Public Administration
Treatment	Within-group	Between-group
Break	Yes	No
Randomization	Twice	Once
Number of students	62	40

Each group differed in their program specialization. In addition, a key difference was that Business Economics was located in a single room due to space restrictions, resulting in the language treatment being assigned using a random number generator across students located in the same room. Another complication emerged from the fact that, due to course design, Business Economics required a fifteen-minute break in between the two tasks—meaning that students logged out of their computer and resulting in treatments being assigned anew for each thinking task in Business Economics. This double randomization therefore implies that the number of students placed in the English language condition differs between the two tasks, as the same student may be placed in one language for one task and another for the other, based on the result of the random number generator. In contrast, the language treatment was physically separated across two rooms for Public Administration: students were randomly sent to one of the two rooms as they entered the main building, with no knowledge of what would take place in each of the two rooms. The instructor assigning the students to each room did not have any information about the students entering the building, resulting in double-blind assignment. Public

Administration completed each task directly in sequence, meaning that the language setting was assigned once for Public Administration and leading to identical language group sizes for the two tasks in this sample.

Given these commonalities and differences, the set-up for the experiment was as follows. Students entered the laboratory, where they were seated at computers. Instructions in the relevant language warned that interaction was forbidden and that communication with others would result in removal. Students were instructed simply to complete each task, with the incentive being a report showing how the student performed on each task. No financial incentive was offered, as such incentives may be counter-productive to creativity (Erat & Gneezy, 2016), although participation in the session was required for monetary rewards in future, unrelated, experiments. The students completed the tasks, after which they could leave the laboratory. In total, 62 students from Business Economics and 40 students from Public Administration completed both the questionnaire and the experiment.

Measures

For *divergent thinking*, students completed the Alternate Uses Task (Guilford, 1967), which asks participants to find as many as six alternative uses for common objects and which is perhaps the most frequently applied test of creativity (Arden, Chavez, Grazioplene, & Jung, 2010). This task has been shown to capture one's ability for spontaneous flexibility (as opposed to *adaptive* flexibility, required for problem solving), and is related to the facility to produce a large quantity of alternative ideas (Guilford, 1967). Students completed Alternate Uses Form B, which requests responses for the following items, with the example common use being shown as well: shoe (used as footwear); button (used to fasten things); key (used to open a lock); wooden pencil (used for writing); automobile tire (used on the wheel of an automobile); and eyeglasses

(used to improve vision). We obtained approval for the use of this task from the copyright holders (Mind Garden), and received detailed instructions for the scoring of the responses. The first author translated the instructions and the six items to Dutch (schoen [gebruikt als schoeisel]; knoopje [gebruikt om dingen vast te maken]; sleutel [gebruikt om een slot te openen]; houten potlood [gebruikt om te schrijven]; autoband [gebruikt als wiel van een auto]; and bril [gebruikt om het zicht te verbeteren]), and reached a translation agreement with Mind Garden, confirming the right to use this translation in the study.

Following the official manual, students were first presented the example of a newspaper (used for reading), for which six other uses might be considered (starting a fire; wrapping garbage; swatting flies; stuffing to pack boxes; line drawers of shelves; making up a kidnap note). It was highlighted that uses which were not different from one another or the primary use would not count. Following the official instructions, students were recommended not to spend too much time on any one item but rather to write down those uses that occur to them naturally (thus promoting a reliance on Type 1 processes rather than Type 2 processes). Following standard practice in the study of divergent thinking (e.g., Barr et al., 2015; Chermahini & Hommel, 2012; Ueda et al., 2016), individuals are seen as engaging in divergent thinking behavior the greater the total generated number of acceptable uses for which the object or parts of the object could serve.

The first author and another researcher unrelated to this project evaluated each response as acceptable by closely following official guidelines, meaning that the use should be possible for the object (e.g., an automobile tire cannot be used as a ring for the finger); that duplicate uses do not count; that vague or very general uses do not count; and that a use pertaining to any conceivable interpretation of the object is acceptable (e.g., a button can also serve as a symbol

for a campaign). Inter-rater agreement was 89.22%, indicating very good agreement (Altman, 1991), and the coders' scores correlate at 0.999—confirming only minor disagreement. There were eleven cases of disagreement (typically related to what constituted too vague or general a use), although in all cases the total score only differed by one. These minor disagreements were resolved through mutual discussion, yielding the final score.

Engagement in *convergent thinking* was measured as the number of correct responses to a Remote Associates Test (also sometimes referred to as the Remote Associations Task; Chermahini & Hommel, 2012; Mednick, 1962; Ueda et al., 2016). Mednick (1962: 221) considered the process of creative thinking to consist of "forming associative elements into new combinations which either meet specific requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution." The RAT was designed to specifically capture this ability, as participants are presented with three unrelated words that hold independent connections with a fourth word. Participants are instructed to find this single correct word, the ability to do so being linked to the identification of semantically distant associations rather than more conventional connections.

As this task requires the respondent to identify a common thread among three distinct stimuli, it is complex enough that Type 2 processes are systematically required to go beyond initial insights emerging from pairwise associations (though sometimes initial insights may yield the correct answer, cf.: Kahneman, 2011; Mednick, 1962).[4] The RAT has seen widespread use as a tool for measuring convergent thinking behavior, with a recent meta-analysis showing that it is the second-most used standardized test in studies linking creativity and neuroimaging (following

[4] For example, an initial solution emerging from Type 1 processes for the triplet "hound", "pressure", and "shot" could be "hunt" (having an association with both "hound", who retrieves killed prey, and "shot"). Yet, rational evaluation subsequently shows that "pressure" has no association with this word, requiring further focused effort to get to a solution.

the Alternate Uses Task, cf.: Arden et al., 2010). Though it has also seen use as a tool to measure a broad range of cognitive abilities, recent psychometric work has confirmed the RAT to first and foremost capture analytical and convergent thinking—distinct from traditional divergent thinking tests of creativity or measures of intelligence (Lee et al., 2014).

We selected 31 problems that corresponded one-to-one with a Dutch translation in the three words, the solution word, and the associative pattern. These were translated by the first author and an unrelated researcher in isolation, who also back-translated and compared the items. The second author completed the tasks in both languages to ensure correspondence between the original and translated versions. Table 1.2 contains the items and their translation. To assess the extent to which mistranslation and differences in the nature of the task in each language potentially affect our results, we compared reliabilities in the English language group (Cronbach's alpha of 0.85; 43 total observations) and the Dutch language group (Cronbach's alpha of 0.76; 59 total observations). A test comparing these two values (Feldt, Woodruff, & Salih, 1987) does not reject the null hypothesis that they are equal (χ-squared[1] = 2.246, p = 0.1340), suggesting that the translation is equally reliable. We reach the same conclusion when comparing Cronbach's alphas within each of the two samples, available upon request. Simple *t*-tests comparing the number of correct answers, the number of attempted answers, and the number of wrong answers both in a combined sample and within each sample all fail to reject the null hypothesis that the two language settings have the same average values for these three variables.[5] Finally, for each item we observe at least one correct answer in both the original English version and the translated Dutch version, implying that no one item was impossible to

[5] For the combined sample: $[M_{EN_{correct}} = 8.77, s.e. = 0.83; M_{NL_{correct}} = 7.63, s.e. = 0.56; t = -1.18, p = 0.243]$; $[M_{EN_{attempts}} = 18.81, s.e. = 1.26; M_{NL_{attempts}} = 18.24, s.e. = 1.01; t = -0.36, p = 0.719]$; $[M_{EN_{wrong}} = 10.04, s.e. = 1.10; M_{NL_{wrong}} = 10.61, s.e. = 0.92; t = 0.39, p = 0.694]$; comparisons within each sample are available upon request.

answer in either language. Overall, therefore, the Dutch translation of the convergent thinking task appears to have been of acceptable quality.

Table 1.2: Translated remote associates test

English			Answer	Dutch			Answer
worm	shelf	end	book	worm	plank	steun	boek
hound	pressure	shot	blood	hond	druk	prik	bloed
rope	truck	line	tow	touw	wagen	lijn	sleep
noise	collar	wash	white	ruis	kraag	wassen	wit
cadet	capsule	ship	space	kadet	capsule	schip	ruimte
sleeping	bean	trash	bag	slaap	bonen	vuilnis	zak
chamber	mask	natural	gas	kamer	masker	natuurljjk	gas
main	sweeper	light	street	hoofd	veger	verlichting	straat
force	line	mail	air	macht	vaart	post	lucht
carpet	alert	ink	red	loper	alarm	inkt	rood
master	toss	finger	ring	meester	werpen	vinger	ring
man	glue	star	super	man	lijm	ster	super
break	bean	cake	coffee	pauze	boon	broodje	koffie
cry	front	ship	battle	kreet	front	schip	slag
coin	quick	spoon	silver	munt	kwik	lepel	zilver
manners	round	tennis	table	manieren	ronde	tennis	tafel
room	blood	salts	bath	kamer	bloed	zout	bad
salt	deep	foam	sea	zout	diep	schuim	zee
water	tobacco	stove	pipe	water	tabak	kachel	pijp
pure	blue	fall	water	puur	blauw	val	water
strap	pocket	time	watch	band	zak	tijd	horloge
mouse	sharp	blue	cheese	muis	pittig	blauw	kaas
house	blanket	ball	beach	huis	laken	bal	strand
spin	tip	shape	top	spin	tip	shape	top
call	pay	line	phone	gesprek	cel	lijn	telefoon
stalk	trainer	king	lion	sluipjacht	trainer	koning	leeuw
blank	white	lines	paper	leeg	wit	gelinieerd	papier
thread	pine	pain	needle	draad	den	pijn	naald
envy	golf	beans	green	jaloezie	golf	bonen	groen
big	leaf	shadow	tree	hoog	blad	schaduw	boom
sandwich	golf	foot	club	sandwich	golf	voetbal	club

Our key experimental variable, *English language treatment*, takes on the value one if the respondent was allocated to the English language condition, and zero if the respondent was assigned to the Dutch native language condition. As noted earlier, because random allocation occurred for each of the two thinking tasks for the Business Economics group, there are two

treatment variables for this group, whereas there is only one treatment applied to the Public Administration group.

Our moderating variable, *foreign language anxiety*, was adopted from Gargalianou, Muehlfeld, Urbig, and van Witteloostuijn (2016), who developed a short-form scale for professional contexts building on the classic Horwitz, Horwitz, and Cope (1986) foreign language classroom anxiety scale. There are ten items, with the respondent being asked to first imagine participation in an important meeting taking place in English and indicating (dis)agreement on a seven-point scale with statements such as "I am afraid that many people will laugh at me when I speak English." The scale is highly reliable and valid (Gargalianou et al., 2016), also confirmed by a Cronbach's alpha of 0.88 and 0.95 in our Business Economics and Public Administration samples, respectively. We opted to adhere to the original scale's focus on a speaking setting, as prior work shows foreign language anxiety to be most vivid in anticipation of and during foreign language speaking (Cheng, Horwitz, & Schallert, 1999; Mak, 2011; Young, 1990), thus increasing the chance that the scale indeed taps into foreign language anxiety. Though neither creativity task required participants to speak, writing in a foreign language has been shown to yield similar behavioral responses and levels of experienced anxiety to speaking, compared to a task such as reading (Argaman & Abu-Rabia, 2002). Moreover, if the tasks at hand trigger foreign language anxiety less strongly, this would likely dampen any anxiety-related effects. Our measure is the average score across the ten items, with responses obtained through the pre-experimental questionnaire.[6] This score is interacted with the treatment to test for moderation.

[6] We average scores rather than modeling measurement error using structural equations modeling, as we do not have sufficient degrees of freedom to estimate both item-level errors and control variables, especially with interactions between foreign language anxiety and treatment effects.

We control for several variables to more precisely isolate the language effects. All controls are from the pre-experimental questionnaire. First, we include *English reading frequency* (how often the respondent reads English media: 1 = once a month or less; 2 = once per week; 3 = several times per week; 4 = daily), as individuals more exposed to English media may have a greater English vocabulary. To control for cultural accommodation effects (Akkermans et al., 2010), we add the extent to which the respondent feels *cultural overlap* with each language, where a value of one indicates complete isolation and seven complete overlap. We also control for *English learning age* (1 = never; 2 = from birth; 3 = zero to five years old; 4 = six to ten years old; 5 = eleven to sixteen years old; and 6 = seventeen or up; all students in our sample have values between three and five for this variable), and for three capability-related variables to ensure that we isolate anxiety's effects from general skill-based effects. We include self-reported *English ability* (1 = very poor to 7 = excellent) in both sets of analyses. Self-assessed *divergent thinking skill* is added in the divergent thinking equation only, captured by asking the respondent to compare oneself to fellow students in the ability to imagine different ways of thinking and doing (1 = much worse through 7 = much better). Similarly, *convergent thinking skill* is included in the convergent thinking equation, captured by the extent to which the respondent agrees with the statement that "I am able to see relationships between seemingly diverse bits of information" (1 = strongly disagree through 7 = strongly agree).[7]

We control for whether or not the respondent's *mother* and/or *father* is of non-Dutch origin, whether or not the respondent is *female*, and the respondent's *age*. We also control for

[7] Keeping these variables isolated in their respective equation prevents the seemingly unrelated regression from being equivalent to an equation-by-equation model where there would be no gain in estimating the system jointly. We also find that neither variable has an effect on the other performance outcome when included: divergent thinking skill never affects convergent thinking performance, nor does convergent thinking skill affect divergent thinking performance.

whether or not the respondent is *religious*, as religiosity has been shown to be an important predictor of creative achievement (Berry, 1981, 1999; Datta, 1967). Because more religious individuals tend to also be more sensitive to anxiety (Dollinger, 2007), it is important to control for religiosity to ensure it does not confound anxiety-related effects (Dollinger, 2007: 1031). For this variable, we asked students to indicate their religious background (Catholic [37 total respondents]; Protestant [13], Islamic [7], No religion [44], and Other [1 Adventist]). To conserve degrees of freedom, we combined all religions into one category, with 'No religion' being the baseline. Finally, we include a variable capturing *entrepreneurial intent* (1 = very unlikely through 7 = very likely) to control for potential motivational differences between the two samples.

Estimation approach

We estimate our models using seemingly unrelated regression (Cameron & Trivedi, 2010; Zellner, 1962), as we have two linear equations (one for divergent and one for convergent thinking) that are likely to be inherently correlated with one another (e.g., Cropley, 2006). Seemingly unrelated regression explicitly models this possibility by estimating a cross-equation correlation, enabling more efficient estimates than running two separate ordinary least squares regression (Cameron & Trivedi, 2010; Zellner, 1962).

Seemingly unrelated regression is highly suitable for our relatively small sample sizes, having desirable small sample properties over ordinary least squares regression especially when the correlation between the two disturbances is high and when the explanatory variables are relatively correlated—as is the case in both our samples—and even under various misspecifications (Kmenta & Gilbert, 1968). Nevertheless, we additionally account for the small-sample nature of our data in two ways (Zellner, 1962; Zellner & Huang, 1962): first, we report

small-sample statistics, which shifts the test statistics for the coefficient estimates from *z*-statistics to *t*-statistics (the degrees of freedom becoming $n * 2 - k_i - k_j - 2$), where *n* equals the number of observations in the sample and k_i and k_j are the number of parameters in the two equations *i* and *j*, respectively. Second, we take the divisor in computing the covariance matrix for the equation residuals to be $\sqrt{(n-k_i)(n-k_j)}$, rather than the usual *n*. While the first correction only affects *p*-values (not the coefficient estimates nor their standard errors) by shifting the test statistic, the second correction does affect the standard errors. Taken together, the corrections substantially increase all reported *p*-values. For example, without these adjustments we observe a significant and negative effect of English language use on divergent thinking in the Public Administration sample (coefficient equals -3.92, s.e. equals 2.35, *z*-statistic equals -1.67, $p = 0.095$). After our correction, this effect is no longer significant (coefficient equals -3.92, s.e. equals 2.98, *t*-statistic[50 d.f.] equals -1.32, $p = 0.193$). As such, these adjustments decrease the likelihood that our reported results represent false-positives.

To ensure that our reported results are not emerging solely from our use of the seemingly unrelated regression approach, we also ran our models as a path model where we estimate the covariance between the errors of the two equations; as two separate linear regression models (thus without estimating a cross-equation correlation); and as two separate Poisson regression models (as both outcome variables are of a count nature, suggesting that a Poisson model may be better suited). All results (shown in Appendix A) are consistent with those reported below in both effect size and levels of significance, with the exception being that the interaction between the English language treatment and English language anxiety on divergent thinking in the Public Administration group becomes insignificant ($p = 0.107$) when estimating two separate linear regression models. This minor change in significance may be the result of the lower efficiency of

OLS regression vis-à-vis the seemingly unrelated regression approach (Zellner, 1962). As we find substantially lower *p*-values for the remaining coefficients in these alternative models, we focus on the generally more conservative results of the seemingly unrelated regression models.

Results

Table 1.3 contains descriptive statistics. In Business Economics, 50 percent were randomly allocated into the English treatment for the divergent thinking task, and 34 percent for the convergent thinking task (this difference emerging from the double randomization that took place in this group, discussed above). In Public Administration, 55 percent were allocated to the English treatment. Two-sample *t*-tests and tests of proportions show that the Business Economics group has lower values for the convergent thinking task, compared to the Public Administration group ($M_{BE} = 7.03, s.e. = 0.90; M_{PA} = 9.78, s.e. = 0.50; t = 2.88, p = 0.005$), that the Business Economics group has marginally lower levels of English language anxiety ($M_{BE} = 3.06, s.e. = 0.13; M_{PA} = 3.49, s.e. = 0.22; t = 1.77, p = 0.080$)[8], that the Business Economics group is younger ($M_{BE} = 19.44, s.e. = 0.34; M_{PA} = 20.98, s.e. = 0.24; t = 3.33, p = 0.001$), and on average has higher entrepreneurial intent ($M_{BE} = 3.69, s.e. = 0.20; M_{PA} = 3.03, s.e. = 0.26; t = -2.05, p = 0.05$). No other differences are statistically observable.

Within the two samples, comparing students assigned to the English language with those in the native language shows the following differences. In Business Economics, those allocated to the English language setting for the convergent thinking task read English more often ($M_{EN} = 3.76, s.e. = 0.14; M_{NL} = 3.34, s.e. = 0.15; t = -1.85, p = 0.069$), feel a greater cultural

[8] It is worth noting the two groups do not differ in their self-reported English language ability: $M_{BE} = 4.97, s.e. = 0.13; M_{PA} = 4.88, s.e. = 0.25; t = -0.36, p = 0.719$, which is in line with the idea that anxiety and ability are separate constructs.

Table 1.3: Descriptive statistics

		Business Economics		*Public Administration*							
		Mean	**S.D.**	**Mean**	**S.D.**	(1)	(2)	(3)	(4)	(5)	(6)
(1)	Divergent thinking	13.35	6.29	15.10	7.02		-0.09	-0.02	0.03	n.a.	n.a.
(2)	Convergent thinking	7.03	3.93	9.78	5.66	0.28		0.09	-0.06	n.a.	n.a.
(3)	EN Treatment[1]	0.50	0.50	0.55	0.50	-0.09	-0.02		0.87	n.a.	n.a.
(4)	EN Treatment[1]*EN Anxiety	1.54	1.71	1.66	1.74	-0.15	-0.04	0.91		n.a.	n.a.
(5)	EN Treatment[2]	0.34	0.48	n.a.	n.a.	-0.00	0.04	-0.03	-0.01		n.a.
(6)	EN Treatment[2]*EN Anxiety	1.03	1.59	n.a.	n.a.	-0.06	-0.05	-0.01	0.10	0.92	
(7)	EN Anxiety	3.06	1.01	3.49	1.38	-0.08	-0.17	0.02	0.31	-0.01	0.24
(8)	EN Reading frequency	3.48	0.86	3.27	1.06	0.13	0.22	0.08	-0.02	0.23	0.15
(9)	EN Cultural overlap	3.76	1.17	3.80	1.22	0.09	0.14	-0.13	-0.22	0.27	0.18
(10)	NL Cultural overlap	5.21	1.29	5.58	1.03	-0.05	-0.03	-0.14	-0.08	0.10	0.07
(11)	EN Learning age	4.55	0.62	4.60	0.50	-0.19	-0.15	0.16	0.26	-0.25	-0.07
(12)	EN Ability	4.97	1.04	4.88	1.56	0.13	0.24	-0.13	-0.27	0.19	0.04
(13)	Divergent skill	4.60	0.95	4.88	0.91	0.23	0.07	0.19	0.12	0.02	-0.02
(14)	Convergent skill	4.73	1.03	4.78	1.00	0.06	0.04	-0.05	-0.13	-0.11	-0.21
(15)	Foreign mother	0.13	0.34	0.07	0.27	-0.03	-0.13	-0.10	-0.11	0.03	-0.05
(16)	Foreign father	0.15	0.36	0.10	0.30	-0.01	-0.13	0.05	-0.01	-0.00	-0.09
(17)	Female	0.32	0.47	0.28	0.45	-0.07	0.03	0.07	0.16	-0.13	-0.13
(18)	Age	19.44	2.66	20.98	1.51	-0.09	0.17	-0.15	-0.16	-0.01	-0.08
(19)	Religious	0.60	0.49	0.53	0.51	0.20	-0.24	-0.03	-0.02	-0.18	-0.19
(20)	Entrepreneurial intent	3.69	1.57	3.02	1.66	0.19	0.14	-0.09	-0.17	0.12	-0.02

	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1)	-0.16	0.09	-0.01	0.15	-0.11	0.20	0.29	0.15	-0.36	-0.36	0.19	-0.12	0.07	-0.13
(2)	-0.08	0.12	0.03	0.24	-0.03	0.04	0.02	0.20	-0.19	-0.03	-0.19	-0.06	0.17	-0.11
(3)	-0.37	0.19	0.14	0.16	-0.23	0.38	-0.18	0.30	-0.31	-0.37	-0.23	0.19	-0.06	-0.32
(4)	-0.03	0.06	-0.12	0.07	0.00	0.16	-0.28	0.03	-0.28	-0.32	-0.14	0.10	-0.09	-0.25
(5)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(6)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(7)		-0.47	-0.42	-0.22	0.59	-0.80	-0.34	-0.56	0.11	-0.05	0.16	-0.18	0.09	0.21
(8)	-0.32		0.14	-0.10	-0.32	0.46	0.04	0.18	0.02	0.07	0.21	-0.08	-0.18	-0.31
(9)	-0.33	0.18		0.50	-0.35	0.46	-0.07	0.23	-0.19	-0.15	-0.18	0.02	-0.03	0.10
(10)	0.13	-0.21	0.43		-0.09	0.09	-0.14	0.03	-0.35	-0.11	-0.35	0.11	-0.00	0.07
(11)	0.47	-0.29	-0.36	0.16		-0.50	-0.11	-0.29	0.23	-0.07	0.16	-0.29	0.25	0.32
(12)	-0.64	0.42	0.34	-0.15	-0.58		0.21	0.44	-0.10	0.08	0.09	0.02	0.02	-0.08
(13)	-0.03	0.18	0.32	0.02	-0.26	0.14		0.22	0.04	0.23	-0.10	-0.06	0.09	-0.24
(14)	-0.18	0.17	0.15	-0.24	-0.38	0.13	0.22		-0.22	-0.18	-0.14	0.13	-0.06	0.02
(15)	-0.11	0.18	0.12	-0.10	-0.11	0.01	0.16	0.39		0.54	0.25	-0.06	0.27	-0.00
(16)	-0.10	0.19	-0.03	-0.21	-0.22	-0.08	0.27	0.43	0.80		-0.02	0.06	-0.02	0.15
(17)	0.17	-0.23	-0.06	0.13	0.17	-0.21	0.00	0.02	0.15	0.21		-0.21	0.14	-0.04
(18)	-0.12	0.09	0.10	-0.11	-0.21	0.11	0.14	0.28	0.56	0.56	0.20		0.08	-0.17
(19)	-0.00	-0.11	-0.20	0.01	0.20	-0.12	-0.04	-0.03	0.22	0.25	0.29	0.10		-0.11
(20)	-0.15	0.15	0.17	-0.14	-0.31	0.20	0.17	0.44	0.32	0.23	-0.09	0.35	-0.20	

Notes: 1) Divergent thinking treatment for Business Economics. 2) Convergent thinking treatment for Business Economics. Sample size: 62 Business Economics students and 40 Public Administration students. Bottom-left diagonal contains correlations for Business Economics; top-right diagonal for Public Administration.

overlap with English ($M_{EN} = 4.19, s.e. = 0.24; M_{NL} = 3.54, s.e. = 0.18; t = -2.15, p = 0.036$), and learned English at a younger age ($M_{EN} = 4.33, s.e. = 0.14; M_{NL} = 4.66, s.e. = 0.09; t = 2.01, p = 0.049$). There are no statistically significant differences comparing those allocated to the English versus Dutch language setting for the divergent thinking task in this sample. In Public Administration, those assigned to the English language setting have lower levels of English language anxiety ($M_{EN} = 3.02, s.e. = 0.24; M_{NL} = 4.05, s.e. = 0.35; t = 2.48, p = 0.018$), higher self-reported English language ability ($M_{EN} = 5.41, s.e. = 0.26; M_{NL} = 4.22, s.e. = 0.40; t = -2.57, p = 0.014$), higher confidence in their convergent thinking skills ($M_{EN} = 5.05, s.e. = 0.19; M_{NL} = 4.44, s.e. = 0.25; t = -1.96, p = 0.057$), are less likely to have a foreign mother ($M_{EN} = 0, s.e. = 0; M_{NL} = 0.17, s.e. = 0.09; z = 1.99\ p = 0.047$) or father ($M_{EN} = 0, s.e. = 0; M_{NL} = 0.22, s.e. = 0.10; z = 2.33, p = 0.020$), and have lower entrepreneurial intent ($M_{EN} = 3.61, s.e. = 0.33; M_{NL} = 2.55, s.e. = 0.36; t = 2.11, p = 0.041$).

Considered jointly, it appears that there are limited differences between the two samples, but that the randomization process for the Public Administration was less successful. This implies that our results for the Public Administration group need to be interpreted with caution, as we may have been unable to randomize away potential unobserved confounding variables. At the same time, because no single variable was found to differ between the English and Dutch language groups in each of the samples and because the two samples are not markedly different (the major difference for our purposes being the lower English language anxiety for the Business Economics group), we can be more confident in the veracity of effects that replicate in both samples.

Several correlations are high in absolute size (particularly between English language anxiety and self-reported English language ability). Although seemingly unrelated regression is favorable compared to ordinary least squares regression when the explanatory variables are relatively correlated (Kmenta & Gilbert, 1968), we nevertheless ran models containing main effects to calculate variation inflation factors (VIF). We find acceptable values for all variables (the highest value is 5.52 for English language ability, which is well under the threshold of ten indicating high multicollinearity, though still indicative of non-negligible collinearity between the explanatory variables; Kutner, Nachtsheim, & Neter, 2004). Including interactions between the treatment variables and English language anxiety only increases VIFs for the components of this interaction, but not for English language ability.

Table 1.4 and Table 1.5 contain the results of the regression models for the Business Economics sample and the Public Administration sample, respectively. Model 0 represents a baseline model with control variables. Interestingly, divergent and convergent thinking are positively correlated in Business Economics, yet negatively correlated in Public Administration. For Business Economics, only religiosity and entrepreneurial intent (positively) predict divergent thinking, while only age predicts convergent thinking. Religiosity has a particularly strong effect on divergent thinking in this group, with religious individuals generating an average five ideas more than those without a religion. This therefore provides some evidence in line with the claim that religious individuals can find "inspiration for their creativity in their religion" (Dollinger, 2007: 1032). For Public Administration, English cultural overlap is negatively and Dutch cultural overlap positively related with divergent thinking behavior, while those with greater faith in their divergent thinking skills also generate more ideas. Those with a foreign father score much lower on the divergent thinking task. Jointly, these latter three results seem to suggest that, on average,

Table 1.4: Results of seemingly unrelated regression models: Business Economics

	Model 0		Model 1		Model 2	
	Div.	*Conv.*	*Div.*	*Conv.*	*Div.*	*Conv.*
EN Treatment			-1.50	0.01	5.15	5.62
			(1.63)	(1.11)	(5.19)	(3.47)
EN Treatment					-2.11	-1.84^{+}
* EN Anxiety					(1.56)	(1.08)
EN Anxiety	0.32	-0.38	0.18	-0.38	1.33	0.41
	(1.09)	(0.67)	(1.10)	(0.69)	(1.39)	(0.81)
EN Reading frequency	0.80	1.06	0.88	1.06	0.96	1.03
	(1.09)	(0.68)	(1.10)	(0.70)	(1.10)	(0.68)
EN Cultural overlap	0.23	0.02	0.20	0.01	0.10	0.29
	(1.01)	(0.60)	(1.01)	(0.62)	(1.02)	(0.63)
NL Cultural overlap	-0.23	-0.01	-0.31	-0.00	-0.28	-0.28
	(0.79)	(0.50)	(0.80)	(0.51)	(0.80)	(0.52)
EN Learning age	-2.13	0.19	-1.78	0.20	-2.26	0.66
	(1.89)	(1.20)	(1.93)	(1.24)	(1.97)	(1.24)
EN Ability	-0.33	0.14	-0.41	0.14	-0.33	0.30
	(1.26)	(0.79)	(1.26)	(0.79)	(1.27)	(0.78)
Divergent skill	1.15		1.35		1.23	
	(0.90)		(0.93)		(0.94)	
Convergent skill		0.27		0.28		0.22
		(0.56)		(0.59)		(0.58)
Foreign mother	-1.38	-2.33	-1.96	-2.34	-0.85	-2.44
	(4.50)	(2.77)	(4.55)	(2.80)	(4.64)	(2.75)
Foreign father	-2.16	-2.56	-1.58	-2.56	-2.83	-2.67
	(4.80)	(2.89)	(4.85)	(2.92)	(4.95)	(2.87)
Female	-0.47	1.40	-0.28	1.40	0.15	1.16
	(1.89)	(1.18)	(1.90)	(1.20)	(1.94)	(1.18)
Age	-0.43	0.49*	-0.48	0.49^{+}	-0.44	0.51*
	(0.39)	(0.24)	(0.39)	(0.25)	(0.40)	(0.24)
Religious	4.98**	-1.45	4.80*	-1.45	4.77*	-1.59
	(1.85)	(1.15)	(1.86)	(1.17)	(1.86)	(1.15)
Entrepreneurial intent	1.09^{+}	0.10	1.09^{+}	0.10	0.93	-0.08
	(0.59)	(0.39)	(0.59)	(0.39)	(0.61)	(0.40)
Intercept	17.92	-7.14	18.24	-7.21	16.68	-11.22
	(16.15)	(10.81)	(16.18)	(10.98)	(16.26)	(11.00)
Corr.(Div,Conv)	0.39		0.38		0.40	
Breusch-Pagan test	9.26	[0.002]	9.14	[0.003]	9.82	[0.002]
R-squared	0.24	0.24	0.26	0.24	0.27	0.29
Log likelihood	-351.50		-350.95		-348.03	
No. of observations	62		62		62	

Notes: Standard errors in brackets. Corr.(Div,Conv) reports the correlation between residuals of the two equations; "Breusch-Pagan test" provides the test-statistic and *p*-value whether or not this correlation is non-zero.
$^{+}$: p < 0.1; *: p < 0.05; **: p < 0.01; ***: p < 0.001, two-tailed.

Table 1.5: Results of seemingly unrelated regression models: Public Administration

	Model 0		Model 1		Model 2	
	Div.	*Conv.*	*Div.*	*Conv.*	*Div.*	*Conv.*
EN Treatment			-3.92	-0.40	-13.53*	12.95*
			(2.98)	(2.76)	(6.47)	(6.40)
EN Treatment					2.97^{+}	-4.05*
* EN Anxiety					(1.77)	(1.78)
EN Anxiety	1.49	0.96	1.32	1.03	-0.39	3.11^{+}
	(1.65)	(1.54)	(1.63)	(1.60)	(1.91)	(1.73)
EN Reading frequency	0.91	1.40	0.77	1.41	0.75	1.45
	(1.25)	(1.17)	(1.24)	(1.19)	(1.20)	(1.10)
EN Cultural overlap	-2.21^{+}	-0.63	-2.53*	-0.66	-1.60	-1.93
	(1.16)	(1.13)	(1.17)	(1.18)	(1.26)	(1.22)
NL Cultural overlap	3.08*	1.54	3.05*	1.58	2.57^{+}	2.13^{+}
	(1.35)	(1.27)	(1.34)	(1.31)	(1.33)	(1.23)
EN Learning age	-4.04	-0.50	-3.05	-0.45	-3.72	0.40
	(3.05)	(2.91)	(3.10)	(2.99)	(3.02)	(2.79)
EN Ability	1.29	-0.17	2.11	-0.07	1.12	1.24
	(1.30)	(1.25)	(1.44)	(1.45)	(1.51)	(1.45)
Divergent skill	3.86**		2.99*		3.13*	
	(1.36)		(1.46)		(1.46)	
Convergent skill		1.77		1.84		1.16
		(1.19)		(1.20)		(1.20)
Foreign mother	-0.95	-4.68	-1.44	-4.58	-1.66	-4.37
	(5.84)	(5.43)	(5.79)	(5.56)	(5.61)	(5.14)
Foreign father	-12.21*	3.28	-13.91**	3.02	-13.98**	2.59
	(4.96)	(4.46)	(5.11)	(5.01)	(4.95)	(4.63)
Female	4.14	-2.25	2.62	-2.39	2.92	-2.80
	(2.65)	(2.60)	(2.87)	(2.85)	(2.78)	(2.64)
Age	-0.19	-0.70	-0.08	-0.68	-0.12	-0.58
	(0.74)	(0.70)	(0.74)	(0.73)	(0.71)	(0.68)
Religious	0.91	3.51	0.55	3.45	1.67	1.94
	(2.29)	(2.21)	(2.29)	(2.29)	(2.31)	(2.22)
Entrepreneurial intent	0.77	-0.39	0.29	-0.42	0.40	-0.44
	(0.78)	(0.73)	(0.85)	(0.77)	(0.82)	(0.72)
Intercept	-7.08	5.02	-6.69	3.62	5.82	-10.80
	(30.46)	(26.74)	(30.18)	(28.16)	(30.45)	(26.79)
Corr.(Div,Conv)	-0.29		-0.32		-0.20	
Breusch-Pagan test	3.34	[0.068]	4.00	[0.046]	1.62	[0.203]
R-squared	0.52	0.29	0.55	0.29	0.59	0.41
Log likelihood	-236.95		-235.38		-230.47	
No. of observations	40		40		40	

Notes: Standard errors in brackets. Corr.(Div,Conv) reports the correlation between residuals of the two equations; "Breusch-Pagan test" provides the test-statistic and *p*-value whether or not this correlation is non-zero.
$^{+}$: p < 0.1; *: p < 0.05; **: p < 0.01; ***: p < 0.001, two-tailed.

those with a greater distance to Dutch culture are less able to generate new ideas. However, when we introduce the language treatments into each equation in Mode 1, we find no direct effects of foreign language use on any of the outcomes in either sample, thus leading to a rejection of both Hypothesis 1 and Hypothesis 2.

Model 2 adds interaction terms between the treatment and English language anxiety. Interestingly, we find a negative coefficient of the interaction term for divergent thinking in Business Economics, albeit statistically insignificant ($p = 0.179$). We do observe the hypothesized positive and marginally significant interaction term for divergent thinking in Public Administration ($p = 0.100$) in conjunction with a negative coefficient for the English language treatment variable, offering only mixed support for Hypothesis 3. To interpret this latter effect more substantively, Figure 1.1 plots the average number of generated ideas in Public Administration across the range of English language anxiety for both language conditions. This figure shows that individuals with low (mean minus 1.5 standard deviations) English language anxiety who were placed in the English language treatment have a lower number of generated ideas than individuals with similar levels of English language anxiety but who completed the divergent thinking task in the native Dutch language (9.09 versus 18.40 generated ideas). This difference shrinks comparing individuals with average English language anxiety across settings (14.43 versus 17.60 generated ideas), and turns around when comparing individuals with high (mean plus 1.5 standard deviations) English language anxiety in the English language treatment with similarly anxious individuals who completed the task in the native Dutch language (19.78 versus 16.80 generated ideas).

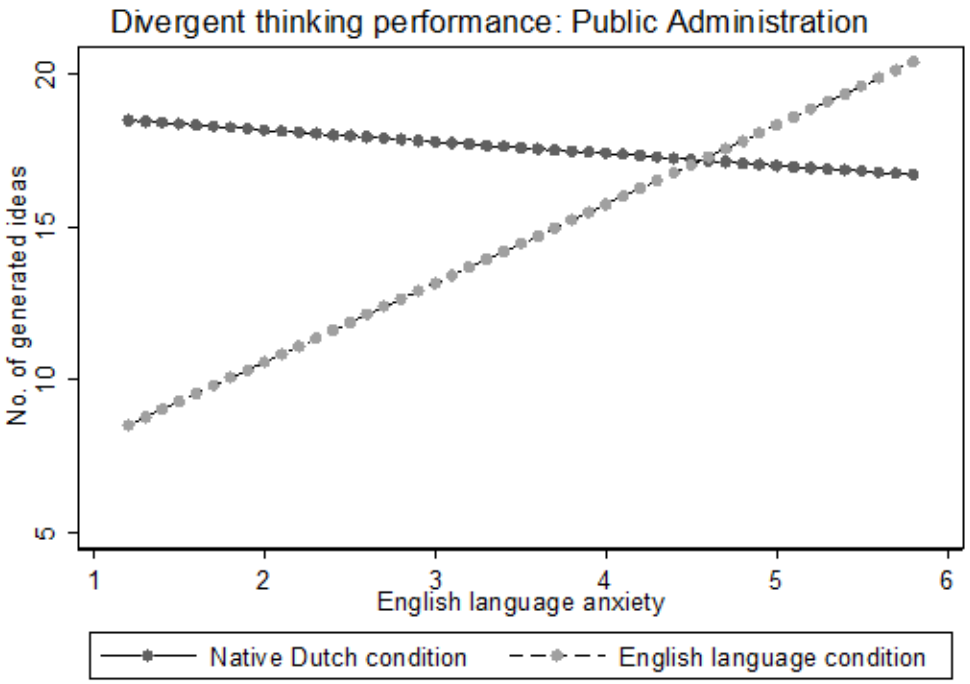
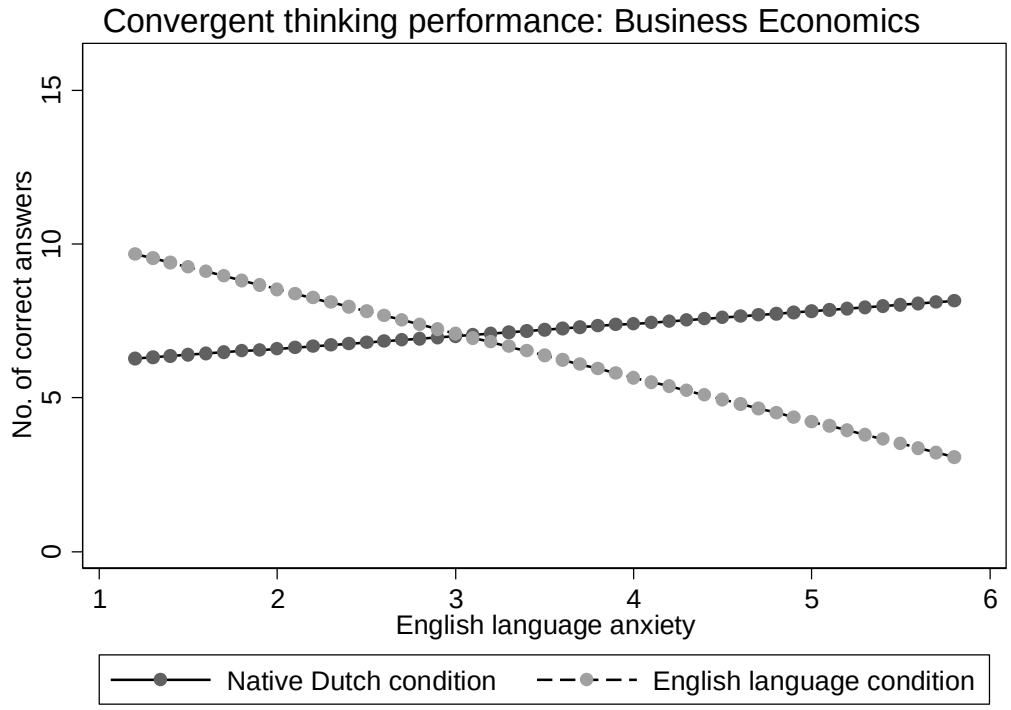


Figure 1.1: Predicted divergent thinking for Public Administration.

Turning to convergent thinking, we find strong evidence supporting Hypothesis 4 with a significant and negative interaction term in both samples (p = 0.091 for Business Economics; p = 0.027 for Public Administration) in conjunction with a positive coefficient for the English language treatment. Figure 1.2 shows average predicted number of correct responses to the convergent thinking task across the range of English language anxiety for both samples. In both samples, individuals with low English language anxiety who were placed in the English language treatment have more correct answers than similarly anxious individuals who completed the convergent thinking task in the native Dutch language (9.18 versus 6.42 correct answers in Business Economics and 10.16 versus 2.95 in Public Administration). These differences even out when comparing individuals with average levels of English language anxiety (7.01 versus 7.03 correct answers in Business Economics, and 8.22 versus 9.40 in Public Administration).



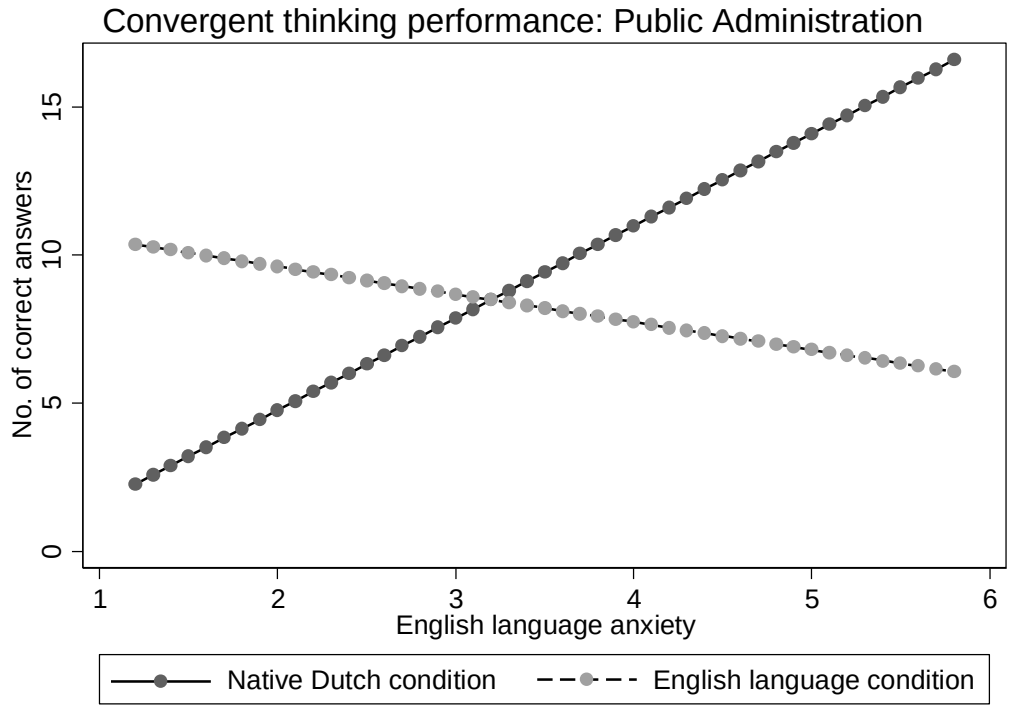


Figure 1.2: Predicted convergent thinking for Business Economics and Public Administration.

Individuals with high English language anxiety who were placed in the English language treatment have fewer correct answers than high English language anxiety individuals who completed the task in the native Dutch language (4.79 versus 7.66 correct answers in Business Economics and 6.28 versus 15.84 in Public Administration). Thus, the English language use effect on convergent thinking turns from positive to negative as English language anxiety increases from low to high values. This effect is replicated across the two groups, and the difference in the number of correct responses comparing low- and high-English language anxiety individuals in the English language settings is very consistent in both samples (being 48 percent lower in Business Economics and 62 percent lower in Public Administration). Hypothesis 4 is strongly confirmed.

It is noticeable in Figure 1.2 that English language anxiety has a markedly positive effect within the native Dutch language setting in the Public Administration sample, which may be related to the between-setting differences identified earlier for this sample. In particular, as students in the Dutch language setting in this sample were found to have higher English language anxiety, lower self-reported English language ability, less confidence in their convergent thinking skills, and were more likely to have a foreign mother or father, it could be that second-generation participants are driving this effect. However, removing students with either a foreign mother or a foreign father does not change the identified effect.[9] Similarly, removing one student in Public Administration with very high scores on the convergent thinking task (answering all questions in English correctly—the only student in either sample to get all questions right—and

[9] The coefficient of the English treatment variable in the convergent thinking equation equals 16.71 (p = 0.025), English language anxiety's coefficient equals 4.45 (p = 0.045), and the coefficient for their interaction equals -5.06 (p = 0.014).

having a low level of English language anxiety, with a score of 2.4 out of seven) does not affect the nature of this relationship.[10]

One remaining potential explanation for this positive effect of English language anxiety is that high English language anxiety students in the Dutch language condition for Public Administration have better Dutch language skills. Though we did not measure Dutch ability explicitly, we turned to the average length of words used in the divergent thinking task. Being very similar in nature to readability measures in educational research (e.g., Flesch, 1948), average word length may provide a proxy for these students' level of writing (as students at a higher writing level tend to use longer, more complex words; Flesch, 1948). However, we find highly comparable average word lengths for students in the Dutch language setting with below-average English language anxiety (average word length is 6.16 characters) versus those with above-English language anxiety (average word contains 6.22 characters). Though this is an admittedly coarse assessment, these numbers do not seem to indicate that the observed positive effect of English language anxiety on convergent thinking in the Dutch language setting for Public Administration emerges from higher unobserved Dutch language ability.

It is worth noting that, in a related check, all our reported effects are entirely robust to controlling for this variable (even improving slightly in terms of *p*-values; full models available upon request). These models show that average word length positively predicts convergent thinking in the Business Economics sample and divergent thinking in the Public Administration sample. However, because we only measure this variable for the specific language in which the

[10] The coefficient of the English treatment variable in the convergent thinking equation equals 10.87 ($p = 0.056$), English language anxiety's coefficient equals 2.48 ($p = 0.105$), and the coefficient for their interaction equals -3.37 ($p = 0.034$).

divergent thinking task was completed (rather than measuring average word length in both Dutch and English), we chose to focus our analyses on models without this variable. Nevertheless, these results provide some suggestive evidence that our identified results are not entirely driven by otherwise unobserved writing skills in the specific language.[11]

Discussion and conclusion

This study develops and tests theory on how foreign language use influences individuals' ability to engage in two types of creative thinking. We combine recent advances in the study on the effects of the use of foreign language in multilingual business settings (Brannen et al., 2014; Kroon et al., 2015; Marschan et al., 1997), work on creative thinking processes (Cropley, 2006; Guilford, 1967; Hommel, 2012), and research on dual process theories (Evans & Stanovich, 2013; Thompson, 2009) to develop negative and positive foreign language use effects on divergent and convergent thinking behavior, respectively. Moreover, we highlight the importance of emotion in foreign language processing (Hinds et al., 2014; Neeley et al., 2012; Tenzer et al., 2014) by incorporating the effects of foreign language anxiety (Horwitz et al., 1986; Scovel, 1978), which we argue weakens the language effects.

We test our hypotheses using lab experiments, with Dutch as the native language and English as the foreign language, enabling us to delve deeper into the causal mechanisms underlying these effects than possible in typical field studies of language (van Witteloostuijn, 2015; Zellmer-Bruhn et al., 2016). Results from a replicated lab experiment in two distinct Dutch

[11] Comparing students with above- versus below-average English language anxiety more generally, we also do not identify any differences in average word length during the divergent thinking task: 5.63 versus 5.41 characters in the total sample, 5.30 versus 5.31 characters in Business Economics, and 5.96 versus 5.64 characters in Public Administration.

student samples confirm a consistent effect of English language usage on convergent thinking, which is entirely contingent on English language anxiety. Individuals who are not anxious about operating in the English language have more correct answers in a convergent thinking task than individuals with similar levels of English language anxiety in the native Dutch language setting. This effect turns around, however, when comparing individuals with high levels of English language anxiety between the two language settings. An opposite moderating dynamic for divergent thinking behavior is found in one of two samples, providing weaker evidence for this language effect.

Contributions and limitations

We contribute to emerging research on language in international business by conducting, to the best of our knowledge, the first quantitative empirical investigation of foreign language use effects on creative thinking. Prior qualitative work has unequivocally shown the importance of the use of a foreign language (often: the English language) in shaping the interpersonal behavior of individuals in multilingual organizations (Hinds et al., 2014; Kroon et al., 2015; Neeley, 2013; Tenzer et al., 2014). Although recent theoretical work has built valuable models around foreign language use also building on a dual process theory perspective (Bordia & Bordia, 2015; Volk et al., 2014), this complementary study provides new empirical insights into the intrapersonal effects of English as a foreign language by taking an experimental approach (Zellmer-Bruhn et al., 2016). Focusing on creativity is particularly useful for this purpose, as creative behavior has important implications for individual careers as well as for performance at more aggregate levels such as the team and organization (Gong et al., 2013). This focus on creativity offers another important contribution by representing a crucial factor in knowledge

generation, rather than the knowledge transfer or integration, which has been the focus of prior work interested in foreign language use (Kroon et al., 2015; Piekkari et al., 2005; Welch & Welch, 2008). Although knowledge transfer and integration are certainly important in international business, our model takes a step back in the theoretical chain by highlighting how foreign language use can both impede and promote the production of new knowledge and ideas, to start, by shaping the ability of individuals to engage in divergent and convergent thinking.

Importantly, whether or not English language use harms or aids convergent thinking, and to a lesser extent divergent thinking, for native Dutch students was strongly contingent on how anxious these students were about using the English language, thus further confirming the importance of considering the individual in the study of language (Brannen et al., 2014; Neeley, 2013). Our results confirm the role of foreign language anxiety in particular, having previously been suggested to be "the main explanation" (Lazar et al., 2014: 2185; see also: Turula, 2016: 231) for mixed language effects (Costa, Foucart, Amon, et al., 2014; Geipel et al., 2015; Hadjichristidis et al., 2015). Future work interested in studying language effects therefore stands to gain by further considering the emotional consequences of language on the individual for a wider set of behavioral and performance outcomes.

These results also have tentative implications for practice. In particular, we offer some new insights to the discussion on whether language standardization is preferable to individualization, where the choice of language is left to the employee (Marschan-Piekkari et al., 1999; Volk et al., 2014). Our results suggest that standardization is unlikely to yield optimal results, as the students in our sample clearly responded differently to the use of the English language depending on their emotional response to the language. Here, we see a parallel with

work on the ambidextrous organization, in particular where exploration and exploitation are tightly coupled within subunits and loosely coupled between (Benner & Tushman, 2003). Our results suggest a similar optimal design for creativity, with individuals being assigned to divergent (e.g., idea generation) and convergent thinking tasks (e.g., idea implementation) in language settings based on their comfort with the specific language of operation. Our results would suggest allowing individuals to generate new ideas mostly in their native language (while perhaps precluding individuals highly comfortable with operating in the foreign language from generating ideas in this language), while assigning individuals who are more comfortable with the foreign language to the implementation and translation of these ideas into the lingua franca. At the same time, we would not recommend assigning highly anxious individuals to divergent thinking tasks in foreign languages, in spite of some of our results showing they generate the most ideas, as there is a rich body of work establishing the long-term negative effects of anxiety for both the individual and the organization (Hinds et al., 2014; Neeley, 2013; Neeley et al., 2012).

The implications discussed above are, of course, subject to a number of limitations. First, we conducted our experiment amongst students, which limits the generalizability of the results (Bello et al., 2009; Zellmer-Bruhn et al., 2016). However, we are interested in a fundamental human process rather than a choice or process specific only to top management (Bello et al., 2009) and because these students will enter business life in the near future, it also seems that these students are reasonably representative of the general population of interest. The internal replication of our experiment by sampling from two diverse groups additionally fosters the generalizability of the results. It is also important to emphasize that all participants in our study

had to complete creative thinking tasks in isolation, rather than engaging in interpersonal processes such as brainstorming or cross-cultural negotiation. Though our two individual creative thinking tasks are the most widely applied in the study of creativity (Arden et al., 2010), capturing the core of the creative process (Guilford, 1950, 1967), the lack of interpersonal interaction limits our ability to extend our results to the creative process in a business setting, where interpersonal processes are more commonplace and important (Neeley et al., 2012; Tenzer et al., 2014). Though we view our intra-person approach as a crucial first step in isolating foreign language use effects independent of social processes, subsequent experimental work manipulating not only language but also social factors should help to come to important practical and theoretical insights.

Another limitation emerges from our exclusive focus on the dual process theory of higher cognition. We focus on this model in light of recent advances emphasizing its conceptual overlap with the dual process theories of creativity (Allen & Thomas, 2011; Sowden et al., 2015), combined with work emphasizing the importance of dual processes in foreign language use effects more generally (Hayakawa et al., 2016; Volk et al., 2014), making it a prime candidate for the integration of these streams of work. However, there are certainly many alternative theoretical perspectives within international business research and outside, such as cultural accommodation (Akkermans et al., 2010; Gargalianou, Urbig, & van Witteloostuijn, 2017), the literature on the bilingual brain (Fabbro, 2001; Stocco & Prat, 2014), and language priming (Oyserman & Lee, 2008). It is likely that each of these perspectives would yield predictions different to ours, in particular with regards to the direct language use effects. For instance, bilinguals tend to have more flexible brains (Stocco & Prat, 2014), likely aiding in both

divergent and convergent thinking tasks such as ours—in particular if this flexibility is more likely to be primed by the use of a foreign language (Oyserman & Lee, 2008). Others, however, suggest that bilinguals are better at convergent thinking tasks at the cost of divergent thinking tasks (Hommel, Colzato, Fischer, & Christoffels, 2011), thus being more aligned with our predictions. Cultural accommodation theory, on the other hand, would probably anticipate positive effects of English language use on divergent thinking and negative effects on convergent thinking, as Anglophonic culture is more masculine than Dutch culture (Akkermans et al., 2010), and masculine processes such as risk-taking and self-direction tend to be attributed to divergent thinking but not convergent thinking (Cropley, 2006: 392; Proudfoot, Kay, & Koval, 2015). Though the integration of this variety of perspectives is outside the scope of this chapter, further consideration and combination of alternative theoretical perspectives on the drivers of foreign language use effects with work on creativity would certainly move the field towards a more cohesive theoretical model.

A fourth limitation relates to our limited ability to disentangle foreign language ability from foreign language anxiety, which is a salient issue within the general literature on foreign language anxiety (Horwitz, 2000; Sparks et al., 2000). In particular, one could pose that our decrease in the number of correct answers in the convergent thinking task in English is only the result of lowered English ability among highly anxious individuals (although this would not explain the identified effect on divergent thinking in the Public Administration group). While we did not find evidence that more anxious individuals differ in the sophistication of their language use (as measured by average word length in the divergent thinking task, see footnote 14 above), and although we control for a simple self-reported measure of English language ability as well as

for English reading frequency and the age at which the participant started learning English, these measures are obviously imperfect. As such, further study is needed to confirm that our identified effects emerge from anxiety, rather than ability.

Appendix B contains details on a proposed experiment which would address this issue in two ways: first, by asking respondents to not only complete written (sections B2 and B4), but also visual convergent and divergent thinking tasks (sections B3 and B5), potentially confounding effects of differences in vocabularies, translation differences, and general language ability should be minimized, given that visual tasks do not rely on language in order to be completed. Moreover, by asking respondents to complete the widely applied Wordsum vocabulary test (Alwin, 1991; Huang & Hauser, 1998; famously utilized in the General Social Survey: Malhotra, Krosnick, & Haertel, 2007) to measure English language ability in conjunction with a localized Dutch vocabulary test (Gesthuizen & Kraaykamp, 2002), this altered experiment would be empirically better able to control for English language ability than we can, at present (see section B1 for the questionnaire).

Finally, a natural limitation emerges from our restriction of the languages under study: Dutch (as the native language) and English (as the foreign language). While the choice of English as the focal foreign language is reasonable given its dominance as a lingua franca in a wide variety of business and non-business settings (Brannen et al., 2014; Ehrenreich, 2010), the choice of Dutch as the native language limits the generalizability of our identified effects to other languages—especially those that are more linguistically distant from Dutch and English. Without direct replication of our findings in other countries and with other languages, we cannot be sure whether the effects found in this study are generalizable to other language pairs. Indeed, Dutch is

one of the closest linguistic relatives to English (Classe, 2000; Mallory & Adams, 2006), suggesting that effects may have been attenuated in our sample as compared to a student sample from, for instance, China (Mak, 2011). At the same time, the two languages do differ in their flexibility in terms of, for instance, word order and the positioning of adverbials (Hoekstra & Roberts, 1993; McDonald, 1987), which in turn may affect creative behavior on our two thinking tasks by virtue of linguistic differences, rather than differential reliance on dual processes. However, many studies find foreign language use effects on Type 1 versus Type 2 behavior to be independent of the specific language combination (Costa, Foucart, Hayakawa, et al., 2014; Keysar et al., 2012), suggesting that foreign language use effects on these dual processes could be more fundamental and general in nature. Therefore, we openly welcome further efforts to not only replicate, but also extend our experiments to other populations and language combinations to shed further light on these important issues. From this study and other work, it is nevertheless clear that foreign language use fundamentally alters human behavior, such that the investigation of the effects of foreign language use remains an important research agenda for international business (Brannen et al., 2014).

Appendix A

Table 1.A1: Results of alternative regression models: Business Economics

	Path model		OLS		Poisson	
	Div.	*Conv.*	*Div.*	*Conv.*	*Div.*	*Conv.*
EN Treatment	5.24	5.61+	2.96	5.82	0.20	0.92*
	(4.49)	(2.97)	(5.64)	(3.77)	(0.25)	(0.39)
EN Treatment	-2.14	-1.84*	-1.45	-1.99+	-0.11	-0.32*
* EN Anxiety	(1.35)	(0.93)	(1.69)	(1.17)	(0.08)	(0.13)
EN Anxiety	1.34	0.40	0.92	0.49	0.07	0.07
	(1.21)	(0.70)	(1.45)	(0.84)	(0.06)	(0.08)
EN Reading frequency	0.96	1.03+	0.94	1.05	0.07	0.18*
	(0.95)	(0.59)	(1.10)	(0.69)	(0.05)	(0.08)
EN Cultural overlap	0.10	0.29	0.08	0.35	0.01	0.05
	(0.88)	(0.54)	(1.03)	(0.63)	(0.04)	(0.06)
NL Cultural overlap	-0.28	-0.28	-0.29	-0.33	-0.02	-0.04
	(0.69)	(0.45)	(0.80)	(0.53)	(0.03)	(0.05)
EN Learning age	-2.27	0.66	-2.08	0.57	-0.16+	0.10
	(1.70)	(1.07)	(1.98)	(1.25)	(0.08)	(0.12)
EN Ability	-0.33	0.30	-0.38	0.29	-0.03	0.05
	(1.10)	(0.68)	(1.27)	(0.79)	(0.06)	(0.08)
Divergent skill	1.22		1.43		0.10*	
	(0.80)		(1.02)		(0.05)	
Convergent skill		0.23		0.01		-0.00
		(0.50)		(0.63)		(0.06)
Foreign mother	-0.84	-2.44	-1.11	-2.37	-0.07	-0.39
	(4.00)	(2.37)	(4.67)	(2.75)	(0.21)	(0.27)
Foreign father	-2.83	-2.68	-2.62	-2.55	-0.23	-0.41
	(4.27)	(2.47)	(5.01)	(2.87)	(0.22)	(0.28)
Female	0.16	1.16	0.04	1.15	0.02	0.17
	(1.67)	(1.02)	(1.94)	(1.18)	(0.09)	(0.12)
Age	-0.44	0.51*	-0.45	0.50*	-0.04*	0.07**
	(0.34)	(0.21)	(0.40)	(0.24)	(0.02)	(0.02)
Religious	4.77**	-1.59	4.76*	-1.60	0.37***	-0.22*
	(1.61)	(0.99)	(1.87)	(1.15)	(0.09)	(0.11)
Entrepreneurial intent	0.93+	-0.09	0.97	-0.06	0.08**	-0.01
	(0.52)	(0.34)	(0.61)	(0.40)	(0.03)	(0.04)
Intercept	16.68	-11.27	16.87	-10.02	2.86***	-0.77
	(14.03)	(9.48)	(16.29)	(11.19)	(0.73)	(1.09)
Cov.(Div,Conv)	7.30**		n.a.		n.a.	
	(2.46)					
Comparative fit index	1.000		n.a.		n.a.	
SRMR	0.007		n.a.		n.a.	
(Pseudo) R-squared	n.a.		0.27	0.29	0.27	0.29
Log likelihood	-1406.92		-191.81	-161.82	-202.15	-165.57
No. of observations	62		62		62	

Notes: Standard errors in brackets. $^{+}$: $p < 0.1$; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, two-tailed.

Table 1.A2: Results of alternative regression models: Public Administration

	Path model		OLS		Poisson	
	Div.	*Conv.*	*Div.*	*Conv.*	*Div.*	*Conv.*
EN Treatment	-13.53**	12.95**	-13.39*	13.15+	-0.91**	1.43***
	(5.02)	(4.96)	(6.48)	(6.41)	(0.29)	(0.39)
EN Treatment	2.97*	-4.05**	2.97	-4.10*	0.21*	-0.45***
* EN Anxiety	(1.37)	(1.38)	(1.77)	(1.78)	(0.08)	(0.11)
EN Anxiety	-0.39	3.11*	-0.30	3.08+	-0.02	0.38***
	(1.48)	(1.34)	(1.91)	(1.73)	(0.10)	(0.11)
EN Reading frequency	0.75	1.45+	0.79	1.45	0.08	0.18*
	(0.93)	(0.85)	(1.20)	(1.10)	(0.06)	(0.07)
EN Cultural overlap	-1.60	-1.93*	-1.59	-1.94	-0.15**	-0.22**
	(0.98)	(0.95)	(1.26)	(1.22)	(0.06)	(0.08)
NL Cultural overlap	2.57*	2.13*	2.62+	2.11+	0.22***	0.22**
	(1.03)	(0.95)	(1.33)	(1.23)	(0.07)	(0.07)
EN Learning age	-3.72	0.40	-3.83	0.43	-0.32*	0.01
	(2.34)	(2.16)	(3.03)	(2.79)	(0.14)	(0.16)
EN Ability	1.12	1.24	1.12	1.25	0.07	0.16+
	(1.17)	(1.13)	(1.51)	(1.45)	(0.07)	(0.09)
Divergent skill	3.13**		3.31*		0.25***	
	(1.14)		(1.49)		(0.07)	
Convergent skill		1.16		1.03		0.11
		(0.93)		(1.22)		(0.08)
Foreign mother	-1.67	-4.37	-1.44	-4.42	-0.36	-0.59+
	(4.35)	(3.98)	(5.62)	(5.14)	(0.31)	(0.35)
Foreign father	-13.98***	2.59	-14.15**	2.52	-1.36***	0.29
	(3.84)	(3.59)	(4.96)	(4.63)	(0.28)	(0.30)
Female	2.92	-2.80	2.98	-2.82	0.20+	-0.31+
	(2.15)	(2.04)	(2.78)	(2.64)	(0.12)	(0.18)
Age	-0.12	-0.58	-0.11	-0.58	-0.02	-0.05
	(0.55)	(0.52)	(0.71)	(0.68)	(0.03)	(0.04)
Religious	1.67	1.94	1.64	1.93	0.08	0.17
	(1.79)	(1.72)	(2.31)	(2.22)	(0.11)	(0.13)
Entrepreneurial intent	0.40	-0.45	0.45	-0.43	0.04	-0.04
	(0.64)	(0.55)	(0.83)	(0.72)	(0.04)	(0.04)
Intercept	5.87	-10.81	4.15	-10.22	2.22	-0.37
	(23.63)	(20.76)	(30.57)	(26.81)	(1.60)	(1.57)
Cov.(Div,Conv)	-3.92		n.a.		n.a.	
	(3.11)					
Comparative fit index	1.000		n.a.		n.a.	
SRMR	0.006					
(Pseudo) R-squared	n.a.		0.59	0.41	0.27	0.29
Log likelihood	-831.48		-116.41	-114.90	-116.81	-106.81
No. of observations	40		40		40	

Notes: Standard errors in brackets. $^{+}$: $p < 0.1$; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, two-tailed.

Appendix B

B.1: Pre-experimental questionnaire

Please note that I show only the English language version of the questionnaire here. The Dutch language version that will by default be presented to participants is available upon request. Also note that the questionnaire will be offered online, such that the layout below is for purely illustrative purposes.

1. Gender:
Please indicate your gender.
Male / Female

2. Age
What is your year of birth (YYYY)?

3. Nationality
What is your nationality?

4. Parents country of origin
In which country were your parents born?

Mother:
Father:

5. Religion
What is your religious background?
Catholic / Protestant / Islam / Buddhism / Hinduism / None / Other, namely …

6. Wordsum (English verbal ability)
We would like to know something about how people go about guessing words they do not know. Below are listed some words. You may know some of them, and you may not know quite a few of them. For each case, the first word is in capital letters--- like BEAST. Then, there are five other words in lower case below it. Please select the word that comes closest to the meaning of the word in capital letters. For example, if the word in capital letters is BEAST, you would choose the fourth option, as "animal" comes closer to BEAST than any of the other words.

Choose only one number for each item below.

EXAMPLE

BEAST
1. afraid 2. words 3. large **4. animal** 5. separate 6. don't know

SPACE
1. school 2. noon 3. captain 4. room 5. board 6. don't know

BROADEN
1. efface 2. make level 3. elapse 4. embroider 5. widen 6. don't know

EMANATE
1. populate 2. free 3. prominent 4. rival 5. come 6. don't know

EDIBLE
1. auspicious 2. eligible 3. fit to eat 4. sagacious 5. able to speak 6. don't know

ANIMOSITY
1. hatred 2. animation 3. disobedience 4. diversity 5. friendship 6. don't know

PACT
1. puissance 2. remonstrance 3. agreement 4. skillet 5. pressure 6. don't know

CLOISTERED
1. miniature 2. bunched 3. arched 4. malady 5. secluded 6. don't know

CAPRICE
1. value 2. a star 3. grimace 4. whim 5. inducement 6. don't know

ACCUSTOM
1. disappoint 2. customary 3. encounter 4. get used to 5. business 6. don't know

ALLUSION
1. reference 2. dream 3. eulogy 4. illusion 5. aria 6. don't know

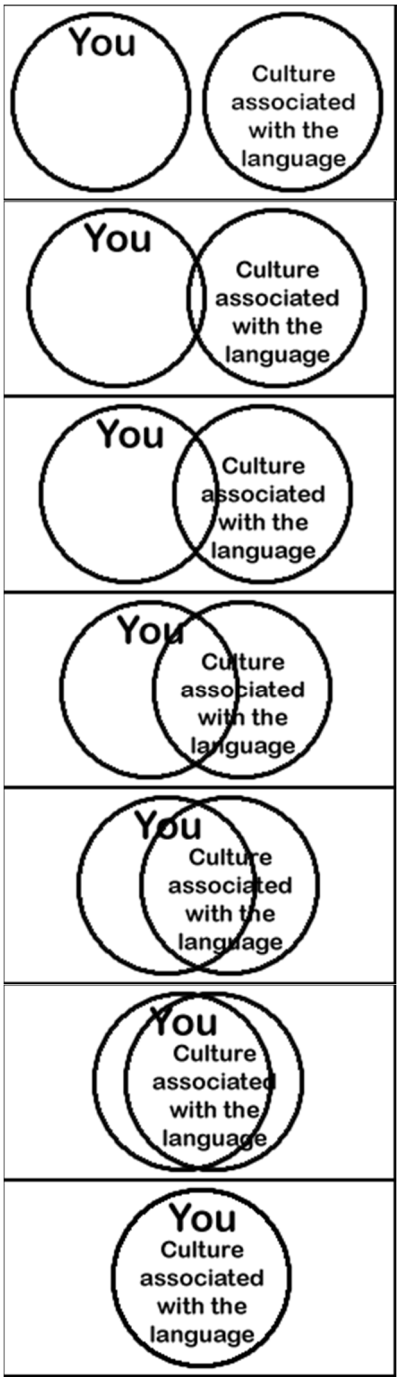
7. **Dutch language ability**
Here, we will ask participants to complete a localized version of the Wordsum instrument adopted from the Family Survey of the Dutch Population (Gesthuizen & Kraaykamp, 2002). However, at the time of writing, I have not yet received the survey instrument from the original authors.

8. Cultural overlap
This question is intended to assess your relationship with the culture associated with different languages (English and Dutch). Below you will find, for each language, seven rectangles. In each rectangle, there are two circles. One represents you and the other one represents the culture of those countries where people speak the mentioned language as mother tongue.

In each rectangle, the circles are overlapping differently. In the first rectangle (number 1), they are totally separate and represent a situation in which you do not accept or believe in the culture associated with the language. In the last rectangle (number 7), the circles are totally overlapping and represent a situation in which you totally accept and believe in almost all norms and attitudes

related to the culture associated with the language. Choose out of these seven rectangles the one that most adequately represents the extent of fit between you and the culture associated with the language.

Please answer the question with respect to **Dutch / English**:



9. English language anxiety

To answer the following questions, imagine that you are participating in an important meeting or public discussion, which is done in English. To communicate with the rest of the participants, you are forced to use English only.

Indicate to what extent you agree with the following statements (Seven-point Likert scale).

I don't worry about making mistakes when I interact in English (*reverse-coded*).
I keep thinking that many other people are better in English than I am.
When interacting in English, I can get so nervous I forget things I know.
I am afraid that people above me are ready to correct every mistake I make when speaking English.
I can feel my heart pounding when I'm going to be called on in a meeting in English.
I feel very self-conscious about speaking English in front of other people.
I get nervous and confused when I am speaking English.
I get nervous when I don't understand every word persons who have power on me say to me in English.
I feel overwhelmed by the number of rules you have to learn to speak English.
I am afraid that many people will laugh at me when I speak English.
I get nervous when persons who have power on me ask questions in English which I haven't prepared in advance.

10. English learning age

At which age did you start learning English?

Never, I do not know this language / From birth / 0-5 years old / 6-10 years old / 11-16 years old / 17+ years old

11. English reading frequency

How often do you read in English (e.g. text books, newspapers, magazines and/or the Internet)?

Daily / Several times per week / Once per week / Once per month or less

12. English language ability

How do you describe your own ability to understand English?

Very poor / Poor / Moderate / Average / Good / Very good / Excellent

13. Entrepreneurial intent

How likely is it that you will actively look for business opportunities for an own start-up in the next three years?

Very unlikely / Unlikely / Somewhat unlikely / Undecided / Somewhat likely / Likely / Very likely

14. Divergent thinking ability

How do you compare yourself to fellow students in your ability to find new and unique ways for solving old problems?

Much worse / Worse / Somewhat worse / About the same / Somewhat better / Better / Much better

15. Convergent thinking ability

Please indicate to what extent you agree with the following statement (Seven-point Likert Scale): I am able to see relationships between seemingly diverse bits of information.

B.2 Written convergent thinking task

Note: The answers, shown in italics, would not be shown to participants.

Below are combinations of three words. For every combination there is a single word that these three words have in common. For every combination, look at the three words and fill in the word that the three words have in common.

Always fill in only one word. If you fill in multiple words, then only the first word will be used as your answer.

Two examples:

fish / mine / rush have 'gold' in common: goldfish, goldmine, and gold rush

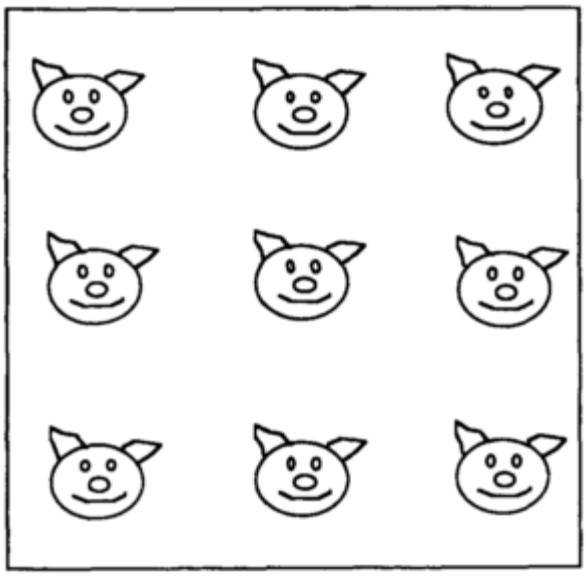
computer / cable / broadcast have 'network' in common: you can have a computer network, networks are typically run through cables, and a broadcast occurs through a network.

You have 15 minutes to complete this section.

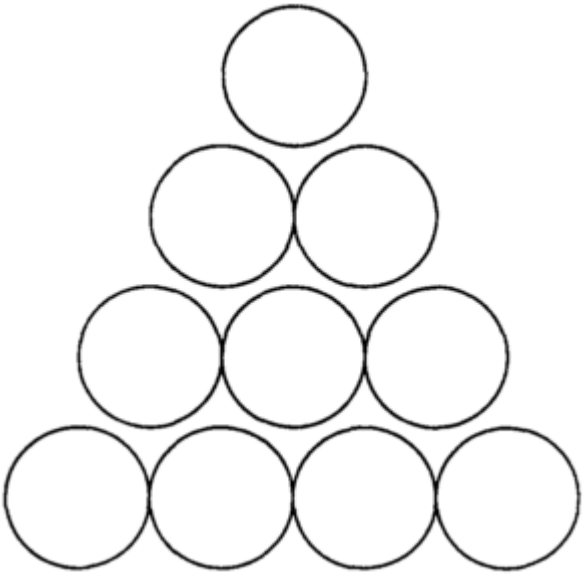
worm	shelf	end	*book*
hound	pressure	shot	*blood*
rope	truck	line	*tow*
noise	collar	wash	*white*
cadet	capsule	ship	*space*
sleeping	bean	trash	*bag*
chamber	mask	natural	*gas*
main	sweeper	light	*street*
force	line	mail	*air*
carpet	alert	ink	*red*
master	toss	finger	*ring*
man	glue	star	*super*
break	bean	cake	*coffee*
cry	front	ship	*battle*
coin	quick	spoon	*silver*
manners	round	tennis	*table*
room	blood	salts	*bath*
salt	deep	foam	*sea*
water	tobacco	stove	*pipe*
pure	blue	fall	*water*
strap	pocket	time	*watch*
mouse	sharp	blue	*cheese*
house	blanket	ball	*beach*
spin	tip	shape	*top*
call	pay	line	*phone*
stalk	trainer	king	*lion*
blank	white	lines	*paper*
thread	pine	pain	*needle*
envy	golf	beans	*green*
big	leaf	shadow	*tree*
sandwich	golf	foot	*club*

B3: Visual convergent thinking tasks

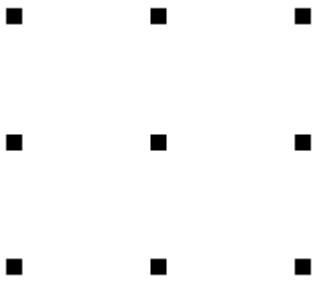
1. Nine pigs are kept in a square pen. Build two more square enclosures that would put each pig in a pen by itself.



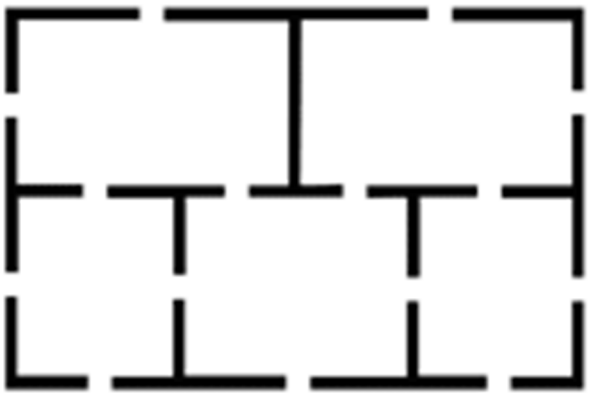
2. Show how you can make the triangle below point downward by moving only three of the circles. Please draw arrows to where you would move the three circles that you decide to move.



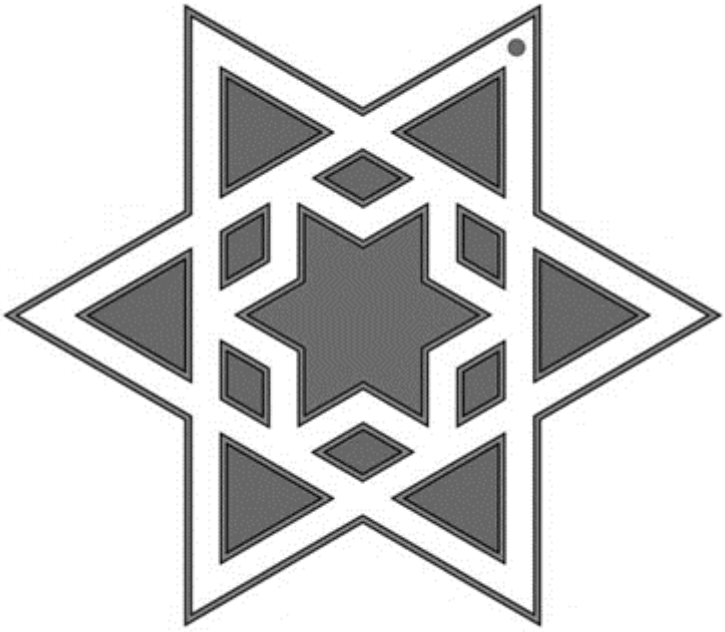
3. Draw four straight lines that pass through all nine dots, without lifting your pencil from the paper.



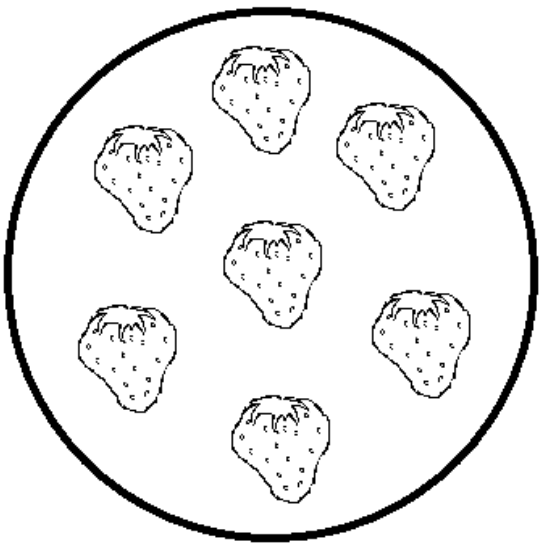
4. Draw a continuous path through all five rooms, without going through any door twice, and without crossing any path. The path can end in any room; not necessarily in the room from where it started.



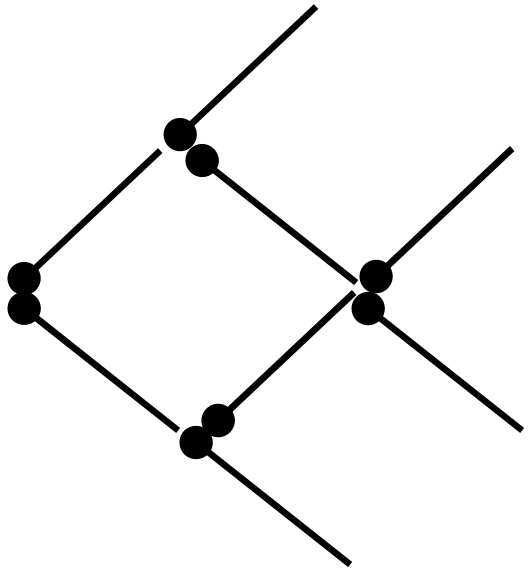
5. Starting from the dot, a jogger ran through all the avenues of the park once without passing twice on the same track. Try to draw the route of the jogger.



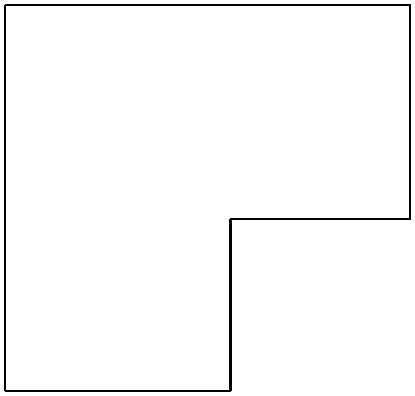
6. Cut this cake up with exactly four straight cuts so that each portion of cake contains just ONE strawberry on the top.



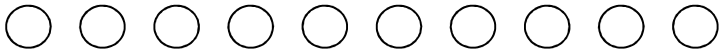
7. By moving only three matchsticks, can you make the fish below face the opposite direction? You can draw arrows to where you would move the three matchsticks, draw the matchstick in their new location while marking which matchstick you would move with a strikethrough or cross, or you can draw a new fish using the eight matchsticks.

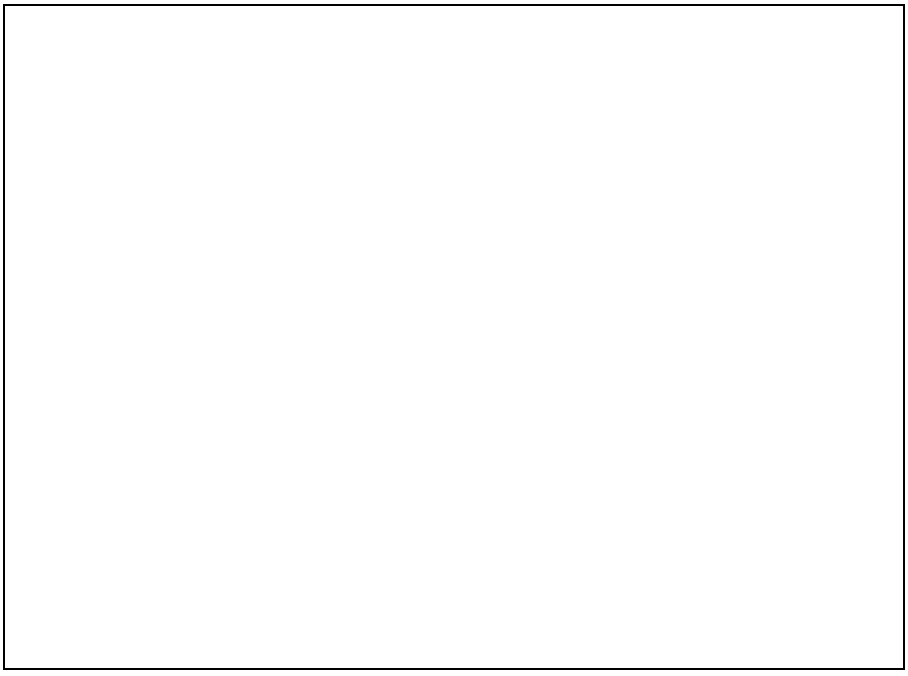


8. Show how you can divide this figure into four equal parts that are the same size and shape.



9 Show how you can arrange the ten pennies below so that you have five rows (lines) of four pennies in each row in the box below.





B4: Written divergent thinking task

In this test, you will be asked to consider some common objects. Each object has a common use, which will be stated. You are to list as many as six other uses for which the object or parts of the object could serve.

Example: A NEWSPAPER (used for reading). You might think of the following other uses for a newspaper.

a) Start a fire
b) Wrap garbage
c) Swat flies
d) Stuffing to pack boxes
e) Line drawers or shelves
f) Make up a kidnap note

Notice that all of the uses listed are different from each other and different from the primary use of a newspaper. Each acceptable use must be different from others and from the common use.

Do not spend too much time on any one item. Write down those uses that occur to you and go on to the others.

You have 20 minutes to complete this section.

1. **SHOE (used as footwear)**
   a.
   b.
   c.
   d.
   e.
   f.
2. **BUTTON (used to fasten things)**
   a.
   b.
   c.
   d.
   e.
   f.
3. **KEY (used to open a lock)**
   a.
   b.
   c.
   d.
   e.
   f.

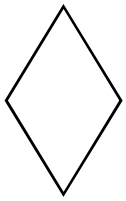
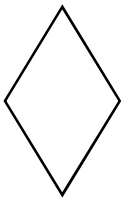
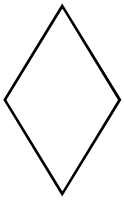
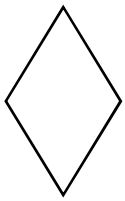
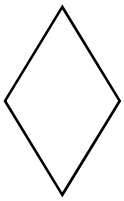
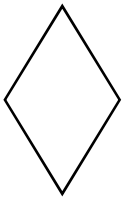
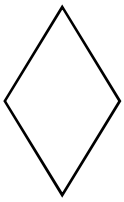
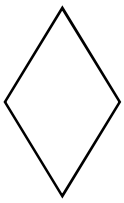
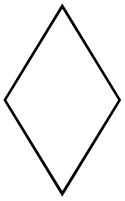
4. **WOODEN PENCIL (used for writing)**
   a.
   b.
   c.
   d.
   e.
   f.
5. **AUTOMOBILE TIRE (used as the wheel of an automobile)**
   a.
   b.
   c.
   d.
   e.
   f.
6. **EYEGLASSES (used to improve vision)**
   a.
   b.
   c.
   d.
   e.
   f.

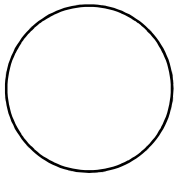
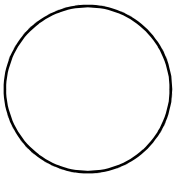
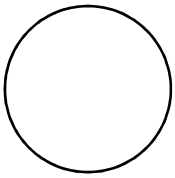
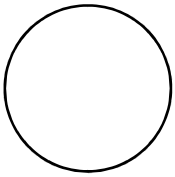
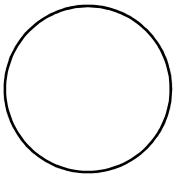
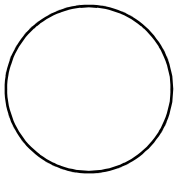
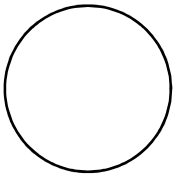
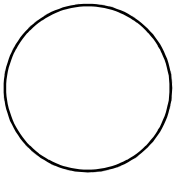
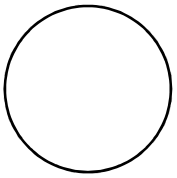
B5: Visual divergent thinking task

Below are three tables containing nine incomplete figures each. Make as many objects or pictures as you can think of using the shapes provided within each cell.

Please make sure to name or label each object or picture that you can come up with. Objects without a name or label will not count.

Do not spend too much time on any one cell. Draw those that occur to you and go on to the others.

1 	**2** 	**3** 
4 	**5** 	**6** 
7 	**8** 	**9** 

1 	**2** 	**3** 
4 	**5** 	**6** 
7 	**8** 	**9** 

1 	**2** 	**3** 
4 	**5** 	**6** 
7 	**8** 	**9** 

CHAPTER 2:

When everyone is different, no one is? Effects of distinctiveness on performance in homogeneous and heterogeneous creative industries

ABSTRACT

Is moderate distinctiveness optimal for performance? Answers to this question have been mixed, with both inverted U- and U-shaped relationships having been found. This paper shows how mechanisms driving the distinctiveness-performance relationship can yield both U- and inverted U-shaped effects as a result of their relative strengths, rather than their countervailing nature. Incorporating distinctiveness heterogeneity, I theorize a U-shaped distinctiveness-performance relationship that flattens out and flips into an inverted U as a category become more heterogeneous. A topic model of 70,232 organizational websites combined with survey data from 2,279 participants in the Dutch creative industries, show a U-shaped distinctiveness-revenues relationship in homogeneous industries that flattens out as heterogeneity increases. What level of distinctiveness is optimal for performance thus depends entirely on how distinct others are.

Introduction

Scholars working at the intersection of strategic management and organizational theory have long been interested in studying why organizations differ and how these differences affect performance (Carroll, 1993; Cennamo & Santalo, 2013; Deephouse, 1999; Jennings, Jennings, & Greenwood, 2009; McNamara, Deephouse, & Luce, 2003; Zhao et al., 2017; Zuckerman, 2016). A key idea underlying this stream of work is the existence of opposing forces, simultaneously pulling and pushing organizations towards conformity versus differentiation. While isomorphic pressures pull organizations towards conformity by legitimizing a limited range of behavior (Deephouse, 1996; DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Zuckerman, 1999), competitive pressures at the same time push organizations to be different in the pursuit of competitive advantage (Barney, 1991; Baum & Mezias, 1992; Carroll, 1993; McNamara et al., 2003). These conflicting forces have led to the conclusion that organizations need to strategically balance these pressures by adopting moderately distinct positions to attain 'optimal' distinctiveness (Alvarez, Mazza, Strandgaard Pedersen, & Svejenova, 2005; Deephouse, 1999; Navis & Glynn, 2011; Zhao et al., 2017).

Though some work has indeed found support for such an optimal distinctiveness relationship, with moderate distinctiveness yielding highest levels of performance (Alvarez et al., 2005; Deephouse, 1999; McNamara et al., 2003; Norman, Artz, & Martinez, 2007), others have identified fundamentally inconsistent results, with moderate distinctiveness leading to the *worst* possible performance for organizations (Cennamo & Santalo, 2013; Jennings et al., 2009; Zott & Amit, 2007). These contradictory results pose a challenge to our understanding of optimal distinctiveness and its implications for practice. Should organizations aim for moderate distinctiveness or not? In this paper, I integrate prior work and show how, contingent on the

relative strength of these countervailing pressures, both an inverted U-shaped relationship and a U-shaped relationship can emerge, even when the two pressures are superficially similar. Put differently, the existence of countervailing mechanisms is not a sufficient condition for either an inverted U- or U-shaped distinctiveness effect on performance to emerge.

In light of these inconsistent results, recent work has called for more explicit recognition of the fact that organizations face complex environments where the nature of the countervailing pressures towards conformity and differentiation differs across time and space (Cobb, Wry, & Zhao, 2016; Zhao et al., 2017). Answering this call, I develop the effects of one important dimension along which environments differ: the extent to which organizations in a given environment vary in strategic positions, or distinctiveness heterogeneity. At the heart of my line of reasoning is the idea that what level of distinctiveness strikes the optimal balance between pressures to be similar and to be different depends first and foremost on what others in the organization's environment do. That is, if many organizations adopt distinctive positions, then distinctiveness of a focal organization should have fundamentally different consequences compared to differentiation when others are more similar. Specifically, I hypothesize that the effects of distinctiveness from the central tendencies of the environment on performance flattens and flips from a U-shape in homogeneous categories to an inverted U-shape in more heterogeneous categories.

I apply topic modeling, a novel methodology to discover and analyze the latent structure underlying large collections of texts, to a dataset of over 70,000 organizational websites in the Dutch cultural and creative industries to test my theory. I find that the distinctiveness-revenues relationship is positive, on average, suggesting that organizations in this setting compete most

successfully when distancing themselves from others in their industries. Moreover, I find strong support for the hypothesis that a U-shaped effect of distinctiveness in homogeneous industries flattens out as distinctiveness heterogeneity increases, though distinctiveness loses its performance effects after heterogeneity crosses a certain threshold, suggesting that a conceptualization of distinctiveness as distance from the average loses its power in highly heterogeneous settings. The role and optimal degree of distinctiveness for performance thus depends entirely on the distinctiveness of others in one's category.

I provide two key contributions to our understanding of optimal distinctiveness. First, though prior work has taken the countervailing pressures towards conformity and differentiation as unobserved and thus did not explicate their exact nature, I offer a simple formalizing framework that is able to harmonize and extend the contradictory results of prior work. Most importantly, I show how it is the relative strengths of the pressures that determine whether the distinctiveness relationship is U- or inverted U-shaped, rather than simply the existence of two countervailing pressures. This framework provides a stepping stone for researchers to address the call for a theory of how incentives for differentiation and conformity shift depending on context (Zuckerman, 2016), thus supporting a move towards a more general yet simultaneously more precise theory of optimal distinctiveness. Second, to date, the nature of categories in work on optimal distinctiveness has been kept remarkably fixed—perhaps due to a typical empirical focus on single-industry settings—leading to calls to incorporate how categories differ (Cobb et al., 2016; Zhao et al., 2017). By exploring the implications of distinctiveness heterogeneity, I provide a first step towards a multi-level theory of distinctiveness integrating the study of category level differences into research on organization level distinctiveness.

Theory and hypotheses

Effects of distinctiveness: Contradictory yet consistent results?

The question of whether organizations should strive to be different or the same compared to competitors in their market categories (henceforth: categories: the "socially constructed knowledge structures ... that are shared among producers and consumers"; Rosa, Porac, Runser-Spanjol, & Saxon, 1999: 64) has seen significant theoretical and empirical exploration (e.g., Deephouse, 1999; McNamara et al., 2003; Navis & Glynn, 2011; Norman et al., 2007; Tan, Shao, & Li, 2013; Zhao et al., 2017; Zuckerman, 2016). This line of work has identified a core paradox underlying the organization's decision to be different or not. On the one hand, 'being the same' prevents the organization from falling outside the range of acceptable or legitimate behavior for their category (Deephouse, 1996, 1999; DiMaggio & Powell, 1983; Porac, Thomas, & Baden-Fuller, 1989). On the other hand, 'being different' enables the organization to escape competition by staking out a distinct position with a greater potential for sustained superior performance (Barney, 1991; Baum & Mezias, 1992; Porter, 1991). This inherent tension has led to the proposition that organizations should adopt positions that are moderately different from its competitors, thus strategically balancing the countervailing pressures (Deephouse, 1999). Put differently, organizations should aim to reach optimal (that is: moderate) levels of distinctiveness if they want to outperform others in their category (Zhao et al., 2017; Zuckerman, 2016). [12]

In line with the optimal distinctiveness proposition, Deephouse (1999) finds that banks that adopt moderately asset positions that are moderately different from average positions attain

[12] I follow recent recommendations by Zhao and colleagues (2016) and henceforth use the term optimal distinctiveness to describe what has been termed, amongst others, strategic balance (Deephouse, 1999), legitimate distinctiveness (Navis and Glynn, 2011), the competitive cusp (Porac *et al.*, 1989), and distinctive positioning (Cennamo and Santalo, 2013) to support more consistent knowledge accumulation centered around this issue.

relative returns on assets that exceed those with both more and with less distinct positions. Also within the banking industry, McNamara and colleagues (2003) find that secondary firms outperform both highly similar core and highly dissimilar solitary firms. Likewise, Roberts and Amit (2003) find that having a composition of innovative activity that is moderately different from the industry average yields the highest financial returns to Australian retail banks. Outside banking, Norman and colleagues (2007) show how strong institutional norms in the U.S. airline industry eventually turn negative the benefits to distinctiveness, such that it does not pay to be excessively different when regulatory pressures are strong, while Alvarez *et al*. (2005) demonstrate how successful film directors balance artistic pressures to be unique with business pressures for profits through wide audience appeal.

In spite of its intuitive appeal, there also exists a non-negligible body of work proposing that moderate distinctiveness results in suboptimal performance. For instance, intermediately distinct organizations have been suggested to be unable to sufficiently reduce competition while also suffering from a lack of focus, insufficient demand, and blurred positions in the minds of stakeholders (Zott & Amit, 2007), such that distinctiveness is beneficial only when taken to very high levels (Ketchen, Snow, & Hoover, 2004; Porter, 1985). Cennamo and Santalo (2013) find a U-shaped effect of distinctive positioning on video game console performance, with moderate distinctiveness thus yielding worse performance than either highly conforming positioning or highly distinctive positioning. In similar spirit, Jennings *et al.* (2009) show how new law firms have the lowest levels of productivity when they incorporate employment systems that deviate moderately from industry norms, with either strong conformity or high deviation leading to

greater productivity. Zott and Amit (2007) find suggestive evidence that attempts to balance between efficiency and novelty in the design of a business model adversely affects performance.

These inconsistent results may lead one to conclude that little progress has been made in way of determining whether or not organizations should aim for moderately distinct positions. However, these two streams of results agree on more than is superficially apparent. Most importantly, there is strong agreement on the existence of the two opposing forces operate in pushing and pulling firms towards conformity and differentiation, and most studies make reference to both forces.[13] For example, in developing an inverted U-shaped effect, Deephouse (1999) explicitly builds on competition as a driver of why "a firm should be different" (p. 150) and legitimacy as a driver of why "a firm should be the same" (p. 151). Similarly, Porac and colleagues (1989: 414) highlight how dual isomorphic and differentiating pressures create a competitive cusp "upon which the strategic must balance". Correspondingly, in theorizing a U-shaped effect, Jennings *et al.* (2009) make reference to the benefits to conformity in signaling that one is a legitimate employer, while competition avoidance is invoked in discussing the benefits of high levels of non-conformity.

Less agreement exists, however, on the exact nature of these pressures towards conformity and differentiation. For instance, Deephouse (1999) assumes that distinctiveness linearly reduces both competition and legitimacy, leaving possible nonlinear mechanisms for future research (cf. p. 159-160). Jennings *et al.* (2009: 344) theorize that that "the benefits associated with either of the more extreme positions", referring to either strong conformity or

[13] Other studies focus on one of the two forces. For instance, Deephouse (1996) and Barreto and Baden-Fuller (2007) focus on the legitimacy-driven conformity or imitation, while Cennamo and Santalo (2013) theorize the effect of distinctiveness on platform performance by concentrating on its competitive aspects.

strong differentiation, "will increasingly outweigh the costs". In contrast, McNamara and colleagues (2003: 170) anticipate "diminishing returns to both conformity to obtain legitimacy and differentiation to reduce rivalry." Such different assumptions about the nature of the mechanisms matter, because they jointly and simultaneously determine whether a U- or inverted U-shaped relationship manifests itself, and even small differences in assumptions can yield widely different outcomes for curvilinear relationships (Haans, Pieters, & He, 2016). Because of this, I will now synthesize prior work addressing each of the two mechanisms to make explicit how, on average, I assume legitimacy and competition to be a function of distinctiveness. I then relax some of these assumptions to develop my moderation hypotheses.

Distinctiveness rapidly reduces legitimacy

Of crucial importance to the existence of categories are prototypical organizations: organizations that are representative of or central to the category (Rosch, 1975; Rosch & Mervis, 1975). As distinctiveness is the result of deviation from the conventional, normal strategies in a category (Deephouse, 1996, 1999), the prototypical organization is often conceptualized and operationalized to be the most-average member of the category, such that distinctiveness entails differentiation from average positions in one's category (Vergne & Wry, 2014: 72).[14] The average aids the categorization process by providing information about the central tendencies of a category (Porac, Thomas, Wilson, Paton, & Kanfer, 1995), and a fundamental consequence of the adoption of a position more similar to this core position (i.e., isomorphism) is that the

[14] This conceptualization contrasts with the prototype as the most salient member of a category, which is more prone to be an extreme case or outlier (Vergne & Wry, 2014). Given the dominant conceptualization of distinctiveness (or conversely: isomorphism) as deviation from an industry average (cf., Vergne & Wry, 2014: 73; also, Deephouse, 1996, 1999; Finkelstein & Hambrick, 1990; Kraatz & Zajac, 1996; Suchman, 1994), I focus on the prototype as the most-average member of a category.

organization is more likely to be judged as legitimate—desirable, proper, or appropriate, by the organization's external environment (Deephouse, 1996; DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Suchman, 1995). This external environment typically consists of a plurality of entities, and within the empirical context of this study (the creative industries) particularly salient external actors include the government, consumers, trade- and professional associations, industry peers, and gatekeepers such as reviewers (Caves, 2000). Legitimacy, then, represents the degree of cultural support from these entities for the organization (Meyer & Scott, 1983).

Organizations have some leeway to position themselves vis-à-vis the average, prototypical organization, however, as there exists a "range of acceptability" (Deephouse, 1999: 152) around the core of the category. Though ambiguity and uncertainty make the choice of the most appropriate position unclear (Deephouse, 1996; Haveman, 1993)—especially in industries where objective quality standards do not exist (Caves, 2000)—organizations can nevertheless feasibly differentiate themselves within this behavioral range without loss of legitimacy (Navis & Glynn, 2011), allowing them to obtain, amongst others, resources of higher quality and on better terms than organizations that fall outside this range (Deephouse, 1999; Lounsbury & Glynn, 2001; Navis & Glynn, 2011). In contrast, more peripheral positioning outside this range tends to trigger difficulties and confusion in audiences' sense making, calling into question what the organization does, why they do it, and how it should be valued (Durand, Rao, & Monin, 2007; Hsu, 2006; Hsu & Hannan, 2005; Zuckerman, 1999, 2016). Consequently, distinctive positions outside the range of acceptable behavior severely jeopardizes the organization's external standing (Durand et al., 2007).

Figure 2.1 illustrates this mechanism, where the left panel of Figure 2.1 shows a hypothetical category, within which organizations can position themselves along two dimensions (for illustrative purposes; the basic argument can feasibly be extended to multi-dimensional space). Most organizations locate themselves around the center of the category, which represents the prototypical, most average, position in this category (though such a perfectly averagely positioned organization need not actually exist). The dark grey area represents the range of acceptability within which organizations can differentiate themselves without losing legitimacy (Deephouse, 1996, 1999). As an organization moves outside away from this range, legitimacy loss is expected to quickly set in (e.g., Deephouse, 1999: 160). This mechanism of legitimacy loss corresponds to the sharp decline faced by deviants in White's (1981) market model, and is plotted in the right panel of Figure 2.1.

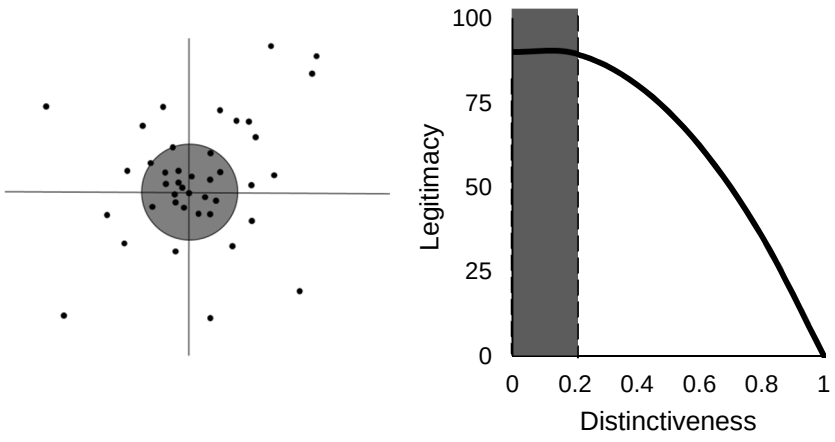


Figure 2.1: Legitimacy as a function of distinctiveness.

Distinctiveness increasingly reduces competition

A central tenet of the resource-based view in strategy research is that "uniqueness and not imitation provides organizations with competitive advantage in acquiring resources" (Barney,

1991; Williamson, 2000: 33). In this view, categories primarily function as the competitive arenas in which rivals struggle to defend contested positions (Porac et al., 1995). Though similarity yields legitimacy, it therefore also introduces competitive pressures for those that are similar—being in direct competition for resources, market share, and attention from the external environment (Livengood & Reger, 2010; McNamara et al., 2003). Competition is the result of competitive intensity, or the average distance of the focal organization to others on strategic dimensions (Baum & Mezias, 1992), and the absolute number of organizations competing with the focal organization for the same resource space (Baum & Singh, 1994; see also: Deephouse, 1999: 151). To avoid such competition, organizations can stake out more distinct positions and locate themselves in un- or underexploited niches with only few competitors and increasing their distance from others in the category (Porter, 1991).

Following this stream of work, I expect competition to be an increasingly negative function of distinctiveness, as the variation-restricting and clustering tendencies of categories (DiMaggio & Powell, 1983; Lounsbury & Rao, 2004; Zuckerman, 1999) suggest that a disproportional number of organizations will be positioned closer to the center of a category (I relax this assumption further into this paper). Assuming such clustering around the mean, more centrally located organizations are similar to most other category members (Lant & Baum, 1995), while also sharing a more crowded market for resources and clients. This interaction between the intensity of rivalry and the number of competitors therefore suggests that competition at the center of a category is most intense.

The more an organization differentiates itself along one or multiple dimensions, the more it moves away from the central tendencies of the category (Porac et al., 1995). Simultaneously,

as increasingly fewer organizations are positioned, in absolute terms, at more deviant combinations of attributes, distinctiveness also helps in reducing the number of rivals that share the organization's resource space (Cennamo & Santalo, 2013; Chung & Kalnins, 2001). Therefore, as both competitive intensity and the absolute number of rivals decrease with distinctiveness, more deviant positions enable the organization to quickly reduce the competition it faces (Cottrell & Nault, 2004).

Figure 2.2 graphically illustrates this mechanism, with the left panel showing the same category space as in Figure 2.1. Organizations at three positions are highlighted: a prototypical organization (located in the center of the category with many others), a moderately distinct organization (in competition with fewer organizations than the prototypical organization), and a highly distinct organization (occupying its entirely own niche)—grey circles indicate the main resource space targeted by each organization. Moderate deviations from the core attributes of the category do not yet dramatically reduce competition, as organizations engaging in moderate differentiation share market space with a non-trivial number of organizations while also maintaining relatively low average distance to others in the category. More substantial increases in distinctiveness, however, more strongly decrease competition by simultaneously reducing the average distance from others in the category and targeting a resource space with fewer rivals. This mechanism is plotted in the right panel of Figure 2.2.

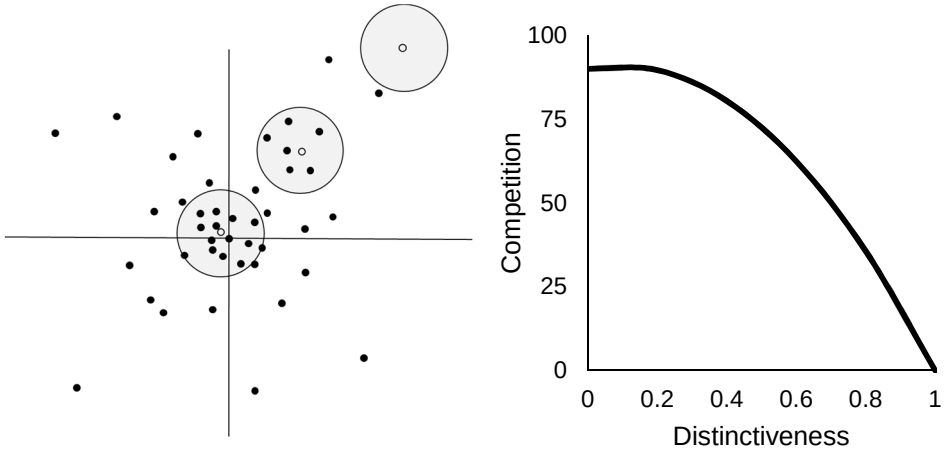


Figure 2.2: Competition as a function of distinctiveness.

Legitimacy loss and competition reduction: A matter of relative strength

Figures 2.1 and 2.2 are most flexibly described by the following quadratic functions:

$$L_i = l_0 + l_1 * d_i + l_2 * d_i^2$$

$$C_i = c_0 + c_1 * d_i + c_2 * d_i^2$$

where L_i represents the legitimacy that organization *i* obtains based on its level of distinctiveness d_i, and C_i captures the experienced level of competition. Most importantly, parameters l_2 and c_2 determine the curvilinearity of the legitimacy and competition mechanisms, respectively. The preceding theoretical discussion suggests that both l_2 and c_2 are negative (that is: both legitimacy and competition decrease at an increasing rate as a function of distinctiveness, on average). Taking legitimacy to be beneficial to performance and competition to reduce performance, the observed effect of distinctiveness on performance (P_i) is determined is follows:

$$P_i = L_i - C_i = (l_0 - c_0) + (l_1 - c_1) * d_i + (l_2 - c_2) * d_i^2$$

The key take-away from this equation is that neither l_2 nor c_2 alone can determine the existence of either a U-shaped or an inverted U-shaped effect of distinctiveness. Indeed, a necessary condition for the existence of a U-shaped effect is that $(l_2 - c_2)$ is positive, whereas a necessary condition for an inverted U-shaped effect is that $(l_2 - c_2)$ is negative (Lind & Mehlum, 2010). This implies that it is the *relative strength* of each of the mechanisms that determines whether a U- or inverted U-shape is observed, rather than the existence of two countervailing forces, *per se*. Figure 2.3 illustrates this for two combinations of the legitimacy and competition effects: in the top row, the drop in legitimacy as a result of deviation from the category norms (l_2) exceeds the rate at which the deviant organization escapes competition (c_2). In the bottom row, the opposite is the case (i.e., $c_2 > l_2$). Figure 2.3 thus shows how small differences in the relative strengths of the two mechanisms dramatically change what type of relationship is observed, with an inverted U-shape arising in the top row, and a U-shape in the bottom row.[15] This makes it is hard, if not impossible, to make an 'average' prediction of distinctiveness' effect on performance. Rather, it seems more valuable to consider contingencies that change whether one mechanism obtains precedence over the other.

[15] In these and the following theoretical illustrations the intercepts of the "Performance" figures have been altered for expositional clarity. That is, intercepts of the P_i equations were set such that the performance curves do not fall below zero. These intercept changes have no bearing on the shape of the observed relationships.

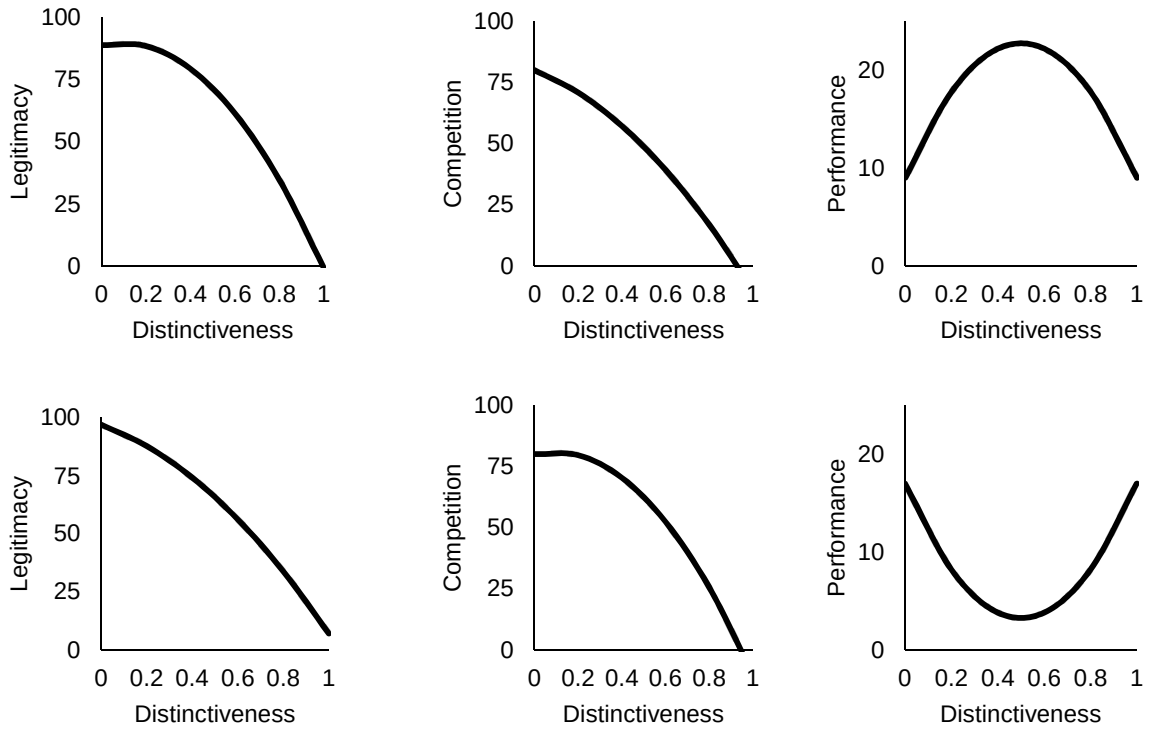


Figure 2.3: Illustration of the relationship between distinctiveness and legitimacy, competition, and performance.

Distinctiveness heterogeneity in organizational categories

So far, it has been assumed that categories do not differ in their composition, implying that organizations differentiate themselves from a fixed reference point located at the center of the industry, independent of whether it is in one category or another or what others in the category do. However, categories *do* vary along a number of dimensions (Lounsbury & Rao, 2004; Zhao et al., 2017), such that organizations can be expected to be punished or rewarded differently for distinctiveness depending on the specific nature of the category. Indeed, a central driver of both the legitimacy and the competitive pressure effects is that an organization is compared to, and compares itself with, others in the category, implying that the positioning of others should matter greatly. Because of this, a natural contingency to explore more in-depth is

the degree to which these others *themselves* are distinct in their positions. At the category level, distinctiveness heterogeneity—the degree of variation in the positions of organizations within a category—captures this contingency. In the following, I structure my argument as a between-category comparison (Weick, 1989) of two 'extreme cases' of categories (Eisenhardt, 1989), and compare the isomorphic and competition pressures in highly homogeneous organizational categories with those underpinning highly heterogeneous categories, respectively.

Distinctiveness in homogeneous categories

In highly homogeneous organizational categories, the positions of organizations in the category are very similar in nature, such that there is only little differentiation between organizations in the category (Navis & Glynn, 2011). Figure 2.4 illustrates such a homogeneous category in two-dimensional space, with the vast majority of organizations clustering closely around the prototypical, average attributes that define the category. As before, the dark grey area represents the range of acceptability, while the light grey area represents the focal resource space of different organizations.

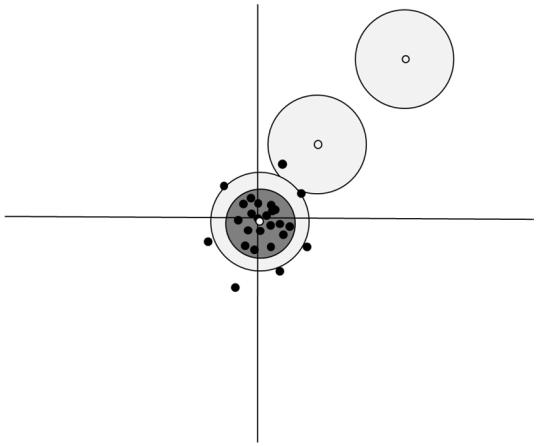


Figure 2.4: A homogeneous category illustrated in two-dimensional space.

In homogeneous categories, strong isomorphic pressures operate through predominantly cognitive and normative forces (Scott, 1995), as there exists a highly salient view of what an organization in this category looks like and what it should be doing (Navis & Glynn, 2011; Zuckerman, 1999). The existence of these clear behavioral rules implies that audiences are likely to notice and subsequently question any deviation from the well-defined prototype (Lounsbury & Glynn, 2001; Navis & Glynn, 2011; Zuckerman, 1999), resulting in only a very narrowly defined range of acceptable behavior in these categories and allowing for very little legitimate differentiation (Deephouse, 1999). Distinctiveness in homogeneous categories is thus strongly devalued, while conformity through isomorphism is highly valued (Deephouse, 1996).

Though they are seen as highly legitimate, organizations that position themselves within the narrow range of acceptability—and thus close to the prototypical average—simultaneously face conditions that resemble perfect competition. The vast majority of organizations crowd around the same narrow attribute space in such categories, therefore competing for the same resources, clients, and audience attention (Cennamo & Santalo, 2013; McNamara et al., 2003) and facing intense rivalry. Therefore, the number of organizations with whom an indistinct prototypical organization competes is high, while the distance of this organization to others is very low, resulting in extreme levels of competition at the center of the homogeneous category.

Assuming such a category structure, it seems that small deviations away from the center are not sufficient to escape the category's fierce competition (Cennamo & Santalo, 2013). Not only is deviation from the core highly visible in homogeneous categories, but small deviations from the average along one or a handful of dimensions maintain a significant degree of overlap with the many core organizations in these categories. Due to this visibility and high degree of

overlap, slightly dissimilar organizations are nevertheless still seen as rivals by the many organizations in the category's core (Porac et al., 1995), implying that more substantive effort is required to tear away from the strong competitive pressures in homogeneous categories. However, once the organization adopts a distinctive enough position to pull away from the intense competition, average similarity as well as the absolute number of rival firms at any deviant position both decrease rapidly, resulting in strong drops in experienced competition as distinctiveness exceeds a sufficient level.

Figure 2.5 shows these effects of distinctiveness on legitimacy and competition (and, in turn, observed performance). Indistinct, highly average, organizations are perceived as legitimate yet also suffer under nearly perfectly competitive conditions due to the strong clustering inherent to homogeneous categories. Conversely, solitary organizations can isolate themselves from the fierce competition in the category but also face major legitimacy challenges. Though highly indistinct and highly distinct organizations therefore each face their own challenges and reap their own benefits in homogeneous categories, organizations that attempt to pull away from the competition while not sufficiently separating themselves from the core bear the brunt of the harmful forces while also reaping insufficient benefits: not only are they perceived as illegitimate to a non-negligible degree, but they are also not able to detach themselves from competitive forces. Therefore, moderately distinct organizations tend to get "stuck in the middle" (Porter, 1980) and face the lowest levels of performance. This results in an observed U-shaped effect between distinctiveness and performance in categories that are highly homogeneous.[16]

[16] One might also reason that the legitimacy effect first drops quickly but eventually levels off at zero at high levels of distinctiveness in these categories. Such a negative exponential function would result in an even stronger U-shaped effect than the one graphed here. A consistently negative function was chosen here for simplicity and to make the transition from homogeneous to heterogeneous categories shown in Figure 2.7 more gradual in nature.

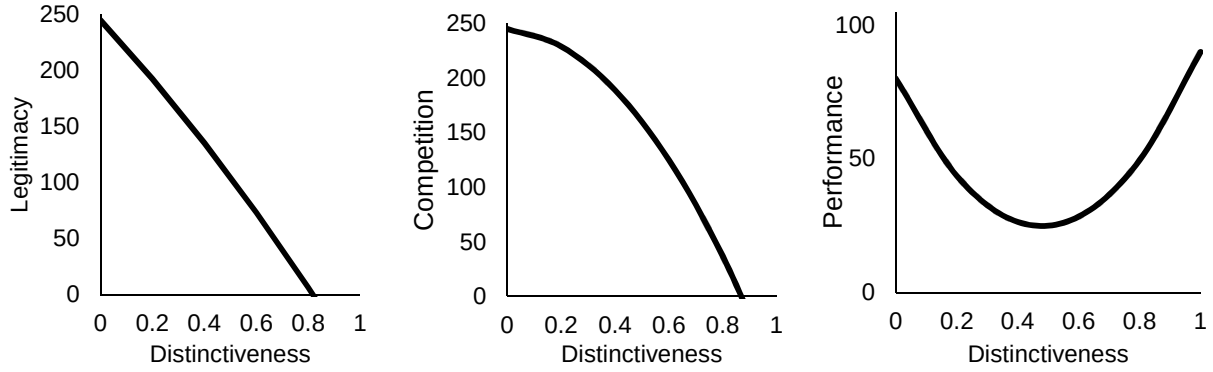


Figure 2.5: Illustration of the relationship between distinctiveness and legitimacy, competition, and performance in homogeneous categories.

Distinctiveness in heterogeneous organizational categories

In contrast to homogeneous categories, heterogeneous categories consist of organizations with widely varying positions (Navis & Glynn, 2011). Figure 2.6 shows such a heterogeneous category, where organizations are spread out much more widely across the theoretically possible positions, compared to prior illustrations. As the organizations in heterogeneous categories are spread out widely around the average, this implies that the average loses much of its informational value for the categorization process (Porac et al., 1995; Rosch, 1975). Nevertheless, the very existence of a category suggests that some sort of organizational prototype still exists (Rosa et al., 1999), as heterogeneity fundamentally emerges from "the *degree or gradient* of identity attributes relative to the exemplars (or prototypes) that represent the focal category" (Navis & Glynn, 2011: 482, emphasis in original). As such, in heterogeneous categories, the average therefore likely serves mostly as a highly abstract representation of the category (Jones, Maoret, Massa, & Svejenova, 2012; Vergne & Wry, 2014), as compared to

more homogeneous categories where the average provides significant information about the typical organization in the category.

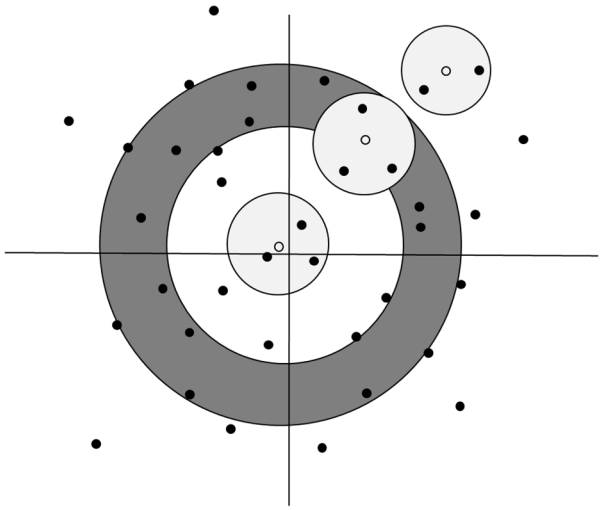


Figure 2.6: A heterogeneous category illustrated in two-dimensional space.

In highly heterogeneous categories deviation, rather than conformity, is the norm. Whereas in homogeneous categories gaining legitimacy is predominantly a matter of convincing audiences that the organization is the same to the many prototypical organizations conforming to the central attributes of the category (Deephouse, 1996, 1999), in heterogeneous categories it becomes a matter of convincing that it is *different* from others. Because legitimacy reflects "cultural alignment" (Scott, 1995: 45), the organization thus needs to convey that it is in one way or another unique (Lounsbury & Glynn, 2001) and provide a twist to their positioning (Heith & Heith, 2008), lest they are seen as uninteresting or boring (Navis & Glynn, 2011). As a result, the range of acceptable behavior moves outwards from the average attributes of the category (as illustrated in Figure 2.6) and into a wide range of more distant attribute combinations. At the

same time, however, it is unlikely that the range of acceptable behavior extends to infinity, as well-established difficulties in sense making of extremely distinct or equivocal positions can be expected to nevertheless emerge, raising doubts about the plausibility and comprehensibility of extremely distinct organizations and their activities (Martens, Jennings, & Jennings, 2007; Navis & Glynn, 2011). Thus, legitimacy in heterogeneous categories is conferred upon those organizations that are able to convey uniqueness through the adoption of distinctive, but not excessively distinctive, positions.

Though distinctiveness enables organizations to escape from strong competitive conditions in highly homogeneous categories, this function is in essence lost in heterogeneous categories. The prototypical, average organization no longer represents the category ideal well (Porac & Thomas, 1990), such that it does not provides a clear reference point for determining rivalry (Rosch, 1975), in turn making it difficult for organizations to engage in rivalry comparisons based on the category average (Lounsbury & Rao, 2004). Moreover, competition for customers and resources is now more evenly spread across the category's attribute space, reducing the number of unoccupied niches (Cennamo & Santalo, 2013). Returning to Figure 2.6, it is clear that the number of rivals is nearly identical for any position in the attribute space, implying that competition in highly heterogeneous categories is so diffuse than any organization shares resource space with some organizations, regardless of its specific position. Distinctiveness in such an environment then would only seem to serve as a way for the organization to position itself in one or the other niche, rather than distancing itself from rivals, per se.

These mechanisms are shown (in black) in Figure 2.7, together with those discussed before (the lightest gray lines representing the mechanisms in homogeneous categories, and the

darker grey lines ‘average’ categories). An inverted U-shaped relationship can be expected to be observed in heterogeneous categories, leaving organizations to be best off when adopting distinct enough identities to seen as legitimate, yet not overly distinct so as to trigger difficulties in sense-making. Taken together, the above arguments result in two hypotheses: first, there exists a U-shaped curve in homogeneous categories, which flattens as the heterogeneity increases. Second, this flattening is expected to be strong enough to flip this U-shaped curve into an inverted U-shape as the organizational category becomes more heterogeneous:

> **Hypothesis 1:** *The relationship between distinctiveness and performance flattens from a U-shape as distinctiveness heterogeneity of the organizational category increases.*
>
> **Hypothesis 2:** *The relationship between distinctiveness and performance flips from a U- to an inverted U-shape as distinctiveness heterogeneity of the organizational category increases.*

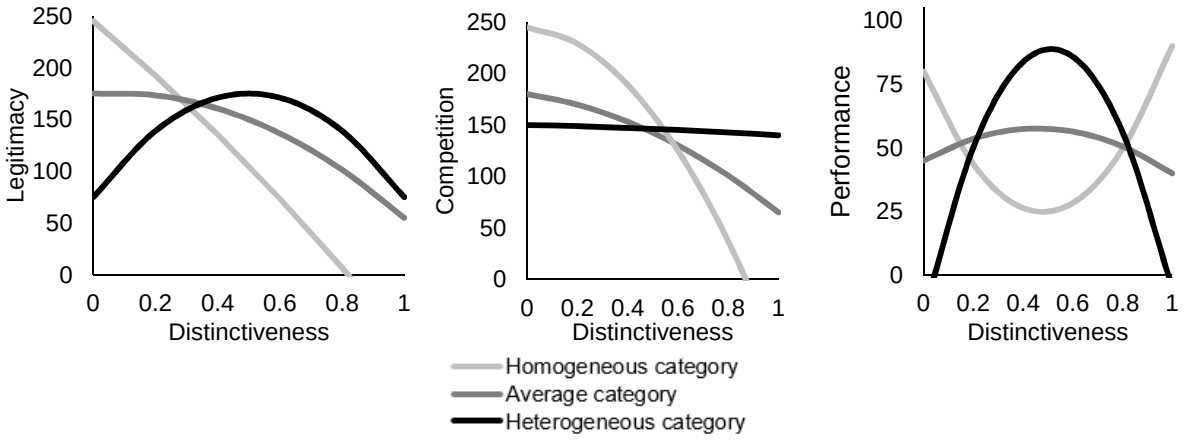


Figure 2.7: Illustration of the relationship between distinctiveness and legitimacy, competition, and performance at three levels of distinctiveness heterogeneity.

Data and methodology

Sample

I test my hypotheses through the analysis of texts located on the websites of organizations in the Dutch creative industries. This approach is chosen a variety of reasons. First, storytelling, identity, and image construction are crucial aspects of positioning work in the creative industries (DeFillippi, Grabher, & Jones, 2007; Jones, Anand, & Alvarez, 2005) and, second, websites serve as an important avenue for such strategic positioning (Lamertz, Heugens, & Calmet, 2005; Navis & Glynn, 2011). Third, the creation and maintenance of a website is a conscious effort, such that websites likely contain deliberately chosen language capturing the intent of the creator (Ashforth & Mael, 1989). Fourth, the creation and maintenance of websites is widespread across categories and types of organizations and activities, and the fact that websites are freely accessible fosters large-scale and cross-category data collection. Finally, the Dutch context is attractive because Dutch law requires anyone providing goods or services and receiving more than purely symbolic compensation for her or his work to be registered with the Chamber of Commerce. As a result, the Dutch context enables us to capture activities and individuals that may not be formally registered in other countries.

Web scraping methods were used to search for websites for all entities in the Dutch creative industries, basing our search on a list of all unique Chamber of Commerce numbers of those that have one of these industries as their primary industry in the Netherlands. Through these scraping methods, a valid domain was identified for 77,134 organizations. All texts on the front pages of these websites were downloaded and parsed, in addition to all texts on pages linked to the same domain on the front page (to ensure that relevant pages such as “About us”

were included). This resulted in a set of 481,988 individual pages, which were aggregated to the organization level for subsequent analyses.

I cleaned the resulting texts by removing any remaining html code after parsing as well as standard website-related words (such as “contact”, “home”, “website”, “sitemap”) and numbers and special characters. I follow common practice in topic modeling (Blei, 2012; see, for example, Blei & Lafferty, 2007; Kaplan & Vakili, 2015) by removing stop words (for instance, “the”, “and”, and “is”) in both Dutch and English, filler words (such as “lorem ipsum” placeholder texts) and highly infrequent words (defined as words that occur in fewer than 500 of the 77,134 websites). Finally, cases where the domain was still registered, but no longer in use were manually identified by looking for common indicators of such domains. After these cleaning routines, a final set of 70,232 organizations with cleaned, validated texts remains. These texts consist of 63,613,551 words in total and contain 6,697 unique words.

Given that there is no public information about the performance of these (predominantly private and small) organizations, contact information was collected for the 70,232 organizations to request participation in a questionnaire. The websites were parsed for e-mail addresses, which were manually checked to ensure that they referred to the relevant entity, yielding a list of 40,990 e-mail addresses. As the vast majority of identified e-mail addresses were a combination of “info@” and the web domain, I estimated such addresses for the remaining 29,242 websites. External validation services were used to confirm that these addresses were valid and active. This step identified that 3,539 addresses were invalid, while 28,226 of the addresses were of unknown validity (for instance, because the e-mail server was “catch all”). Removal of invalid addressed yielded 66,693 addresses that were contacted through e-mail in March and April of

2015, inviting them to participate in a questionnaire. Respondents were incentivized to participate in the questionnaire by offering personalized reports comparing their scores with overall averages as well as sub-sector specific averages. In addition, 50 national museum subscriptions were raffled among participants. To convince participants of the importance and validity of our study, seventeen industrial and professional associations supported the validation of the survey instruments and sent out messages to their constituents highlighting the importance of participating in the questionnaire; 2,595 questionnaires were completed, yielding a 3.89% response rate.

The "cold call" nature of the request, the fact that in most cases only had general "info@" addresses with often unknown validity existed, and the fact that several informants indicated receiving a very large number of requests to participate in questionnaires all suggest that the response rate is acceptable.[17] After data cleaning by list wise deletion of missing or invalid observations, 2,279 respondents are included in analyses. As such, we combine the textual data from 70,232 organizations' websites (with organizations from 43 4-digit industry codes, making up 481,988 total pages, 63,613,551 total words, and 6,697 unique words, after cleaning) with primary data from 2,279 completed questionnaires. Note that the topic model and all related variables reported below are computed based on the full sample of websites, rather than only the websites of the 2,279 organizations that responded to our questionnaire.

In order to assess the extent of possible non-response bias, I compared early respondents with late respondents based on demographic variables (Armstrong & Overton, 1977). Late

[17] Additionally, it is worth noting that the survey platform used (Qualtrics) indicated that about 37% of individuals contacted opened the e-mail. If we take this 37% as the denominator, our response rate is about 9.5%.

respondents were classified as such when they participated in the questionnaire after receiving a reminder (sent two weeks after initial contact). Of the 2,279 respondents, 1,316 (57.74%) were classified as late respondents. Comparisons of the number of employees, the respondent's age, the respondent's level of education, and revenues using two-sample Kolmogorov-Smirnov tests for the equality of distribution functions and T-tests comparing means between the two groups consistently indicate that early- and late-respondents do not differ on these dimensions, suggesting that non-response bias may be limited in nature (Armstrong & Overton, 1977).

Topic modeling methodology

I apply latent Dirichlet allocation (LDA), a generative probabilistic model for collections of texts (Blei, Ng, & Jordan, 2003), to the full set of organizational websites to model the organization's strategic positioning and identity. Probabilistic topic modeling provides a statistical methodology to discover and analyze latent themes underlying large databases of textual data (Blei, 2012) by using documents and words in the documents, which are observed, to learn the unobserved topic structure, consisting of the topics, the distribution of topics per document, and the distribution of words over topics (Blei, 2012). The central idea behind this methodology is that words more frequently used in conjunction are more likely to belong to the same topic than words that are never or less often used together. LDA is especially attractive for the purposes of this study because it does not require any labeling or keyword application by humans before analysis and does not require any information about the documents when learning the topic structure, allowing the topic structure to emerge entirely from the data. Furthermore, the automated nature of this methodology implies that it is highly suitable for the analysis of very large datasets such as this.

One crucial choice when using LDA is the number of topics to be estimated by the algorithm. However, there are no hard rules for identifying the optimal number of topics, and the few fit measures that exist in the literature tend to produce excessively large number of topics which do not represent distinct meanings and which do not correspond well with human interpretation (Chang, Boyd-Graber, Gerrish, Wang, & Blei, 2009). Because of this, I follow recent recommendations (Blei & Lafferty, 2007; Hall, Jurafsky, & Manning, 2008), and set the number of topics to 100—a number that has been suggested to provide a balance between having an number of topics too large to be interpretable and having too few topics to allow meaningful variation (see also Kaplan & Vakili, 2015). I report results using alternative topic numbers further below.

I use the Gibbs sampling algorithm (Steyvers & Griffiths, 2007) to estimate the model. I follow recommendations made in prior work and set the topic smoothing parameter α to 0.5 and the term smoothing parameter β to 0.1 (Griffiths & Steyvers, 2004; Kaplan & Vakili, 2015; Ramage & Rosen, 2009). These values allow topics and the words assigned to them to be somewhat "coarse", such that an organization can have multiple topics assigned to it and such that a given topic is allowed to have a relatively wide set of words, respectively, compared to lower values for these parameters (Griffiths & Steyvers, 2004). This aligns well with the fact that I study a wide set of categories, as well as with the idea that organizations can combine different elements in their positioning.

By and large, the LDA model is able to identify a wide variety of rather coherent topics, which seem to capture the various dimensions that organizations can use when describing themselves. For instance, some topics are clearly centered on the services that the organization

provides (one topic has as its most important words “education”, “school”, “care”, “schools”, and “students”; another consists of “training”, “course”, “trainings”, “program”, and “programs”), some are more centered on the individuals that make up the organization (“us”, “we”, “our”, and “team” for one topic, “my”, “me”, “story”, “inspiration”, “passion” for another). [18] Some topics emphasize location (“eindhoven”, “tilburg”, “breda”, “maastricht”), while others are more anchored in a specific industry (“video”, “film”, “videos”, “animation” for one topic, “music”, “sound”, “live”, and “club” for another). Yet others are more temporally infused (one in particular is both future-oriented by emphasizing newness as well as backwards-looking by referring to history: “new”, “newest”, “first”, “assignment”, “last”, “start”, and “collaboration”). In all, though the exact nature of the topics is not necessarily of substantive interest for my empirical approach (discussed below), it does appear that the topic model is able to capture the many ways in which organizations use text to position themselves and talk about who they are, what they do, and how they are different, with the topics capturing specific strategic dimensions.

To illustrate how I use the LDA output in my measures, Figure 2.8 illustrates the average topic distribution over the 100 estimated topics for the industrial and graphic design industry, a more heterogeneous industry, together with the topic distribution of a more distinct organization in this industry. On average, organizations in this industry tend to have rather high topic weights for a topic that centered around words such as “design”, “corporate identity”, “logo”, “graphic”,

[18] For illustrative purposes, I provide translations of words of Dutch origin here. I did not translate any content when conducting the analyses, opting to keep all content in its original language. In practice, the topic model is able to deal with the fact that our data consists of multiple languages (predominantly: Dutch and English) quite well. For instance, several topics consisted of a mix of Dutch and English words that are very close in meaning to one another. Furthermore, the use of non-native or multilingual content can be seen as being a way to express a distinct position, which the current approach allows for. By and large, texts in the database tended to be Dutch, however.

and “design”. The second-most important topic, on average, in this industry contained words such as “design”, “graphic”, “branding”, “identity”, and “interior”; being similar in nature to the dominant topic in this industry. As such, the average positioning in this industry seems to be centered on the graphic design aspects of the activities.

Looking at the websites of some of the most average organizations in this industry provides a rough indication of how similar they tend to be. For instance, one organization has on its “About” page only a short piece of text, stating “A logo or corporate identity is one’s face towards the outside world, and it deserves attention. Your assignment receives this attention at [Company name]”. Then, the founder is listed, the founding year is shown, and it is mentioned that prices are competitive and that customer satisfaction is very important. Another average organization states that “[Company name] offers professional and affordable graphical solutions for companies and organizations in any industry. I distinguish myself through my forward-looking vision and the finding of smart solutions that work.” Then, the main specialties of this organization are mentioned (logos, corporate identities, websites, flyers, posters, broches, and social media management).

The highly distinct organization shown in Figure 2.8 has two clear deviations from the average, primarily driven by an emphasis on a topic with words such as “digital”, “animation”,

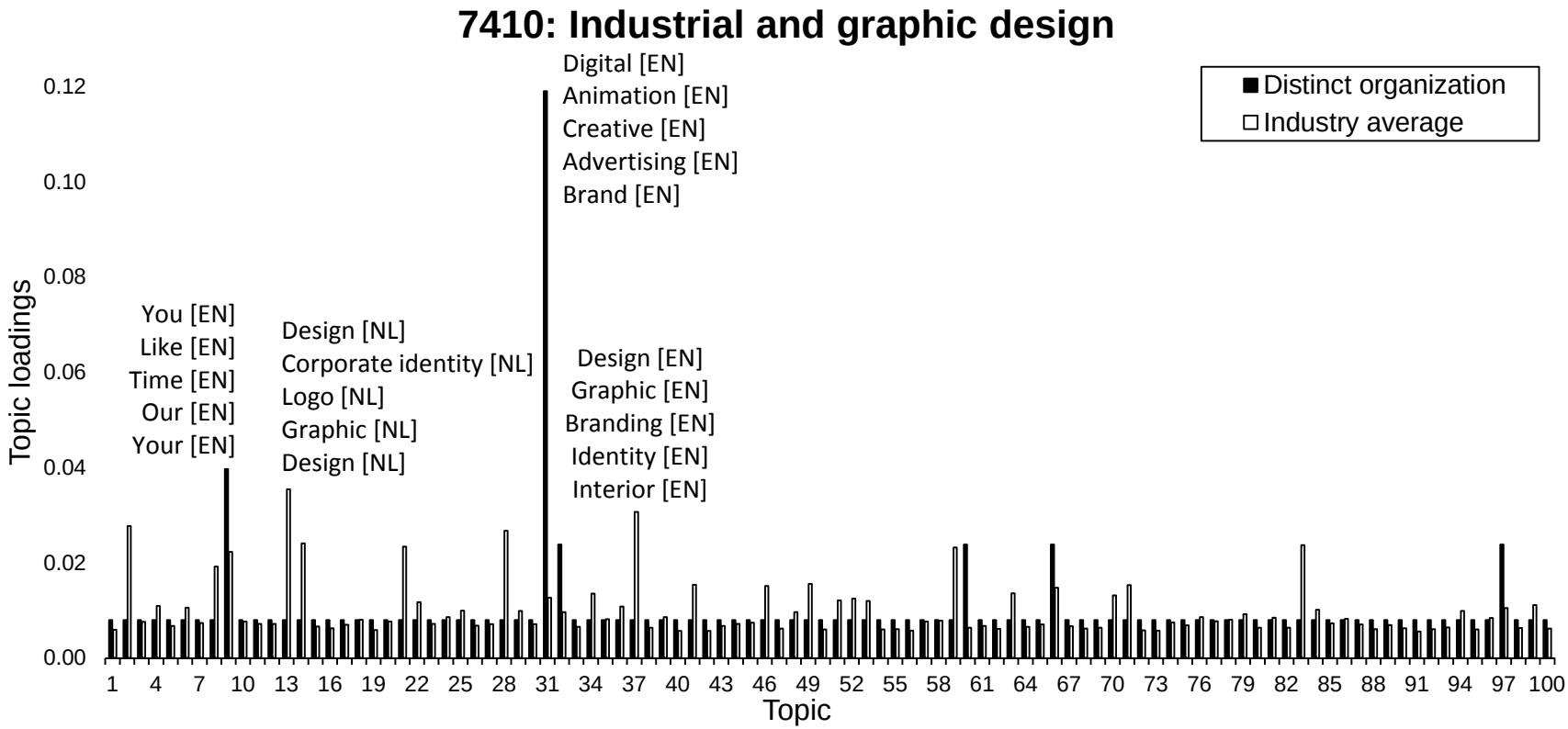


Figure 2.8: Topic distributions for the industrial and graphic design industry.

"creative", "advertising", and "brand", and to a lesser extent one that consists of words such as "you", "our", and "your". The topic model seems to capture quite well what sets this organization apart from the average in this industry, looking more closely at the organization's website. For example, the individual behind this organization describes himself as "a digital creative", stating that "I define myself as a creative, multi-disciplined, ambitious, international, easy-going, self-motivated, and determined person". In describing what sets his activities apart from others, this individual focuses on his skill in video editing, arguing that "film and animation are a very powerful tool to tell a story", though he also emphasizes his experience in print and web design, which are the more typical static media forms in this industry. In all, it therefore seems that our distinctiveness measure (discussed below) is appropriately classifying organizations that are very typical for a given industry as well as capturing more unique organizations.

Measures

Dependent variable: Respondents were asked to indicate in which of the following categories their total *revenues*, in Euro, earned during the past year fell: no revenues (value zero); 1 to 12,499 (value of one); 12,500 to 24,999 (two); 25,000 to 49,999 (three); 50,000 to 99,999 (four); 100,000 to 149,999 (five); 150,000 to 249,999 (six); 250,000 to 499,999 (seven); 500,000 to 999,999 (eight); 1,000,000 to 4,999,999 (nine); and more than 5,000,000 (ten). These categories were chosen in order to be similar to a log-transformation. I focus on revenues as it is a key growth-related construct in entrepreneurial settings such as the creative industries (Gundry & Welsch, 2001; Kolvereid, 1992), and because the sample consists of predominantly small organizations and freelancers, such that revenues can be considered an appropriate measure of

performance, rather than an indicator of size, per se (and I control for a wide range of size classes). Finally, the creative industries are home to a relatively large degree of non-profit activity, and usage of profits as a measure of performance would result in the omission of this group. Respondents were asked to categorize their revenues (see also Porac et al., 1995), rather than report exact values, because pretests suggested that respondents were not aware of their exact revenue values, potentially resulting in missing values or attrition because few respondents would be willing to take the time to look up their exact financial information.

Distinctiveness for organization *i* is computed as $\sum_{T=1}^{100} ABS[(\theta_{T,i} - \bar{\theta}_{T,I})]$, where $\theta_{T,i}$ indicates the organization *i*-specific topic weight for topic *T* and $\bar{\theta}_{T,I}$ indicates the industry *I*-specific average topic weight for topic *T*. In other words, for every organization the sum of absolute deviations from the industry-average topic weight over every topic is calculated. The organization's primary four-digit industry group is used as the reference group for these calculations, thus taking the industry to be representative of the organizational category which the organization predominantly operates in and identifies with (see, for example, Lounsbury & Rao, 2004; Zuckerman, 1999). This measure is conceptually and practically similar to measures of strategic deviation (Deephouse, 1999), strategic conformity (Finkelstein & Hambrick, 1990), idiosyncrasy (Suchman, 1994), and isomorphism (Kraatz & Zajac, 1996), and similarly uses summation of deviations to take into account the fact that an organization's strategic positioning is a holistic concept involving interrelated components (see also: Deephouse, 1999; Finkelstein & Hambrick, 1990). To test for an initial curvilinear distinctiveness relationship, I include the square of this variable.

Distinctiveness heterogeneity: To measure distinctiveness heterogeneity, I compute the sum of standard deviations of the topic weights over every topic at the industry level: $heterogeneity_I = \sum_{T=1}^{100} \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}\left(\theta_{T,i} - \bar{\theta}_{T,I}\right)^2}$, where N indicates the number of organizations with a website in the industry. Put differently, I compute for every topic the industry-specific spread in the usage of the topic, and then sum these up. Industries that have higher values on this measure therefore have greater heterogeneity in topic weights among organizations in the industry. Based on the topic model, I find art galleries, theatre, and architecture to be among the most homogeneous industries, film production, software development, and photography to be moderately heterogeneous, and industrial design, the performing arts, and advertising among the most heterogeneous. This variable is interacted with the distinctiveness measure as well as its square to test for the hypothesized flattening and flip of the distinctiveness relationship (Haans et al., 2016), and is similar in nature to Lounsbury and Rao's (2004) category performance heterogeneity measure.

Control variables: I control for a variety of industry-, organization-, and respondent level variables to isolate the distinctiveness effect. At the industry level, I control for the total number of organizations that are registered in the Chamber of Commerce as having the industry as their primary industry (including those without a website; '*density*'). The main purpose of the inclusion of this variable is to ensure that more general density dependence effects are not driving the effects of interest (Hannan & Freeman, 1977). This variable is divided by 1000, and I include its quadratic term to allow for a non-linear effect. I also control for broad industry type, as delineated by the Chamber of Commerce by including a set of mutually exclusive categories: the arts and cultural heritage ('*arts*'); media and entertainment ('*M&E'*)*;* creative business

services (‘*CBS*’)*;* knowledge-intensive services (‘*KIS*’)*;* creative retail (‘*CR*’); and *other* (including, for example, crafts not captured by the above categories such as jewelry crafting). Arts and cultural heritage functions as the baseline category. The purpose of these variables is to control for the fact that different industries are home to fundamentally differing types of activities which also have different potential for revenue generation, in general.

At the level of the organization I control for the number of ‘*employees*’, obtained from Chamber of Commerce data, which divides organizations into seven size classes: one employee (i.e., freelancers), two to four employees, five to nine employees, ten to nineteen employees, 20 to 49 employees, 50 to 99 employees, and 100 to 199 employees (there are no larger organizations in the sample). For the sake of parsimony, I assign values one through seven to these classes, rather than including size class dummies, as supplemental analyses with such dummies indicated only a linear effect of size while yielding the same effects of interest.

The remaining variables stem from self-reported data originating from the questionnaire: I control for whether or not the organization has any *exporting* activities, as domestic activities may be less influential for such organizations, as well as whether or not the organization has a *creator* role, rather than a role such as distributor or intermediary. I also control for three strategy-related variables: first, respondents were asked to choose whether their organization was mostly *cost-driven* in its activities, or whether they focused mostly on value creation. Second, respondents were asked to indicate the extent to which their organization focused on existing products or services or new products or services (ranging from zero for entirely focusing on existing products or services to one for entirely focusing on new products or services, labeled

'*new products'*). Third, the same was asked for its focus on customers / clients (labeled '*new clients*').

At the level of the individual respondent, the respondent's *age*, gender (1 for *female*, 0 for male), and, to proxy for human capital, *education* (a continuous variable ranging from one [high school] to five [PhD]) are controlled for. I also include an indicator of whether or not the income generated by the organization was the respondent's *sole income* source, as respondents with multiple income sources may position the activities of the focal organizations differently from respondents for whom the organization is the sole income source, may be invested differently in the activities of the organization, and can be expected to have different levels of revenues.

I also control for the extent to which the respondent pursues artistic *goals* with her or his organization: respondents were requested to indicate how important (on a seven-point scale, from very unimportant to very important) they find (i) producing innovative work, (ii) artistic freedom, and (iii) expanding the art form (adapted from Voss, Cable, & Voss, 2000), because respondents may simply be conducting their activities "for art's sake" (Caves, 2000) rather than for economic purposes. Because Cronbach's alpha is low for these three items (0.62), the three items are included separately in models rather than combining them into a single measure. Finally, I include a measure of *creative personality* (using the Creative Personality Scale; Gough, 1979), because this measure has been shown to capture the individual's overall creative potential (Oldham & Cummings, 1996), and because creativity is a crucial trait in the creative industries such that it may independently drive performance (Caves, 2000; Tschang, 2007).

Model

I estimate the following equation for the full model:

$$revenues_i = \exp(\beta_0 + \beta_1 distinctiveness_i + \beta_2 distinctiveness_i^2 + \beta_3 distinctiveness_i * heterogeneity_I + \beta_4 distinctiveness_i^2 * heterogeneity_I + \beta_5 heterogeneity_I + controls)$$

using Poisson regression, as the operationalization of the revenues variable transformed this variable into a non-negative count variable.[19] For all models, standard errors are clustered at the four-digit industry level to account for a lack of independence of observations within industries.

In order to test for the presence of flattening of the curve, I follow recent recommendations and compare the slopes at different values of the moderating variables and at equal distances from the respective turning points of the curves at these values (due to the non-linear nature of the Poisson model, cf.: Haans et al., 2016). For the hypothesized flip (from a U-shape at low levels of heterogeneity to an inverted U-shape at high levels of heterogeneity), I assess whether the point at which the relationship flips (-β_2 divided by β_4) is statistically within the data range of the moderating variable (Haans et al., 2016).

Results

Table 2.1 shows descriptive statistics and correlations. A rather large correlation (of 0.38) between distinctiveness heterogeneity and density is evident, suggesting that industries with

[19] The variable does not exhibit overdispersion, the presence of which would imply the need for a negative binomial regression model. A negative binomial regression model strongly suggests the absence of overdispersion. All results are robust to using OLS regression or Tobit regression, with the revenues variable either log-transformed or untransformed, as well as using an ordered Logit regression model. These alternative models are available upon request.

Table 2.1: Descriptive statistics and correlations

		Mean	S.D.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	revenues	2.82	1.97	0.00	10.00												
(2)	distinctiveness_100	0.89	0.35	0.28	1.98	0.09											
(3)	distinctiveness2	0.91	0.66	0.08	3.93	0.09	0.98										
(4)	distinctiveness * heterogeneity	1.59	0.65	0.42	3.73	0.08	0.99	0.97									
(5)	distinctiveness2 * heterogeneity	1.64	1.20	0.12	7.39	0.08	0.98	0.99	0.98								
(6)	heterogeneity	1.79	0.12	1.19	2.18	-0.07	0.09	0.09	0.24	0.18							
(7)	(density / 1000)	19.12	9.46	0.01	28.38	-0.11	0.03	0.03	0.08	0.06	0.38						
(8)	(density / 1000)2	454.79	313.59	0.00	805.59	-0.08	0.04	0.04	0.10	0.07	0.40	0.97					
(9)	arts	0.37	0.48	0.00	1.00	-0.15	0.00	0.02	0.03	0.03	0.16	0.22	0.20				
(10)	M&E	0.15	0.36	0.00	1.00	-0.01	-0.04	-0.03	-0.08	-0.05	-0.27	-0.38	-0.43	-0.33			
(11)	CBS	0.30	0.46	0.00	1.00	0.09	-0.03	-0.03	-0.01	-0.02	0.11	0.14	0.14	-0.50	-0.28		
(12)	KIS	0.13	0.33	0.00	1.00	0.11	0.07	0.05	0.07	0.05	0.01	0.16	0.18	-0.29	-0.16	-0.25	
(13)	CR	0.00	0.04	0.00	1.00	0.05	0.01	0.01	0.01	0.01	0.00	-0.08	-0.06	-0.03	-0.02	-0.03	-0.02
(14)	other	0.05	0.22	0.00	1.00	0.01	0.00	-0.00	-0.02	-0.02	-0.18	-0.38	-0.32	-0.18	-0.10	-0.15	-0.09
(15)	employees	1.21	0.57	1.00	7.00	0.49	0.10	0.10	0.10	0.09	-0.01	-0.11	-0.08	-0.08	-0.00	0.03	0.06
(16)	organization age	7.12	6.74	1.00	93.00	0.33	-0.03	-0.03	-0.03	-0.03	-0.02	-0.07	-0.05	-0.05	0.05	-0.01	-0.01
(17)	exporting	0.38	0.49	0.00	1.00	0.11	0.06	0.08	0.07	0.08	0.06	0.05	0.05	0.06	-0.01	-0.03	-0.01
(18)	creator	0.85	0.36	0.00	1.00	-0.27	-0.05	-0.05	-0.06	-0.05	-0.03	0.19	0.18	0.09	-0.00	0.05	-0.17
(19)	cost-driven	0.41	0.49	0.00	1.00	-0.08	-0.03	-0.03	-0.03	-0.03	-0.02	-0.04	-0.04	-0.06	0.04	0.01	0.02
(20)	new products	52.73	23.89	0.00	100.00	-0.06	-0.00	-0.00	0.00	0.00	0.04	-0.00	-0.00	0.01	-0.07	0.02	0.01
(21)	new clients	49.49	22.27	0.00	100.00	-0.09	0.01	0.01	0.01	0.01	0.00	-0.00	-0.00	0.04	-0.01	0.00	-0.05
(22)	age	45.47	11.60	18.00	98.00	0.13	-0.02	-0.03	-0.02	-0.02	0.01	-0.04	-0.01	0.11	-0.00	-0.10	-0.04
(23)	female	0.42	0.49	0.00	1.00	-0.24	0.03	0.03	0.05	0.04	0.13	0.06	0.07	0.16	-0.09	0.06	-0.20
(24)	education	2.97	0.84	1.00	5.00	-0.02	0.05	0.05	0.05	0.05	-0.00	-0.01	0.00	0.07	-0.05	0.00	0.03
(25)	sole income	0.72	0.45	0.00	1.00	0.30	0.05	0.04	0.04	0.04	-0.01	0.02	0.03	-0.07	-0.04	0.08	0.02
(26)	goals: innovative work	5.34	1.35	1.00	7.00	0.05	0.02	0.03	0.02	0.03	-0.00	0.04	0.04	-0.05	-0.04	0.06	0.06
(27)	goals: artistic freedom	5.86	1.20	1.00	7.00	-0.27	-0.06	-0.04	-0.07	-0.04	-0.02	0.10	0.07	0.23	0.01	-0.05	-0.26
(28)	goals: expanding art form	5.09	1.56	1.00	7.00	-0.22	-0.04	-0.01	-0.04	-0.02	-0.01	0.07	0.04	0.18	0.04	-0.05	-0.23
(29)	creative personality	4.64	2.98	-5.00	15.00	0.04	0.03	0.03	0.04	0.03	0.03	0.01	0.01	0.05	-0.06	0.00	-0.00

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
(13)	CR																
(14)	other	-0.01															
(15)	employees	0.06	0.01														
(16)	organization age	0.14	0.05	0.33													
(17)	exporting	0.01	-0.04	0.06	0.05												
(18)	creator	-0.10	-0.02	-0.22	-0.14	0.03											
(19)	cost-driven	0.03	0.01	-0.04	0.04	-0.05	-0.04										
(20)	new products	0.01	0.02	0.01	-0.03	0.02	0.02	-0.06									
(21)	new clients	0.01	-0.00	-0.03	0.00	0.00	0.01	-0.02	0.44								
(22)	age	0.05	0.03	0.12	0.40	0.04	-0.09	-0.01	0.02	0.11							
(23)	female	-0.04	-0.00	-0.11	-0.15	-0.11	0.07	-0.03	0.06	0.05	-0.12						
(24)	education	-0.02	-0.13	0.01	-0.05	0.01	-0.02	-0.05	0.01	-0.06	-0.05	0.11					
(25)	sole income	0.00	0.00	0.08	0.05	0.06	-0.01	-0.01	-0.02	-0.06	-0.07	0.02	0.00				
(26)	goals: innovative work	-0.05	-0.02	0.06	-0.07	0.09	0.08	-0.09	0.26	0.13	-0.08	-0.04	0.09	0.02			
(27)	goals: artistic freedom	-0.03	-0.02	-0.16	-0.07	0.06	0.32	-0.05	0.12	0.13	0.01	0.13	-0.06	-0.08	0.19		
(28)	goals: expanding art form	-0.02	-0.01	-0.11	-0.06	0.10	0.27	-0.04	0.20	0.18	-0.01	0.15	-0.06	-0.05	0.28	0.61	
(29)	creative personality	-0.04	-0.00	0.00	-0.00	0.09	0.07	-0.11	0.13	0.09	0.14	-0.00	0.07	0.02	0.19	0.13	0.09

Note: Number of observations = 2,279.

more organizations tend to also consist of a more heterogeneous set of organizations. However, though these variables and the set of interactions included in our equations are highly correlated, the size of the sample should yield sufficient statistical power for the testing of the effects, such that this multicollinearity should not be a major issue. Furthermore, models excluding the density variables yield identical results to those reported below, suggesting that their impact on the focal results is limited.

Table 2.2 contains the results of the Poisson regression. The baseline model, Model 0, indicates that more heterogeneous industries tend to have organizations with lower revenues, that the creative business services in particular have high levels of revenues, that larger and older organizations have higher revenues, as do organizations that have exporting activities. Organizations that are involved in creation, rather than for instance being intermediaries, have lower revenues, as do those that are cost-driven in their strategies and those that focus on new products and services. Older respondents tend to have higher revenues, and female respondents have lower revenues, on average. Education is marginally and negatively related to revenues, while respondents for whom the organization is the sole income source have higher revenues. Individuals who find the production of innovative work more important have higher levels of revenues, while the opposite is found for the other two artistic goals. Furthermore, individuals with a more creative personality have higher revenues, on average.

A linear term of distinctiveness is introduced in Model 1, which is positively and marginally significantly related to revenues: those in the creative industries seem to gain by taking more, rather than less, distinctive positions compared to their industry peers. Model 2 then introduces the quadratic term of distinctiveness to test for an average curvilinear effect of

Table 2.2: Poisson regression results

Outcome: Revenues (count)	**Model 0:** Baseline	**Model 1:** Main term	**Model 2:** Squared term	**Model 3:** Moderation	**RC1:** 75 topics	**RC2:** 125 topics	**RC3:** RoA transformed	**RC4:** Small industries dropped	**RC5:** Winsorized variables
distinctiveness		0.08+	-0.19	-5.23**	-4.27*	-4.33*	-10.03+	-5.17**	-5.02*
		(0.04)	(0.19)	(1.94)	(2.10)	(2.17)	(5.15)	(2.00)	(2.04)
distinctiveness^2			0.14	3.20**	2.76*	2.63*	6.82*	3.15**	3.08**
			(0.11)	(1.09)	(1.20)	(1.20)	(3.05)	(1.15)	(1.16)
distinctiveness * heterogeneity				2.79*	2.50+	2.13+	5.21+	2.76*	2.66*
				(1.10)	(1.31)	(1.13)	(2.90)	(1.13)	(1.16)
distinctiveness^2 * heterogeneity				-1.69**	-1.59*	-1.28*	-3.53*	-1.67*	-1.62*
				(0.62)	(0.75)	(0.63)	(1.71)	(0.65)	(0.66)
heterogeneity	-0.30*	-0.32*	-0.32*	-1.27**	-1.14*	-1.00*	-2.47*	-1.28**	-1.24**
	(0.15)	(0.15)	(0.15)	(0.45)	(0.55)	(0.46)	(1.08)	(0.45)	(0.46)
(density / 1000)	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.06	-0.02	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)
(density / 1000)^2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
M&E	-0.02	-0.02	-0.02	-0.03	-0.03	-0.02	-0.23	-0.04	-0.03
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.17)	(0.07)	(0.07)
CBS	0.14*	0.14*	0.14*	0.14*	0.14*	0.14*	0.22	0.14*	0.14*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.13)	(0.06)	(0.06)
KIS	0.06	0.05	0.06	0.05	0.06	0.06	0.05	0.05	0.05
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.20)	(0.07)	(0.07)
CR	-0.13	-0.14	-0.13	-0.14	-0.15	-0.15	-0.61	-0.12	-0.13
	(0.15)	(0.15)	(0.15)	(0.14)	(0.14)	(0.14)	(0.40)	(0.15)	(0.14)
other	-0.09	-0.09	-0.09	-0.09	-0.09	-0.08	-0.50	-0.09	-0.09
	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)	(0.10)	(0.31)	(0.11)	(0.10)
employees	0.21***	0.20***	0.20***	0.20***	0.21***	0.20***	-0.74***	0.21***	0.20***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.07)	(0.03)	(0.03)
organization age	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.04***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
exporting	0.09***	0.08***	0.08***	0.08***	0.08***	0.08***	0.16**	0.08***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.02)	(0.02)

creator	-0.20***	-0.20***	-0.20***	-0.20***	-0.20***	-0.20***	-0.58***	-0.19***	-0.20***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.14)	(0.04)	(0.04)
cost-driven	-0.12***	-0.11***	-0.11***	-0.12***	-0.12***	-0.11***	-0.27***	-0.12***	-0.11***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.03)	(0.03)
new products	-0.00*	-0.00*	-0.00*	-0.00*	-0.00*	-0.00*	-0.00+	-0.00*	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
new clients	-0.00*	-0.00*	-0.00*	-0.00*	-0.00*	-0.00*	-0.00**	-0.00*	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
age	0.00+	0.00+	0.00+	0.00+	0.00+	0.00+	0.00	0.00+	0.00+
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
female	-0.23***	-0.23***	-0.23***	-0.23***	-0.23***	-0.23***	-0.48***	-0.22***	-0.23***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.08)	(0.03)	(0.03)
education	-0.03+	-0.03+	-0.03+	-0.03+	-0.03+	-0.03+	-0.07	-0.03+	-0.03+
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)
sole income	0.45***	0.45***	0.45***	0.45***	0.45***	0.45***	0.97***	0.45***	0.45***
	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.07)	(0.03)	(0.03)
goals: innovative work	0.03*	0.03*	0.03*	0.03*	0.03*	0.03*	0.08*	0.03*	0.03*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)
goals: artistic freedom	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.14**	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)
goals: expanding art form	-0.02**	-0.02**	-0.02**	-0.02**	-0.02**	-0.02**	-0.06*	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
creative personality	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.03***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
intercept	1.45***	1.41***	1.54***	3.27***	2.84**	2.91**	9.04***	3.27***	3.22***
	(0.37)	(0.38)	(0.37)	(0.84)	(0.95)	(0.90)	(1.96)	(0.85)	(0.86)
Wald Chi-squared	8,626.07***	10,028.16***	10,422.85***	12,628.16***	16,994.77***	13,963.14***	312.02***	16,747.59***	11,595.97***
Log pseudolikelihood	-3,967.91	-3,965.78	-3,964.87	-3,962.37	-3,963.03	-3,963.87	-3,846.60	-3,942.24	-3,962.50
No. of observations	2,279	2,279	2,279	2,279	2,279	2,279	2,279	2,269	2,279

Notes: Standard errors are clustered at the 4-digit industry (43 clusters) and are shown in parentheses. Row "Wald Chi-squared" contains the F-statistic for model RC3, as it is estimated using OLS regression.

+: $p < 0.1$; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, two-tailed.

distinctiveness. The signs of the main and quadratic term of distinctiveness suggest an average U-shaped effect, but the quadratic term for distinctiveness is not statistically significant. As such, this necessary condition for curvilinearity is not met, and there is no average curvilinear effect of distinctiveness on performance (Lind & Mehlum, 2010).

Model 3 contains the results of the full model specification, where interactions between distinctiveness heterogeneity and distinctiveness and its square are included. In line with the hypothesized flattening, a large, negative, and significant coefficient for the interaction between distinctiveness heterogeneity and distinctiveness squared is found, supporting the thesis that the curvature of the distinctiveness-revenues relationship is moderated by category level distinctiveness heterogeneity. Before turning to formal statistical tests, Figure 2.9 illustrates the distinctiveness-revenues relationship at low (average minus 1.5 standard deviation), medium (average), and high (average plus 1.5 standard deviation) values of distinctiveness heterogeneity, showing a strong U-shaped effect exists in highly homogeneous industries. In particular, it is clear that those that deviate from the industry norms in these industries can reap tremendous rewards, while those adhering closely the industry norms also reap greater rewards than those that are more moderately distinct. I calculate the slopes of the curve at this level of heterogeneity, and find that the slopes on the lower end of distinctiveness are negative and significant, while they are positive and significant on the higher end of distinctiveness, thus confirming the existence of a U-shaped effect of distinctiveness in homogeneous industries.

Figure 2.9 suggests that this U-shaped effect flattens as distinctiveness heterogeneity increases. To formally assess this, I compare the slopes in homogeneous and heterogeneous industries to the left of each curves' turning points (as the curves are symmetric around the

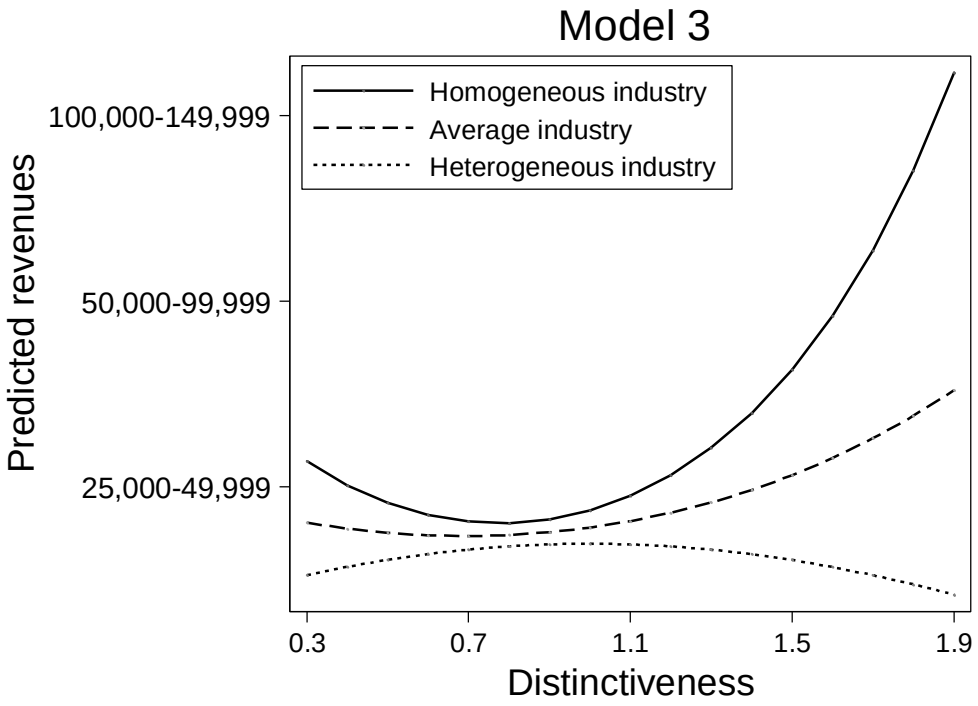


Figure 2.9: The distinctiveness-revenues relationship (from Model 3, Table 2.2) plotted for homogeneous categories, average categories, and heterogeneous categories.

turning point, there is no need to repeat this test to the right of the curves' turning points). For the U-shaped effect of distinctiveness in homogeneous industries, the minimum occurs at a distinctiveness value of 0.77 while for heterogeneous industries the maximum of the relationship occurs at 1.03. Taking 1.5 standard deviations of distinctiveness to the left of these turning points (0.42 and 0.68 in homogeneous and heterogeneous industries, respectively) and comparing the slopes at these values confirms that the effect of distinctiveness on revenues significantly flattens as heterogeneity increases (difference in slopes equals 1.29, Chi-squared[1] = 6.14, p = 0.013). As such, Hypothesis 1 is strongly supported. In monetary terms, the differences at different levels of distinctiveness in Figure 2.9 are large in practical magnitude, as recent reports show that half of entrepreneurs in the Dutch creative industries have a total annual income lower than 30,000 euro (OCW, 2016).

Figure 2.9 also suggests that the U-shaped effect flattens to such an extent that it flips into an inverted U-shaped effect when the industry is highly heterogeneous. However, it is also clear from this figure that the inverted U-shaped effect is very weak. Therefore, I calculate the exact value of distinctiveness heterogeneity at which the relationship flips. This value equals 1.89, with a 95% confidence interval of this point [1.75; 2.04]. Because the maximum of the heterogeneity variable equals 2.18, it appears that this value is statistically within the range of the moderating variable, lending statistical support to Hypothesis 2. However, it is also clear that the inverted U-shape is so weak as to render it meaningless, practically speaking. Economic significance of the flip from a U-shape in homogeneous industries into an inverted U-shape in heterogeneous industries is very weak. Therefore, Hypothesis 2 is statistically, but not practically, supported.[20]

Robustness checks

I conducted a number of robustness checks to verify the identified relationships. These are presented in Table 2.2. First, I checked whether the results are robust to alternative topic numbers. Columns RC1 and RC2 show that the results are unchanged when estimating either 75 or 125 topics for the topic model, such that the results do not hinge upon the specific topic model that I estimated. Then, I performed analyses where the revenues variable was replaced by a variable where the numeric values of the revenues categories were divided by the numeric values of the employee classes currently used as a control. The purpose of this alternative specification

[20] This is further confirmed by a split sample approach. I split the sample into three roughly equals subsamples: those in industries with low heterogeneity values (797 observations), those in industries with high heterogeneity (929 observations), and those in between (553 observations). In the homogeneous subsample, I find a strong inverted U-shape; in the average subsample, I only find a positive linear effect; and I find no effect of distinctiveness in the heterogeneous subsample.

was to get closer to a ROA-type variable by adjusting the revenue variable more directly for current number of employees. The results, estimated using OLS regression and shown in column RC3, remain consistent with those reported above. Fourth, I re-ran all analyses after removing organizations from the sample for which I identified a website for fewer than 100 organizations in the four-digit industry code. This was done because the distinctiveness and distinctiveness heterogeneity variables may be less precise or less meaningful for very small industry groups. This check, reported in column RC4, affected ten organizations in the regression sample, and their omission did not affect the results. Finally, I assessed whether or not the results may be driven by the presence of outliers on either the distinctiveness variable or the distinctiveness heterogeneity variable by winsorizing observations at the bottom and top percentile of these two variables: all results (shown in column RC5) persist when doing so. All in all, these robustness checks further substantiate the findings reported above.

Discussion and conclusion

The choice of being different or the same to others in one's category is a central question underlying strategic behavior. Indeed, one of the core paradoxes at the intersection of strategic management and organization theory is how organizations should best manage the competing pulls towards conformity through isomorphic pressures with the competitive push towards non-conformity to attain competitive advantage (Deephouse, 1999; Durand and Calori, 2006; Zhao *et al.*, 2017; Zuckerman, 2016). Yet, prior work studying the relationship between distinctiveness and performance has come to fundamentally contradictory conclusions, with some finding inverted U-shaped and yet others finding U-shaped effects. This study was therefore driven by the question of whether and under what conditions moderate distinctiveness is optimal. Analyses combining a topic model of over 70,000 organizational websites in the Dutch creative industries

with a questionnaire with over 2,200 respondents show that a U-shaped effect of distinctiveness on revenues exists in homogeneous industries, which flattens out and disappears as the industry becomes increasingly heterogeneous. Thus, the value of distinctiveness depends crucially on what others in one's category do.

Recent work emphasizes that it is "both timely and important to synthesize the literature on optimal distinctiveness, evaluate its strengths and weaknesses, and map out a renewed agenda" (Zhao *et al.*, 2017: 34). My review shows that there are several areas of agreement in the literature, in particular regarding the fundamental mechanisms driving the distinctiveness-performance relationship. More importantly, however, clear disagreement exists on the *exact* nature of the countervailing pressures that drive distinctiveness' effect on performance. This study provides a formalization of each mechanism, building on insights from both organizational theory and strategic management, showing how the existence of countervailing forces is not a sufficient condition for neither a U-shape nor an inverted U-shaped effect of distinctiveness to emerge. Rather, their relative strengths solely determine the outcome, such that a general distinctiveness-performance relationship is difficult, if not impossible, to predict.

This study contributes to the rapidly growing literature on optimal distinctiveness (see Zhao *et al.*, 2017; Zuckerman, 2016 for recent reviews) through its formalization of the countervailing forces driving the effect of distinctiveness on performance—baring the "essential structure or morphology" of optimal distinctiveness theory (Hunt, 1991: 159). This practice of formalization has recently been shown to be oft-neglected but especially important for complex non-linear relationships such as those hypothesized by optimal distinctiveness theory (Haans, Pieters, & He, 2016). Yet, only few studies (e.g., Deephouse, 1999; Jennings *et al.*, 2009; McNamara *et al.*, 2003) were found to explicitly discuss the precise nature of the mechanisms

driving the distinctiveness-performance relationship (that is, over and above general positive or negative effects). Through its formalization, this paper provides an initial step to "sharpen the discussion of the theory" (Hunt, 1991: 159), thus serving as a tool supporting the renewed and enriched agenda on optimal distinctiveness (Zhao *et al.*, 2017) and aiding in attaining both more precise theory and better informed recommendations for practice.

Moreover, the framework developed in this paper provides a stepping stone for researchers to address the call for a theory of how incentives for differentiation and conformity shift depending on context (Zuckerman, 2016). I took an initial step in this direction by investigating the question of how distinctiveness heterogeneity, the extent to which organizations in a category vary themselves in their positions, shapes the legitimacy and competition effects underlying distinctiveness' effects on performance. My multi-level theory of distinctiveness considers how distinctiveness heterogeneity at the category level fundamentally alters the mechanisms driving the effect of distinctiveness at the organization level. Further research in this direction would not only enhance the completeness of optimal distinctiveness theory, but would also provide valuable insights to managers in identifying when and to what extent they should and should not attempt to differentiate themselves from others in their category.

By relaxing the assumption that positions in categories strongly cluster around the average, this study also offers valuable new insights regarding the role and importance of the different conceptualizations of the category prototype (Vergne and Wry, 2014). The results of this study show that distinctiveness as distance from the average position in the category (the dominant reference point in most work on optimal distinctiveness; Vergne and Wry, 2014: 73) loses its effects as heterogeneity increases—suggesting that the prototype-as-average conceptualization is less valuable for such categories. Further study of the role of positioning vis-

à-vis alternative prototypes such as the most salient member of a category or the most salient attributes of category members (Jones *et al.*, 2012) could help further the accumulation of knowledge about the role of different (types of) reference points for optimal distinctiveness, and the boundary conditions of these different conceptualizations.

More generally, this study contributes to the literature on categorization by bringing to the forefront the importance of within-category heterogeneity or variability. Though prior work has shown the important consequences of variability in determining when categories were reconstituted (Lounsbury and Rao, 2004), most work on categories tends to background variability in the pursuit of other questions (Lounsbury, 2001), or has predominantly focused on antecedents and consequences at relatively high levels, such as institutional logics (Lounsbury, 2007). The cross-level mechanisms identified in this study add to the recent calls to shift neoinstitutional theory to studying variability rather than isomorphism (Lounsbury, 2008), with particular potential for a more intensive dialogue with strategic management (Deephouse, 1999; Lounsbury, 2008; Oliver, 1991; Zhao *et al.*, 2017).

The theoretical development underpinning this study was built on an explicit 'between-organization' and 'between-category' theorization as well as cross-sectional analyses, therefore abstracting from temporal considerations. Though this approach usefully simplified the theorization process, studying the interplay between organizational adjustments in positioning and subsequent changes in category level makeup over time provides a prime candidate for further exploration. For example, homogeneous categories become increasingly heterogeneous if more organizations stake out the apparently profitable distinct positions in such categories, and results suggest that the effects of such distinctiveness disappear as heterogeneity increases, begging the question of whether occupying such a (potentially risky) position is worthwhile in

the long run. Similarly, exploring the interplay between industry development and distinctiveness heterogeneity could offer important insights, as many industries are heterogeneous at birth yet converge to a homogeneous dominant design (Anderson and Tushman, 1990; Suarez, Grodal, and Gotsopoulos, 2015). Studying change over time and across levels can thus offer important new insights for optimal distinctiveness (Zhao *et al.*, 2017).

Though this study's application of topic modeling to organizational websites enabled novel cross-industry comparisons, it also begs the question of generalizability and compatibility with other work investigating the effects of distinctiveness. Indeed, many prior studies have focused on "hard" sources of distinctiveness, such as asset positions (Deephouse, 1999), firm actions (Norman *et al.*, 2007), and employment practices (Jennings *et al.*, 2009), though others have also investigated "softer" practices such as distinctiveness in storytelling (Martens *et al.*, 2007) or use of organizational images in communication (Lamertz *et al.*, 2005). Though my empirical results therefore largely speak to this latter group, the theorized dynamics in this paper should be general enough to apply to wider distinctiveness types.

In spite of this, one could also pose that much of what is being said on these websites may simply be rhetorical or posturing, rather than representing actual behavior. However, in the creative industries "all work … in some way or the other is preoccupied with claims to authenticity" (Jones *et al.*, 2005), and websites in particular allow organizations to make such claims to the outside world. Considered as such, rhetoric rather than actual behavior may be what matters most in these industries. In addition, many of the claims made are relatively easily verifiable, such as educational background, place of operation, products and services offered, et cetera, suggesting that many claims made in these texts do capture "true" differences between organizations. Nevertheless, it might be that the softer aspects or rhetoric claims predominantly

affect legitimacy, whereas differences in products and services offered perhaps mostly shape competitive outcomes, while these differential effects may also depend on the heterogeneity underlying the category. Further study is therefore warranted investigating whether and what types of claims made matter most for (the effects of) distinctiveness, and under what conditions.

In conclusion, this paper provides a synthesis of the literature on optimal distinctiveness by evaluating the assumptions underlying prior work and by providing an explicit framework that not only synthesizes prior contradictory findings, but also offers a jumping-off point for future work to build on and expand. There remain many dimensions along which organizational categories—and the organizations therein—differ across space and time, such that more work is clearly needed before we can conclude what level of distinctiveness is optimal for organizations.

CHAPTER 3:

Regional stickiness of novel ideas in the scholarly International Business community: A founding topic model and geographic usage regression of the *Journal of International Business Studies*, 1970-2015

ABSTRACT

We investigate the geographic dissemination of work in the *Journal of International Business Studies* by applying topic modeling to articles published between 1970 and 2015. Our analyses show strong path dependency between the geographic origin of topics and their spread across the world. This suggests the existence of geographically narrow mental maps in the field, which we find have remained constant in North America, widened yet are still present in East-Asia, and disappeared in Europe and other regions of the world over time. These results contribute to the study of globalization in the field of International Business, and suggest that neither a true globalization nor North-American hegemony have occurred.

This chapter is the result of joint work with Arjen van Witteloostuijn.

Introduction

Since the launch in 1970 of the *Journal of International Business Studies* (*JIBS*) as the major outlet in International Business (IB), the academic world has gone through an impressive internationalization process, as is witnessed by the increasing heterogeneity of *JIBS*'s authorship and readership (Cantwell & Brannen, 2016; Cantwell, Piepenbrink, & Shukla, 2014; Cantwell, Piepenbrink, Shukla, & Vo, 2016). More and more author teams consist of researchers from different countries, with IB leading the forefront in this regard (Cantwell et al., 2016), and the field has an especially high proportion of scholars with experience in multiple disciplines and countries (Cantwell & Brannen, 2011). These patterns mirror long-standing calls in IB to globalize or internationalize our research. For example, Thomas, Shenkar, and Clarke (1994: 685) claimed that, to "preserve its leadership in International Business scholarship, *JIBS* must continue to expand its geographical horizons and define new frontiers for research. It must globalize our mental maps".

In spite of this impressive internationalization, a significant body of work also finds that IB phenomena tend to be observed and analyzed from a North-American (specifically: U.S.) perspective and evaluated in terms of their conformity to U.S. standards, pre-empting the emergence of a "truly global perspective" (Shenkar, 2004: 165). Vernon (1994: 227) notes that "U.S. history, values, and institutions continue inescapably to dominate our thinking and narrow our vision," while Thomas, Shenkar and Clarke (1994: 675) reveal "a substantial expansion in the journal's geographic reach over the years, but also a somewhat narrow 'mental map,' with many countries and areas receiving minimal coverage." Most research in IB is conducted in countries similar to the U.S., and the most accurate predictor of the probability of a country being included in a study is its U.S. trade ranking (Thomas et al., 1994). Sullivan (1998), investigating the consequences of this narrow focus, finds that simpler analog reasoning

dominates logics of interpretation in IB research—likely due to a paradigm shift to a North-American positivist approach (Teagarden et al., 1995). These studies therefore beg the question of whether the field of IB has become truly globalized, or whether IB research has actually deepened the institutionalization of North-American influenced research—more in line with the convergence thesis, whereby advances in communication and transportation technology only drive similarity to one dominant view and thus result in extreme homogeneity (Shenkar, 2004).

Recent advances in the large-scale analysis of textual data enable us to approach this question through a new lens. Barley, Meyer, and Gash (1988: 27) argue that "text can be treated as traces of an author's world view, preserved to a point in time and immune to retrospective construction", suggesting that authors' mental maps can be studied through the analysis of their writing and topics of interest. Rather than stopping at descriptive information such as author origins or countries under study, we can now delve deeper into the substantive content of work in *JIBS* by applying advanced topic modeling methodology (Blei, 2012) to analyze the geographic origin and subsequent spread of topics in *JIBS* during the period 1970-2015. Here, we follow Chabowski, Hult, Kiyak and Mena (2010: 925), who pose that by studying "the most influential topics in an academic community, a more complete understanding of its social structure can be discussed as a basis for future theory development." This enables us to investigate whether new ideas in *JIBS* spread independent of their origin, as would be expected from a globalization perspective, or whether North-American ideas dominate across the globe, whereas ideas that originate elsewhere linger and fail to disperse.

We find that the mental maps of IB scholars are substantially narrow in their geographic focus. In particular, North-American scholars rely predominantly on topics that originated in North-America, while East-Asian scholars work by and large on topics originating from East-

Asia. In contrast, European scholars do not exhibit such general geographic patterns in their topic usage. Investigating how these tendencies have changed over time, we find evidence of a recent widening of the mental maps of authors in East-Asia, Europe, and countries outside the three major regions. At the same time, the regional use of North-American research topics is essentially unchanged over time.

This study offers three core contributions. First, it yields new insights regarding the extent to which the scholarly community in IB, as represented by those publishing in *JIBS*, has (not) internationalized along a dimension that is distinct from the focus of prior work describing the field: researchers' mental maps as captured by the research topics they pursue. Second, we shed light on otherwise unnoticed tendencies that exist in the field, with results clearly showing that several latent tendencies against globalization persist. We provide evidence of neither true globalization, nor pure convergence to North-American dominance, but instead of a pattern similar to that underlying regional multinational (Rugman, 2005; Rugman & Brain, 2003; Rugman & Verbeke, 2004), with scholars' work diffusing mostly in their home region in spite of the increasingly international nature of academia. Third, we introduce a novel methodological tool that can be used in the study of textual data—topic modeling—offering great opportunities for IB research more generally, where a linguistic turn has become increasingly apparent (Brannen et al., 2014).

This paper is structured as follows. First, we describe our data collection, sample, and the topic modeling methodology. We continue by describing the topics that emerge from articles published in *JIBS*, and in turn set out the variables that emerge from this model. We then present regression analyses that quantify the geographic patterns emerging from the topic model, and we conclude by positioning these results in the wider International Business literature.

The geographic nature of authors and topics in *JIBS*

Geographical dispersion of *JIBS* authors: Data and descriptive patterns

As we were interested in studying the geographic dissemination of novel ideas published in *JIBS*, we manually coded the location of the primary affiliation at the time of publication of all 2,868 authors who published an article longer than five pages in *JIBS* between its founding in 1970 until the end of 2015 (1,525 articles in total). In cases where author affiliation information was unavailable (which was often the case for the initial years of *JIBS*), we consulted online biographies to complete these data. The patterns that we observe from this effort are consistent with those from prior work (e.g., Cantwell et al., 2016), with authors from the United States making up about 84 per cent of those publishing in *JIBS* in its initial decade, which decreased to 33 per cent in the five most recent years of *JIBS*'s publication. Similarly, the trend that Thomas, Shenkar, and Clarke (1994) observed of Canada and the United Kingdom (UK) rising in importance has continued according to our data, as Canadian authors now make up for 10 per cent, while UK authors for about 7 per cent of authors in *JIBS*, compared to 3 per cent for both groups in the first decade of *JIBS*. Our data also confirm that the geographic diversity of authorship in *JIBS* has clearly increased over the years, where we observe 14 unique countries in *JIBS*' first decade versus 47 in the past five years (see also Cantwell et al., 2016).

However, although encouraging, these figures do not provide any direct evidence for globalizing mental maps, per se. For us, such a globalization would imply that IB scholars have no predilection to study topics that originate from their own region, but rather have an open mind by using research from anywhere in the world. The concept of the mental map originates in geography, being defined as "a model of the environment which is built up over time in the individual's brain" (Graham, 1976: 259). In the context of IB, this translates to a model of the

world of IB research. A truly global mental map implies lack of 'regional stickiness,' meaning that research of a scholar from region *x* is inspired by topics originating from anywhere in the world, rather than primarily by those from this region *x*. To study this issue, we turn to topic modeling in order to build our model of the world of IB research and, in particular, to identify work that first introduced important research ideas.

Topic modeling: an introduction

To identify those articles that introduced new research topics in *JIBS*, we analyzed the full-texts of the 1,525 articles in our sample using topic modeling (Blei, 2012; Blei et al., 2003; Mohr & Bogdanov, 2013). Topic modeling provides an automated machine learning procedure for coding the essential content of a collection of texts into a set of substantively meaningful categories—topics (Mohr & Bogdanov, 2013). Because novelty detection is a central aim of topic modeling (Blei et al., 2003), this suggests that it provides a highly suitable tool for us to identify the articles that introduced new research topics. Indeed, topic modeling has seen recent applications to identify new research topics in scientific articles (Blei & Lafferty, 2007), as well as breakthrough innovations using patent abstracts (Kaplan & Vakili, 2015). An attractive trait of this methodology over citation-based identification of important articles is that it allows for the possibility that new research topics were not picked up in the literature (indeed, in our final model there are thirteen topics that are used in five or fewer articles), as well as for the possibility that highly influential articles in terms of subsequent impact are not necessarily the first to discuss a topic. Moreover, because topics are assigned to articles based on the core content of the articles, this enables us to identify and count articles that truly built upon a topic, as opposed to citing important work in a more ceremonious manner. Finally, the data-driven

nature of the topic model is attractive in that it operates completely independently from our own mental maps, which may in and of themselves shape or even bias our assessment of important research topics and articles in IB.

We use the variational expectation maximization algorithm of Latent Dirichlet Allocation (LDA: Blei et al., 2003), which is a statistical model of language that discovers the latent topic structure underlying a collection of texts (DiMaggio, Nag, & Blei, 2013). We clean our data by removing terms that appear fewer than fifty times across all articles in *JIBS*, as well as those that appear in fewer than ten documents (see, for example, Blei & Lafferty, 2007 for similar practice). This leaves us with a vocabulary of 9,934 unique terms and a total of 6,217,182 terms across all documents. In practice, the input for this model is a document-term matrix, where rows are the individual documents (1,525, in our case) and columns are unique terms across all documents (here: 9,934 terms). Each cell contains the number of times a given term occurs in a given document.

The basic intuition is that words that are more often used together are more likely to belong to the same topic than words that are less frequently used together. LDA attempts to uncover the unobserved topic structure that most likely generated the observed data by modeling a generative process where the researcher knows what mixture of topics she or he wants to produce (for instance: emphasizing cross-cultural differences, but not transaction cost economics). Each document is viewed as a 'bag-of-words' that is produced according to these mixtures, and each topic is itself a distribution over all observed words (that is, a topic on cross-cultural differences is assumed to place greater emphasis on words such as 'culture' and 'difference' than a topic on transaction cost economics). Given these distributions, the researcher picks more important words with a greater probability and places these words in the document

until it is complete (see also Mohr & Bogdanov, 2013, for an intuitive discussion of this method). Having uncovered the unobserved topic structure, the algorithm yields two key outputs: per topic, word distributions across all unique words capturing how important or how frequent each word is in each topic, and per document a distributions over all topics to indicate how important each topic is for each article.

The crucial choice in LDA is the number of topics that needs to be identified by the algorithm, which has to be fixed before estimation by the researcher. However, there are no hard rules for deciding on the optimal number of topics, and the few fit measures that exist in the literature tend to produce an overly large number of topics that do not represent distinct meanings nor correspond well with human interpretation (Chang et al., 2009). Therefore, we follow recent recommendations (Blei & Lafferty, 2007; Hall et al., 2008), and start by setting the number of topics to 100 (see also Kaplan & Vakili, 2015). To ensure that this number provides the best fit to our data, we also estimated topic models with 50, 75, 125, and 150 topics, and assessed the degree to which each topic from these models describes a coherent, sensible research topic based on its words and the articles assigned to it. This entailed an iterative process, whereby we first attempted to label each topic solely based on its most important words. Then, we turned to the topic founding articles, being the first article in the set to have the focal topic as its primary topic of discussion, to ensure that there was a close match between the topic label and the topic of the founding article. We then did the same for a random selection of articles that are assigned to the topics. Where necessary, we updated the topic label or classified the identified topic as incoherent when mismatches between topics and articles were evident.

During this process, we also counted the number of topics that appeared to be mixtures of two or more seemingly separate topics (so-called “chimera topics”; cf. Schmidt, 2012). For

instance, one such chimera in our final model has amongst its most important words “internet”, “terrorism”, “tax”, “ecommerce”, “web”, and “penalty”. Its topic founding article is “A Survey of Corporate Programs for Managing Terrorist Threats” (Harvey, 1993), and articles that are classified as belonging to the topic included “Terrorism and International Business: A Research Agenda” (Czinkota, Knight, Liesch, & Steen, 2010) and “Another Day, Another Dollar: Enterprise Resilience Under Terrorism in Developing Countries” (Branzei & Abdelnour, 2010)—which both clearly fall within the purview of the founding article and topic—yet also articles such as “Is eCommerce boundary-less? Effects of individualism-collectivism and uncertainty avoidance on Internet shopping” (Lim, Leung, Sia, & Lee, 2004) and “Profiles of Internet buyers in 20 countries: Evidence for region-specific strategies”, which clearly do not fall within the theme of the topic founding article. As about half of the assigned articles to this topic were clearly about the Web whereas the other half of the assigned articles to this topic were clearly about terrorism, this topic was classified as a chimera.

These robustness checks clearly confirm 100 topics as providing the most optimal fit to work published in *JIBS*, as it has the highest degree of sensible topics (93.0 percent versus 72.0, 81.3, 84.8, and 84.7 percent for the models with 50, 75, 125, and 150 topics, respectively), as well as the lowest number of chimera topics (2.0 per cent versus 18.0, 5.3, 2.4, and 4.7 percent for the models with 50, 75, 125, and 150 topics, respectively). This number is also suitable for our purposes, as it strikes a good balance between the number of topic founding articles (providing sufficient observations for subsequent statistical analysis) while not spreading the data too thin in terms of the articles that can be assigned to every topic (such that we have sufficient variation in our dependent variables). As shown further below, our key results are nevertheless robust to other topic numbers.

Topics in *JIBS*, 1970-2015

Table 3.1 contains the topics identified by the 100-topic model. We classify topic founding articles by focusing on the highest topic weight assigned to every article, and then selecting those articles that were the first to discuss this topic in *JIBS*. The topic model performs well, as we are able to label the vast majority of topics emerging from the model in a straightforward manner. In fact, we observe only one topic that we are entirely unable to label, and two chimera topics. We also identify three clearly empirical topics (related to, for instance, general measurement issues). Throughout the remainder of this article, we report results with these six topics excluded, but all findings are entirely robust to their inclusion (available upon request).

The face validity of the topic list reported in Table 3.1 is high, we believe, in terms of both completeness and variation. Of course, the outcome of the algorithm cannot be perfect, being associated with method-specific Type I and II errors. Some articles viewed by some as being the founding article for a given topic may not appear as such based on the model, while conversely some of the identified articles may not be considered to be founding by others. Similarly, the model may not identify certain research topics which some view as important. This is inevitable ("all quantitative models of language are wrong—but some are useful"; Grimmer & Stewart, 2013: 269), but immaterial for the purpose of the current study given that we examine patterns of founding topic origin and usage in terms of regional stickiness. These patterns are, by and large, unlikely to be affected by a few of such errors listed above, and may even be attenuated by them by introducing a certain degree of randomness to the model.

We identify geographic patterns by allocating all authors' affiliation at the time of publication over four focal geographic 'regions': East-Asia, Europe, North America, and Other

Table 3.1: Topics discussed in *JIBS* and their founding years

Label	Top 5 words	Year
Foreign policy	countries, government, foreign, policy, investment	1970
Exchange rates	exchange, rate, rates, foreign, currency	1970
IB education	business, international, education, schools, students	1970
Disclosure practices	accounting, companies, disclosure, financial, practices	1970
FDI	firms, foreign, firm, domestic, size	1970
Consumers / brands	consumer, consumers, brand, products, country	1971
Management and control	managers, control, management, company, companies	1971
Unions and labor	labor, production, union, unions, offshore	1971
Financial planning	financial, percent, foreign, planning, companies	1971
Exporting and importing	trade, exports, export, innovation, import	1972
International trade	countries, country, data, international, trade	1972
Differences in values	managers, values, management, differences, study	1973
Marketing strategies	market, product, marketing, markets, strategy	1973
Exporting	export, exporting, firms, exporters, studies	1974
International business	business, international, research, new, world	1974
Licensing / tech transfer	technology, licensing, patent, rights, transfer	1974
Finance	debt, financial, financing, capital, ratio	1974
Culture	culture, people, business, cultural, new	1975
Risk reduction	risk, market, returns, stock, political	1976
International trade	trade, percent, countries, united, west	1976
Institutions	institutional, economic, systems, business, press	1976
Strategic management	management, strategic, business, process, managers	1977
Theory of the firm	theory, international, firm, firms, business	1980
Six sigma adaptation	adaptation, six, sigma, crossborder, practice	1980
FDI	investment, foreign, international, countries, country	1981
Values and identification	identification, organization, values, organizational, lean	1981
Marketing channels	relationship, performance, channel, marketing, commitment	1982
Ownership / performance	firms, performance, firm, board, ownership	1982
Purchasing	suppliers, supplier, new, automotive, supply	1982
Hofstede's dimensions	culture, cultural, national, hofstede, values	1983
Cross-cultural research	cultural, research, studies, culture, management	1983
Negotiations (in China)	negotiations, chinese, negotiation, business, negotiators	1983
Global strategy	global, strategy, strategic, business, integration	1984
Japan / Korea	japanese, japan, firms, management, korean	1984
India	industry, firms, indian, india, transparency	1984
Diversification-performance	diversification, firm, performance, international, firms	1985
Entry mode choice	entry, mode, choice, modes, foreign	1986
Job satisfaction	satisfaction, job, leadership, employees, organizational	1987
Expatriate adjustment	expatriate, expatriates, adjustment, international, career	1989
FDI	fdi, investment, host, direct, foreign	1989
CSR	csr, social, corporate, firms, stakeholder	1990
IB journals	international, business, research, journals, management	1991
Joint ventures	joint, ventures, venture, control, partners	1991
Chinese market	local, china, chinese, foreign, market	1991
Innovation / Patents	patent, innovation, technological, patents, knowledge	1992
IJVs	ijv, ijvs, partners, partner, control	1992
Internationalization	internationalization, international, firms, firm, foreign	1993
Chinese values	values, chinese, hong, kong, china	1993
HRM practices	practices, employees, human, management, hrm	1994
Target-acquirer	acquisitions, target, acquisition, firms, acquirers	1994
Knowledge transfer	knowledge, transfer, social, management, international	1994

Real options	affiliates, affiliate, growth, uncertainty, options	1994
Banking and finance	banks, bank, foreign, banking, international	1995
Trust	trust, relationships, partners, business, international	1996
TCE	governance, opportunism, contract, relational, contracts	1996
Corruption	corruption, countries, international, business, government	1996
Learning and experience	experience, international, jvs, learning, business	1996
International growth	economic, business, growth, development, international	1996
MNCs	mncs, mnc, business, value, management	1996
Location decisions	location, firms, locations, geographic, cities	1998
Global climate change	environmental, mindset, global, climate, change	1998
Strategic alliances	alliance, alliances, international, strategic, partners	1998
Spillover effects	productivity, foreign, firms, spillovers, fdi	1999
Cultural / social values	cultural, social, values, psychology, behavior	1999
Internationalization	international, internationalization, business, internationalisation, market	1999
Learning	knowledge, learning, organizational, capabilities, international	1999
Services	service, services, clients, client, global	2000
Elections / Politics	election, business, elections, country, france	2000
Cultural distance	distance, cultural, international, differences, business	2001
International law	financial, law, countries, index, variables	2001
Family firms	firms, corporate, family, firm, governance	2002
Foreign entry	firms, entry, foreign, country, firm	2002
MNC-subsidiaries	subsidiary, subsidiaries, parent, mnc, headquarters	2002
Political power	political, power, conflict, bargaining, project	2002
MNEs	mnes, mne, international, subsidiaries, new	2003
Transitions and change	management, business, transition, studies, research	2004
Born-globals	international, firms, business, performance, internationalization	2004
Regional strategies	regional, region, regions, global, rugman	2004
Culture	international, culture, business, values, global	2004
Plants and production	plant, costs, production, knowledge, local	2004
Emerging markets	markets, emerging, business, strategy, international	2004
SOE privatization	state, ownership, privatization, research, schemes	2004
Network studies	network, ties, firms, networks, innovation	2004
Entrepreneurship	entrepreneurs, entrepreneurship, entrepreneurial, social, business	2005
Financial markets	bond, rating, sovereign, spreads, institutional	2005
Venture capital	venture, investment, capital, firms, iso	2006
Language	language, english, international, linguistic, team	2006
Women studies	gender, women, model, female, ikea	2006
SOEs in China	soes, state, government, chinese, ownership	2007
Home country effects	firms, effects, industry, country, home	2008
Institutions	institutional, institutions, firms, business, international	2008
Governance	activity, foreign, activities, governance, business	2010
Accounting	firms, information, earnings, accounting, foreign	2011

countries.[21] To elaborate on the patterns that emerge from the topic model, we visualize the geographical spread of three topics in Figure 3.1. The left panel shows the usage of Hofstede's (1983) work on cultural dimensions (articles using this topic are shown with rhombuses on the map). This European topic's most important words are "culture", "cultural", "national", "hofstede", and "values". It was predominantly picked up from 1995-1999 onwards by North-American scholars, but has seen recent usage by European scholars—in particular in the Netherlands—and scholars from other countries.

The middle panel illustrates the use of Rugman's (1976) work on risk reduction by international diversification (with articles shown using triangles). This North-American topic had as its most important words "risk", "market", "returns", "stock", "political", and saw a spike in usage when it first arose, remaining mostly in North-American as time went on. The right panel shows the usage of a recent topic of multiregional origin centered on international strategy, with a focus on understanding the interplay among firms and places in emerging markets in particular (Ricart, Enright, Ghemawat, Hart, & Khanna, 2004; articles using this topic are shown with squares). Its most important words are "markets", "emerging", "business", "strategy", and "international", and our figure shows that this topic has seen most of its use in the east of North-America and in East-Asia.

The world map illustrates the dominance of North-American in terms of absolute numbers of publications, as the majority of papers within these three topics have a North-American author on the team. Yet, at the same time, a certain degree of regional clustering in

[21] The following countries are allocated to East-Asia: China, Hong Kong, Japan, Korea, Macau, and Taiwan. The following countries are European: Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, France, Finland, Germany, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Russia / USSR, Slovenia, Spain, Sweden, Switzerland, the Ukraine, and the United Kingdom. The two North-American countries are Canada and the United States of America. All remaining countries are allocated to the "Other" category.

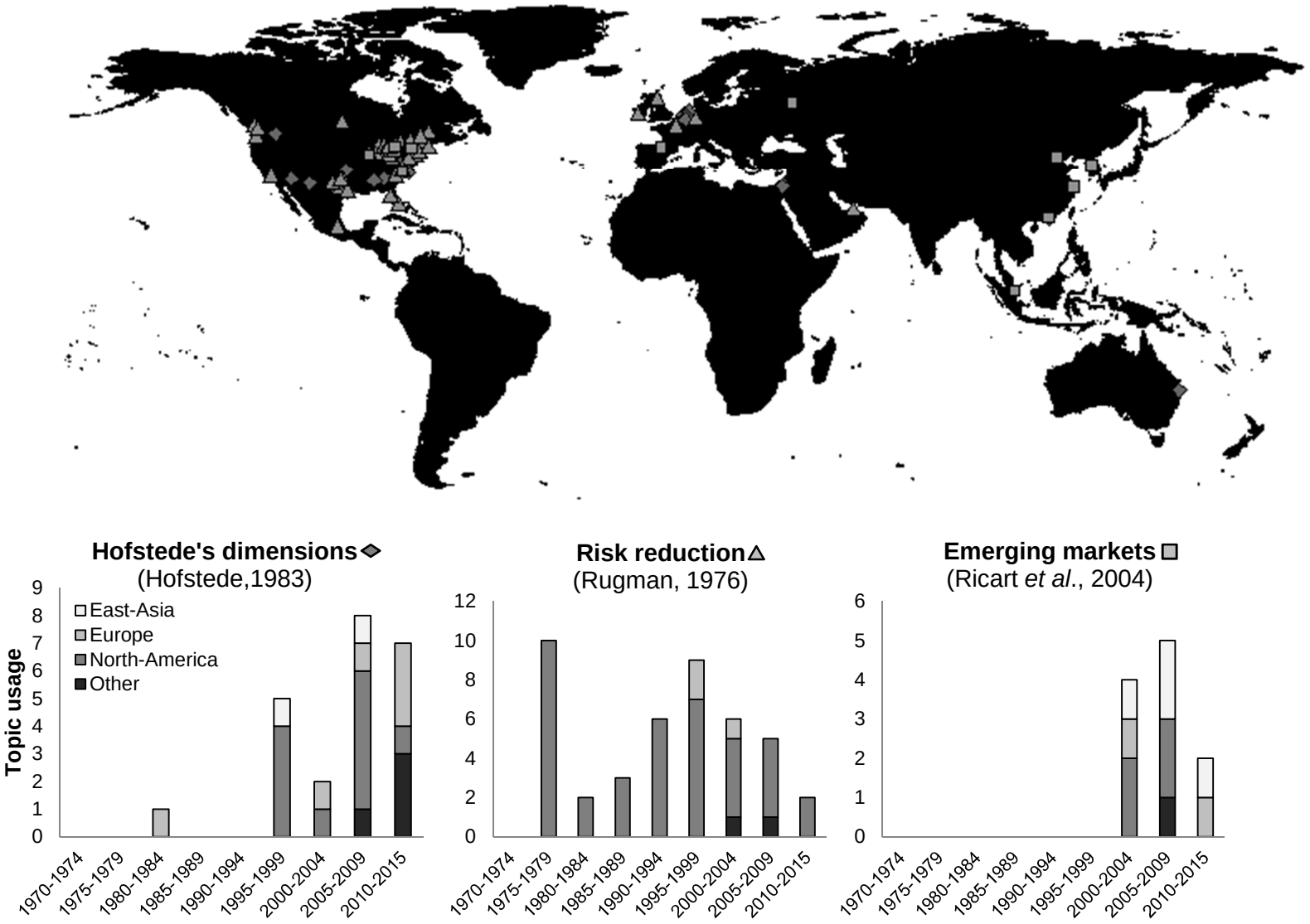


Figure 3.1: Regional topic usage of three research topics in *JIBS*.

terms of topic usage is evident from this figure as well, with topics seeing disproportionate use in their region of origin. However, because this figure provides little in the way of systematic insights, we continue by analyzing the origin and spread of topics and their usage across the four regions using negative binomial regressions that link the geographic origin of a research topic to its region-specific usage. We take as our unit of analysis the topic founding article, resulting in a sample of 101 articles that were classified as topic founding.[22] In this way, we can analyze whether or not authors tend to build predominantly on research topics that originated from the region in which they were working at the time of publication in order to assess to what extent research topics in IB are geographically sticky. Before presenting our findings, we first introduce our variables and regression methods.

Variables and methods

Outcome variables

In order to study the geographic dissemination of the different topics in *JIBS*, we counted the total number of times each topic appeared as articles' primary topic over the years. We separated this count into the four different regions: East-Asia, Europe, and North-America, and other countries. That is, for every article in *JIBS*, we checked the affiliation of each author and added the article to each respective count when any of the article's authors belonged to one of the four regions. This resulted in four outcome variables: '*Topic usage in East-Asia*', '*Topic usage in Europe*', '*Topic usage in North-America*', and '*Topic usage in other countries*'. We removed founding articles from these counts to prevent inflation of these counts.

[22] This count is greater than the number of unique topics given that some topics were introduced by multiple articles in the same issue of *JIBS* – analyses where we constrain research topics to single articles yield the same results as those reported below (available upon request).

Explanatory variables

We allocated each of the founding articles to the four regions above, based on the authors' institutional affiliations at the time of publication, such that four dummy variables are created: '*East-Asian origin*', '*European origin*', '*North-American origin*', and '*Other origin*'. The '*Other origin*' category serves as the baseline category in our regression analyses. Authors teams in which the authors are spread across multiple regions are assigned to each of these regions.[23]

Control variables

At the author level, we control for whether or not any of the article's authors is affiliated to one of the 56 universities that were ever ranked in the top-25 universities between 1990 and 2015 in the UT Dallas Ranking ('*Top 25 affiliated*') based on the full set of journals included in the ranking. Scholars from high status universities may be more well-known in the field, and their scientific discoveries may therefore disseminate more widely in the field (Medoff, 2006). This ranking was chosen because it is based exclusively on research output, which makes it attractive given our focus on research-related variables. Including all 56 universities enables us to code top affiliation for all articles in our dataset, including those before 1990. Second, we include the '*Percentage of female authors*', as work conducted by female authors may be received differently in different areas of the world (Larivière, Ni, Gingras, Cronin, & Sugimoto, 2013). Additionally, we control for the number of authors (with dummy categories for articles

[23] When controlling for whether or not the topic founding author team is multi-regional, we find that the difference in topic usage for the 'other' countries reported in Model 4 disappears. Consistent with robustness checks reported further into this chapter, this confirms that this effect is not robust in nature. All remaining effects persist when including this control variable. Nevertheless, because this control variable is very highly correlated with the different region indicators and with team size, we opt to report models excluding the variable throughout.

with '*One author'*, '*Two authors*', '*Three authors*', and '*Four-plus authors'*, where the single author dummy is the baseline category) as larger author teams are more likely to be from multiple regions and have more opportunities to spread the word on their work.

At the level of the article, we control for log-transformed '*Number of pages*' and '*Title length*' (in characters), as articles and titles of different lengths may be more able to capture and keep the attention of audiences (Stremersch, Verniers, & Verhoef, 2007). Furthermore, we include the total '*Article impact'* in terms of the citations that the article accrued up to and including 2015 to proxy for the topic founding article's inherent quality (taking the natural logarithm plus one due to the extremely skewed nature of this variable). We collected this information from Google Scholar, as it also indexes articles from *JIBS*'s initial years whereas alternatives such as Web of Science do not. Similarly, we control for the '*total usage*' of each topic to ensure that our outcome variable is capturing region-specific usage, rather than more general, worldwide usage patterns.

We also coded, for each of the topics, whether or not the topic had an international or cross-cultural focus based on the words assigned to the topics, as more '*internationally-focused*' topics may have a wider applicability—thus potentially limiting the inherent stickiness of a research topic. For instance, the topic of expatriate adjustment (with words such as "expatriate", "expatriates", "adjustment", "international", "career investment") is inherently more internationally flavored than topics such as disclosure practices ("accounting", "companies", "disclosure", "financial", "practices"). We also classified whether or not the topic being introduced was anchored explicitly in a specific country or region, as such a geographic focus may limit the ability of scholars worldwide to build on the topic. As we found that only Asian countries were dominant in multiple topics (such as topics on Chinese values or on Japanese and

Korean management), we label this variable '*Asia-focused*'. In addition, we control for whether or not the article appeared in a *'Special issue'* of *JIBS*, because special issues serve a tailored purpose in the creation and dissemination of new research (Olk & Griffith, 2004). Finally, we add a set of year dummies, in three-year increments, to control for time of publication effects. Some topic founding articles were the only such article in their year of publication, such that inclusion of single-year dummies was not practically feasible.

Table 3.2 shows descriptive statistics and bivariate correlations for our variables. It appears that topic usage counts for the four regions are distinct from one another, suggesting some geographic fragmentation, as correlations among the four variables are only modest. For example, topic usage in East Asia only has a correlation of 0.07 with topic usage in North America, while topic usage in Europe has a correlation of 0.10 with topic usage in North America. About 9 per cent of topic founding articles had an East-Asian scholar on the research team, while 18 per cent of articles included a European scholar. Furthermore, 82 per cent of topic founding articles had a North-American scholar on the team, and about 9 per cent of topic founding articles had authors affiliated to universities elsewhere in the world. These numbers therefore confirm a North-American dominance, as observed by Thomas and colleagues (1994), with the vast majority of new topics being introduced by scholars from North-America.

Regression model

The different types of geographic topic usage are all of a count nature and exhibit overdispersion, implying that ordinary least squares would yield inefficient and biased estimates (Greene, 2008). Therefore, we model our outcome variables using the negative binomial regression method. We follow recommendations for the interpretation of effects in such models by reporting and testing for differences in average predicted topic usage for each of the different

Table 3.2: Descriptive statistics and correlations

	Mean	S.D.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Topic usage in East-Asia	1.81	1.86	0.00	9.00	1.00							
(2) Topic usage in Europe	3.80	3.14	0.00	18.0	0.26	1.00						
(3) Topic usage in North-America	9.96	7.89	0.00	37.0	-0.02	0.10	1.00					
(4) Topic usage in other countries	1.69	1.56	0.00	8.00	0.21	0.20	0.00	1.00				
(5) East-Asian origin	0.09	0.29	0.00	1.00	0.35	-0.06	-0.14	0.20	1.00			
(6) European origin	0.18	0.38	0.00	1.00	0.06	0.05	-0.19	-0.11	-0.05	1.00		
(7) North-American origin	0.82	0.38	0.00	1.00	-0.08	-0.07	0.18	0.04	-0.13	-0.53	1.00	
(8) Other origin	0.09	0.29	0.00	1.00	0.07	-0.07	-0.16	-0.07	-0.10	-0.05	-0.31	1.00
(9) Top 25 affiliated	0.45	0.50	0.00	1.00	0.18	-0.04	-0.16	0.05	-0.00	-0.16	0.42	-0.14
(10) Percentage female authors	0.11	0.24	0.00	1.00	0.04	0.06	-0.14	0.16	0.03	-0.13	0.01	0.09
(11) One author	2.76	0.38	1.61	3.40	0.36	0.15	-0.37	0.14	0.23	0.17	0.03	-0.01
(12) Two authors	4.33	0.34	3.04	5.11	0.13	-0.02	-0.15	0.16	0.07	-0.07	0.05	0.06
(13) Three authors	0.49	0.50	0.00	1.00	-0.15	0.14	0.48	0.12	-0.16	-0.19	-0.07	-0.10
(14) Four+ authors	0.33	0.47	0.00	1.00	0.00	-0.01	-0.29	-0.16	-0.14	0.23	0.05	0.00
(15) ln(Nr. of pages)	0.13	0.34	0.00	1.00	0.10	-0.13	-0.22	0.04	0.19	-0.10	0.02	0.09
(16) ln(Title length)	0.06	0.24	0.00	1.00	0.16	-0.10	-0.13	0.02	0.36	0.10	0.01	0.07
(17) ln(1+ Article impact)	4.72	1.61	0.00	7.93	0.37	0.32	-0.24	0.20	0.15	0.19	-0.05	-0.05
(18) Total usage	13.52	8.57	1.00	41.0	0.07	0.37	0.94	0.11	-0.13	-0.17	0.15	-0.16
(19) Internationally-focused	0.67	0.47	0.00	1.00	0.02	-0.05	0.13	0.17	-0.08	-0.17	0.12	-0.08
(20) Asia-focused	0.07	0.26	0.00	1.00	0.18	-0.16	-0.11	0.03	0.05	-0.03	0.03	-0.09
(21) Special issue	0.16	0.37	0.00	1.00	0.09	0.05	-0.15	0.16	0.15	0.15	-0.08	-0.14

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(10) Percentage female authors	-0.08	1.00											
(11) One author	0.39	0.18	1.00										
(12) Two authors	0.11	0.14	0.34	1.00									
(13) Three authors	-0.31	-0.10	-0.30	-0.09	1.00								
(14) Four+ authors	0.10	-0.00	0.13	-0.01	-0.68	1.00							
(15) ln(Nr. of pages)	0.25	0.12	0.09	0.17	-0.37	-0.27	1.00						
(16) ln(Title length)	0.11	0.05	0.24	-0.03	-0.24	-0.18	-0.10	1.00					
(17) ln(1+ Article impact)	0.13	0.25	0.49	0.16	-0.29	0.21	0.02	0.16	1.00				
(18) Total usage	-0.15	-0.12	-0.30	-0.16	0.49	-0.26	-0.25	-0.18	-0.14	1.00			
(19) Internationally-focused	-0.06	-0.01	0.04	-0.07	0.04	-0.01	-0.11	0.09	0.09	0.14	1.00		
(20) Asia-focused	-0.01	0.03	-0.05	-0.16	-0.03	-0.02	-0.10	0.26	0.05	-0.16	0.19	1.00	
(21) Special issue	-0.12	0.19	0.15	-0.01	0.01	-0.01	-0.09	0.12	0.34	-0.13	0.24	0.10	1.00

region groups (i.e., predicted topic usage given individual values for all articles, averaged at the level of each respective region; cf. Greene, 2008), in addition to coefficient estimates for all our models. We report robust standard errors for all models.

Results

1970-2015

Table 3.3 reports the results of our negative binomial regressions for the whole 1970-2015 time window, where Model 1 focuses on topic usage by East-Asian scholars in *JIBS*. We observe a significant and positive coefficient for the East-Asian origin dummy, suggesting that topics originating from East-Asia are used more frequently by East-Asian scholars. To investigate this more precisely, we compute average predicted topic usage for topics of East-Asian origin and compare this with average predicted topic usage for topics originating anywhere else in the world.[24] On average, predicted topic usage of East-Asian topics by East-Asian scholars equals 3.89, while predicted topic usage for topics originating elsewhere equals 1.61 (the difference between these values is statistically significant: $\chi^2[1] = 25.78$, $p = 0.000$). In other words, East-Asian scholars' mental maps seem geographically limited, as they build upon East-Asian topics 2.42 times more often than topics originating from outside East-Asia. Several other variables also predict topic usage by East-Asian scholars. Topics that were founded by teams with a larger proportion of women are used less often in East-Asia: a topic introduced by a team with no women is used more than twice more often than a topic introduced by a team with only women

[24] We report only the comparison between articles from the focal region and articles originating from anywhere else (i.e., combining the remaining three categories into a single comparison group) because comparing each and every geographic region would encompass six comparisons per model. Conducting such a large number of comparisons would greatly increase the probability that false positive findings arise. Regardless, the statistical patterns that emerge when conducting each possible comparison are consistent with the more general comparisons reported in the paper. These full comparisons are available from the authors.

Table 3.3: Results of negative binomial regression

	M1: Topic usage in East-Asia	**M2:** Topic usage in Europe	**M3:** Topic usage in North-America	**M4:** Topic usage in other countries
East-Asian origin	0.58*	-0.20	-0.13	0.96***
	(0.26)	(0.26)	(0.16)	(0.27)
European origin	-0.08	-0.43+	-0.03	0.00
	(0.29)	(0.24)	(0.13)	(0.35)
North-American origin	-0.32	-0.31	0.06	-0.04
	(0.30)	(0.23)	(0.12)	(0.22)
Top 25 affiliated	0.12	-0.03	0.09	0.54*
	(0.23)	(0.15)	(0.07)	(0.24)
Percentage female authors	-0.82*	-0.21	0.13	0.45
	(0.36)	(0.25)	(0.16)	(0.30)
Two authors	0.49	0.60*	0.01	-0.38
	(0.38)	(0.27)	(0.10)	(0.30)
Three authors	-0.07	-0.20	-0.03	0.77**
	(0.24)	(0.18)	(0.10)	(0.26)
Four+ authors	0.00	-0.05	-0.09	-0.23
	(0.26)	(0.18)	(0.09)	(0.23)
ln(Nr. of pages)	0.37	-0.08	-0.08	0.10
	(0.26)	(0.31)	(0.13)	(0.24)
ln(Title length)	0.06	-0.14	0.08	-0.38
	(0.30)	(0.29)	(0.18)	(0.43)
ln(1+ Article impact)	0.17+	0.12*	-0.01	0.19*
	(0.09)	(0.06)	(0.02)	(0.09)
Total usage	0.05**	0.05***	0.05***	0.02
	(0.02)	(0.01)	(0.00)	(0.02)
Internationally-focused	-0.06	-0.39*	-0.11+	0.57*
	(0.20)	(0.17)	(0.07)	(0.22)
Asia-focused	0.35	-0.49+	0.16	-0.35
	(0.25)	(0.26)	(0.18)	(0.36)
Special issue	-0.28	-0.02	0.22+	-0.45+
	(0.29)	(0.18)	(0.11)	(0.24)
Intercept	-2.66+	-0.50	1.76***	-4.21**
	(1.40)	(1.05)	(0.48)	(1.38)
Wald Chi-squared	277.54***	220.48***	1071.65***	203.11***
Log pseudolikelihood	-145.44	-206.17	-234.02	-146.61
Nr. of observations	101	101	101	101

Notes: Robust standard errors in parentheses. Topic usage excludes founding articles.
Baseline category for region comparison is "other countries".
+: p < 0.1; *: p < 0.05; **: p < 0.01; ***: p < 0.001, two-tailed.

(2.03 versus 0.89: $\chi^2[1] = 8.53$, $p = 0.004$), and both total article impact and total topic usage have positive effects on East-Asian topic usage, although topic usage has a stronger effect (predicted East-Asian usage increases from 1.03 to 2.55 moving from the 5th to the 95th percentile for article impact and from 1.18 to 4.30 for total topic usage).

Model 2 contains estimates where topic usage by European scholars is the outcome variable. We find no evidence of regional stickiness in Europe, as the European origin dummy variable is marginally significant and *negative*. However, the difference in average predicted topic usage between European and other topics is not statistically significant (4.19 versus 3.72, $\chi^2[1] = 0.99$, $p = 0.320$). Hence, we do not observe any clear geographical patterns in topic usage by scholars affiliated to European universities. We do find that longer topic founding articles tend to get used more often by European scholars (average marginal effect equals 2.29, $p = 0.026$), while, again, both total article impact and total topic usage have positive effects, and topic usage once more has a stronger effect (predicted European usage increases from 2.62 to 4.90 moving from the 5th to the 95th percentile for article impact and from 2.30 to 8.61 for total topic usage). Interestingly, we find that European scholars are less inclined to use topics either with a clear international focus (decreasing usage from 5.00 to 3.37, $p = 0.026$) or an Asia-focus (decreasing usage from 3.89 to 2.37, $p = 0.019$).

Model 3 contains results for topic usage by North-American scholars. We again do not observe any significant origin dummies. However, comparing average predicted topic usage of North-American topics and of topics originating anywhere else, it becomes clear that North-American scholars build significantly more on North-American topics (average predicted topic usage equals 10.63 for North-American topics versus 6.89 for topics originating anywhere else: $\chi^2[1] = 49.44$, $p = 0.000$). North-American topics are thus regionally sticky in nature, with North-American scholars using such topics 1.54 times more often than other topics. In terms of our control variables, we find that total topic usage positively predicts North-American topic usage (average marginal effect equals 0.538, $p = 0.000$), but total citations does not. North-American scholars tend to build slightly less on internationally-focused research topics (which decreases

topic usage from 10.80 to 9.67, $p = 0.103$), and more on topics that originate from special issues of *JIBS* (increasing topic usage from 9.74 to 12.09, $p = 0.075$).

Finally, Model 4 takes topic usage in all other countries of the world as its dependent variable. We find that the difference between average predicted topic usage for topics that originate from one of the other countries and those from the three major regions is statistically significant (1.29 versus 1.73, $\chi^2[1] = 7.00$, $p = 0.008$), showing that these scholars build more heavily on topics that come from one of the three major regions. Thus, these scholars use topics 0.75 times *less* often if they do not originate from one of the three major regions. As the East-Asian origin dummy is particularly large and significant, this suggests that scholars from these other countries especially prefer building on East-Asian topics. Our control variables show that topic founding articles that originate from one of the top research institutes in the world tend to be used more often (1.36 times versus 2.33 times, $p = 0.032$), and that scholars from the other countries tend to prefer articles that have longer titles (average marginal effect equals 1.31, $p = 0.004$). For this group, we find that only article impact, and not total topic usage, is a strong predictor of topic usage in the other countries (average marginal effect equals 0.314, $p = 0.038$). Moreover, scholars from these countries tend to favor internationally-focused topics (increasing topic usage from 1.14 to 2.02, $p = 0.003$) and use topics that are introduced in special issues less often (decreasing topic usage from 1.89 to 1.21, $p = 0.039$).

Summarizing the above, we find that topics of East-Asian and North-American origin are regionally sticky in the sense that they are used predominantly by authors located in those regions, pointing towards rather narrowly focused mental maps of scholars in these regions. At the same time, we do not observe a clear geographic pattern in the topic usage of European scholars. Interestingly, scholars that are not located in one of the three major regions have a

distinct mental map of their own, as they tend to build more on research topics that originate from one of the three major regions—in particular East-Asia.

Robustness analyses

We ran several robustness analyses (all full results available upon request). First, to assess to what extent our findings are dependent on our choice of the number of topics identified by the topic model, we ran analyses based on 75- and 125-topic models. For both models, significant patterns for East-Asian and North-American scholars persist, while the lack of a geographic pattern in topic usage by European scholars remains for both models. However, we find that the decreased local topic usage by scholars in the other countries disappears in both the 75- and 125-topic model, suggesting that this pattern is not very robust. Second, to ensure that our findings are not the result of topic founding authors themselves building on their own work, we re-ran our models after excluding from the different counts those articles in *JIBS* written by the founding authors. This affected 31 topics' usage counts, yet all results persist entirely. Third, we re-ran our regression models after removing topics that were founded before 1980 to ensure that our regression model is not biased by a possible tendency of the model to over-allocate topic founding status to early articles. All patterns reported above persisted for this reduced sample.

We also re-ran our models whilst separating the United Kingdom from the remainder of Europe, given that the United Kingdom has a distinct role within the scholarly IB community, hosting amongst others the famous Reading School and natively sharing the lingua franca of *JIBS*. There are nine topic founding articles from the other European countries, eight from the U.K., and one with scholars both from the U.K. and Europe. When we take topic usage in the remaining European countries as our outcome variable—also separating the original "European topic" dummy—we still do not find any evidence of regional stickiness of European (i.e., non-

U.K.) topics. Interestingly, we do identify rather strong regional stickiness of U.K. topics when taking topic usage by U.K. scholars as the outcome variable: U.K.-based scholars, on average, use a research topics 3.00 times when this topic originates from the U.K., compared to 1.02 times when it does not ($\chi^2[1] = 33.16$, $p = 0.000$). As such, while we do not observe regional stickiness in mainland Europe, such stickiness does appear to be present for the U.K.

To assess to what extent our results may be driven by differing academic origins of authors, rather than their location at the time of publication, we estimated a model where we controlled for the region where the authors' highest degrees (typically, a Ph.D.) were obtained. We were able to identify the academic origin for 94 out of our 102 author teams, reducing our sample size slightly. Of these 94 teams, 5.31 percent had at least one author who was obtained her or his degree in East-Asia, 18.09 percent in Europe, 88.30 percent in North-America, and 1.06 percent in the other countries. Controlling for these dummies, we find that all results are unchanged from those reported in Table 3.3. Along similar lines, we ran models where we replaced the original region dummies based on affiliation at the time of publication with these academic origin dummies. These models confirm the regional stickiness of East-Asian and North-American topics, and interestingly enough also provide evidence of regional stickiness for European topics: topics that were founded by scholars who received their highest degrees in Europe tend to be used more frequently by other European scholars (4.88 times versus 3.51 times, respectively; $\chi^2[1] = 5.38$, $p = 0.020$). Similar to the results reported above, the stickiness for the other countries disappears for this analysis, though this may also be driven by the fact that only one topic was founded by a scholar with training outside the three major regions.

We also checked the extent to which author mobility may be driving these identified effects. Specifically, we created an overview of each author who founded a new research topic as

well as published two or more articles in our total sample (176 unique authors). We then created, for each author, a chronological overview of her or his publications and where the focal author was located at the times of publication. We then created a set of variables capturing whether or not the focal author switched from or to any of the other regions before and after the publication of the topic founding article. We then estimated our models again, controlling in each model for the two variables corresponding to the relevant region. For example, we estimated Model 2 from Table 3.3 while also controlling for whether or not any of the authors was located in Europe in the past (but not when publishing the focal article) and whether or not any of the authors would move to Europe in the future (but was not located there at the time of publication of the focal article). We find that our reported results are unaffected, suggesting that inter-region mobility of authors across their careers is not confounding our effects.[25]

Finally, we conducted analyses using citation patterns to assess the extent to which the topic modeling approach is distinct from a citation-based approach. Specifically, we used Google Scholar to identify all works that cite the topic founding articles, then created a selection of those articles that are in our sample of *JIBS* articles (to ensure comparability between our topic usage models and these models), and finally created a new set of variables based on where the author teams of these citing works were located. We used this information in two ways: we first re-estimated our original models while also controlling for how often scholars in each respective region cited the founding article. This check was conducted to ensure that our topic usage patterns were not capturing otherwise omitted region-specific citation patterns. We find that all reported results from Table 3.3 are unaffected by the inclusion of region-specific citations.

[25] By and large, inter-region mobility is rather low: three scholars moved to East-Asia after publication of a topic founding article; one moved to Europe; five to North-America; and one to the other countries. No topic founding authors were located in East-Asia before publishing the founding piece while located in another region; five moved from Europe; two moved from North-America; and one from the other countries.

Moreover, we find that these region-specific citation patterns do not substantively predict topic usage in the respective regions—only the number of citing articles from Europe marginally predicts topic usage by European scholars (each additional citation from Europe increases topic usage in Europe by 0.110: $p = 0.098$). As such, regional topic usage appears to be distinct from region-specific citation patterns, per se.

Then, we also ran a series of negative binomial regression models where we take region-specific citations as the dependent variables, controlling for the focal region's topic usage and all other control variables from Table 3.3. Starting with citations from East-Asian *JIBS* articles, we find strong evidence for regional stickiness of East-Asian topics for this outcome as well: East-Asian-origin topics are cited 2.33 times by East-Asian scholars, on average, compared to 1.26 times by topics originating elsewhere ($\chi^2[1] = 9.31$, $p = 0.002$). Neither region-specific topic usage nor total topic usage predicts citations from this region. Other significant predictors of East-Asian citations are having an affiliation to a top 25 university (an increase from 0.99 to 1.72, $p = 0.075$), having three authors (a decrease from 1.82 for sole-authored articles to 0.82, $p = 0.049$), and total article impact (average marginal effect equals 1.26, $p = 0.000$).

For European citations, we again find no evidence of regional stickiness to the founding topic, although the number of European articles using the topic in future work does increase citations coming from European scholars (average marginal effect equals 0.350, $p = 0.001$). In contrast, we find that total topic usage is *negatively* related to citations from European scholars (average marginal effect equals -0.253, $p = 0.001$). As we parcel out topic usage from Europe, this implies that European scholars seem to build less heavily on topics that are used outside of Europe. Similar to East-Asian scholars, we find that European scholars cite topic founding articles more often when they originate from a top-affiliated research team (increase from 1.64 to

3.30, $p = 0.022$). In contrast to the negative effect of being an internationally-focused topic on European topic usage, we observe that European scholars cite topics with an international focus *more* often (an increase from to 1.71 to 2.78, $p = 0.017$). Though this is purely speculative, it may be that European scholars more ceremoniously cite international topics, while being more substantively concerned with less internationally focused topics (as captured by the results for topic usage). European scholars cite topic founding articles with longer titles more often (average marginal effect 1.66, $p = 0.024$), articles written by three authors are cited less often (a decrease from 3.56 for sole-authored articles to 1.33, $p = 0.006$), and total impact is again the dominant predictor of region-specific citations (average marginal effect equals 2.39, $p = 0.000$).

With regards to North-American citations, we find no evidence of regional stickiness based on the North-American origin dummy—in contrast to the patterns identified based on topic usage. At the same time, the number of North-American articles using the topic in future work increases citations coming from North-American scholars (average marginal effect equals 0.325, $p = 0.025$), while total topic usage is again negatively related to region-specific citations (average marginal effect equals --.382, $p = 0.004$), controlling for region-specific topic usage and thus capturing a different type of regional stickiness. In terms of control variables, articles by two, three, and four or more authors are all cited less often than sole-authored articles (5.44, 4.35, and 3.12 versus 7.61, respectively; $p = 0.069$, 0.003, and 0.001, respectively). We also find that North-American scholars cite internationally-focused topics more often (an increase from 3.92 to 6.40, $p = 0.001$), and Asia-focused topics less often (a decrease from 6.02 to 3.69, $p = 0.004$). Total impact once again is the dominant predictor of region-specific citations (with an average marginal effect of 4.76, $p = 0.000$).

For the remaining countries, we find no evidence of regional stickiness based on the origin dummy. While the number of articles from the other countries using a topic doesn't affect citations from this region, we do again find a negative effect of total usage (controlling for usage from the focal region: average marginal effect equals -0.04, $p = 0.058$). As in the three other models, author teams with three authors are cited significantly less often than sole-authored topic founding articles (0.63 versus 1.77, $p = 0.000$), and total article impact has the largest effect of all variables (average marginal effect equals 1.03, $p = 0.000$).

These supplemental regression models confirm that, while there are certain areas of overlap, topic usage and citations have distinct drivers and characteristics. In all, the primary driver of region-specific citations is total citations, while we found earlier that one of the more dominant drivers of region-specific topic usage was total topic usage. Though we do not identify consistent region-of-origin effects of topic founding articles, our analyses do suggest that region-specific citations are frequently driven by others within the same region building on the same topic, whereas work from outside the region using the topic dampens use in the focal region. As such, we interpret these results as providing further evidence of regional stickiness of research topics, albeit less driven by the nature of topic founding articles and more so by local use in the communities that subsequently emerge from these articles within the topic's region of origin.

Post-hoc analyses: Patterns before and after 1992

In order to examine if and to what extent the above topic usage patterns have changed over the years, we re-ran our regression models after adding interaction terms between the three region dummies and an indicator of whether or not the topic founding article originated before 1992 or not. We chose this particular year, as it lies in the middle of the 1970-2015 time period and is, incidentally, the median year of topic founding in our data (such that about half of the

topic founding articles were published before 1992). We take an interaction rather than a split-sample approach, as this enables direct statistical comparison of usage patterns between these two periods in a clean and straightforward manner. Furthermore, a split-sample approach would reduce our already small sample even further, leading to potential power-related issues. For the sake of space conservation, we report average predicted usage counts for each of the models in the two time periods in Table 3.4 (full regression tables on which these calculations are based are available upon request).

Table 3.4: Results of pre- and post-1992 comparison of topic usage

Pre-1992 topics		**Post-1992 topics**	
M1: Predicted usage in East-Asia		**M1: Predicted usage in East-Asia**	
East-Asian topic: 7.00	Difference χ-sq[1]: 81.60, p = 0.000	East-Asian topic: 3.00	Difference χ-sq[1]: 5.29, p = 0.021
Anywhere else: 1.51	Ratio: **4.64**	Anywhere else: 1.71	Ratio: **1.75**
Difference between ratios (Wald test statistic *z):* 4.09, p = 0.000			
M2: Predicted usage in Europe		**M2: Predicted usage in Europe**	
European topic: 6.14	Difference χ-sq[1]: 8.01, p = 0.005	European topic: 2.61	Difference χ-sq[1]: 6.61, p = 0.010
Anywhere else: 3.68	Ratio: **1.67**	Anywhere else: 3.75	Ratio: **0.70**
Difference between ratios (Wald test statistic *z):* 3.48, p = 0.001			
M3: Predicted usage in North-America		**M3: Predicted usage in North-America**	
North-American topic: 15.45	Difference χ-sq[1]: 31.84, p = 0.000	North-American topic: 5.68	Difference χ-sq[1]: 5.33, p = 0.021
Anywhere else: 11.14	Ratio: **1.39**	Anywhere else: 4.18	Ratio: **1.36**
Difference between ratios (Wald test statistic *z):* 0.13, p = 0.898			
M4: Predicted usage in other countries		**M4: Predicted usage in other countries**	
Other countries: 0.19	Difference χ-sq[1]: 71.21, p = 0.000	Other countries: 1.61	Difference χ-sq[1]: 0.15, p = 0.670
Anywhere else: 1.75	Ratio: **0.11**	Anywhere else: 1.68	Ratio: **0.96**
Difference between ratios (Wald test statistic *z):* -6.39, p = 0.000			

Several patterns arise from these regressions. First, it is clear that the relative usage of East-Asian research topics by East-Asian scholars has diminished over time. East-Asian topics founded before 1992 were used 4.64 times more often by East-Asian scholars than topics founded anywhere else during this period, whereas this ratio decreased to 1.75 in the recent time period (the difference between these ratios is significant: $z = 4.09$ with $p = 0.000$).[26] In other words, the regional stickiness of East-Asian research topics appears to have diminished in recent decades, albeit still present to a significant degree in recent years. Next, in terms of topic usage by Europeans, we find that in the pre-1992 period European research topics were used significantly more often by Europeans than non-European topics (1.67 times more), such that European topics originating from this time period appear to be regionally sticky. However, the opposite is found for more recent European topics: Europeans used European topics founded in 1992 or after 0.7 times *less* than non-European topics (the difference between these two ratios is statistically significant: $z = 3.48$ with $p = 0.001$)—a sign of a globalizing mental map on the European continent. This provides an explanation for the lack of any geographical pattern in the total period, as the two opposite effects may have canceled each other out.

Strikingly, we find no decrease in the regional stickiness of North-American topics, as North-American scholars used North-American research topics 1.39 and 1.36 times more often in the two periods (this difference far from statistically significant: $z = 0.13$ with $p = 0.898$). The North-American mental map remained rather North-America-centric over the whole 1970-2015 time window. Finally, we observe that for the remaining countries the heightened usage of topics from the three major regions has diminished in the most recent period. Whereas scholars from

[26] We focus on comparison of ratios rather than comparisons of absolute differences, as pre-1992 articles have had more time to accumulate topic usage. The more meaningful comparison lies in differences in the *relative* usage, rather than absolute differences, between time periods.

the other countries used topics from these countries 0.11 times less than those from the three major regions in the pre-1992 period, this ratio increased to 0.96 for topics founded in or after 1992 (the difference between these ratios is significant: $z = -6.39$ with $p = 0.000$). In a way, this suggests a trend toward a more balanced mental map in this part of the scholarly IB community.

Discussion and conclusion

We set out to assess the extent to which the mental maps of researchers in International Business (IB) have (or have not) expanded in conjunction with the increasing globalization of the field. While authors publishing in *JIBS* indeed come from increasingly diverse disciplines and regions of the world (Cantwell et al., 2014, 2016), when investigating the topics that researchers publishing in *JIBS* investigate, we find that many mental maps of IB scholars remain substantially narrow in their geographic focus, as many research topics exhibit a degree of regional stickiness and thus seeing use mostly in their home regions. For instance, our regression models establish that scholars in North-America rely predominantly on research topics that originated in North-America, while East-Asian scholars work by and large within the purview of topics originating from East-Asia. In contrast, European research topics do not exhibit such general geographic patterns in their topic usage.

The times also seem to be changing in some parts of the world, however: the regional stickiness of East-Asian is significantly lower for topics that were founded more recently, and we find that European topics were only sticky before 1992. In fact, European scholars in recent years have relied *more* on research topics from outside Europe than on European topics, while scholars from countries outside the three major regions are increasingly balanced in their geographic use of topics—all suggesting a widening of the mental maps of authors in these regions. At the same time, the regional stickiness of North-American research topics is

essentially unchanged over time. As such, we confirm and expand upon the trend identified by Thomas et al. (1994) that North-America had left a significant mark on the mental map of International Business scholars. Though our results indicate that, indeed, a narrow focus on North-American research persists, we also find that such a regional focus is not specific to North-American scholarship. Similar narrow foci exist or have existed in the different geographic communities in the field. Therefore, we offer evidence of neither globalization, nor convergence to North-American dominance. Rather, our results suggest strong fragmentation into regional communities, each with their own dominant research topics seeing mostly local use.

These patterns of regional topic usage add new evidence against the convergence thesis of North-American dominance, where improvements in communication and transportation technology increasingly lead to similarity to work and practices from this region. This is in line with recent observations by Shenkar (2004: 165), who noted how work identifying clash rather than convergence gained less traction in the field than would be expected. We observe that the field has not so much reached a level of knowledge similar to that of a transnational firm, transcending regional boundaries and considering the entire global domain in its production (Dunning, 1989). Rather, topics in the field instead seem to more resemble regional multinationals (Rugman, 2005; Rugman & Brain, 2003; Rugman & Verbeke, 2004), with scholars' work within a topic diffusing mostly in their home region, in spite of the increasingly international nature of academia. This metaphor is obviously imperfect, as we find evidence not so much of knowledge producers having a home-region orientation (though this may certainly be a driver of our effects), but rather of knowledge consumers absorbing and using local knowledge, yet offers some potential drivers of our identified effects (discussed further below).

Our results offer a contribution to the field of international business by identifying clusters of regional knowledge different from the regional know-how ("the understanding of different national environments and their cultural, religious, political and economic variations and their correlates"; Shenkar, 2004: 168) identified as a core competency of the field in prior work. We have identified clusters of topical knowledge specific to, but not necessarily about, the different regions under study, and our findings show that these clusters have developed rather isolated from one another. What can be done to overcome such stickiness? Here, we mirror Shenkar's (2004) call to balance the global and local requirements of the field, as aiming exclusively for globalization runs the risk of losing the richness of region-specific knowledge. Special care therefore needs to be taken that no one region dominates another when conducting inter-region work (Thomas et al., 1994).

Several strategies can be used for such inter-regional research by both IB researchers and institutions in the field, such as the AIB. For researchers, both the seeking of new subject locations that allow effective further theory development by offering an environment that is different from the one in which a given topic was originally developed (Boddewyn, 1997, 1999) as well as cross-theory and cross-region application and comparison (Child, Chung, & Davies, 2003) may help move the field forward by blending and extending specialized, otherwise locally embedded, knowledge. Researchers can also gain by joining global gatherings such as the annual meetings of the AIB in order to disseminate their work to researchers from other regions while also being exposed to their work in order to widen their mental maps. Institutions—both professional associations and universities—could support such activities by establishing collaborations with regionally-focused institutions from other regions and to foster inter-region mobility of their constituents. In our view, such strategies could enable researchers to be exposed

to topics and scholars from other regions, without needing to sacrifice their local knowledge the process.

This study contributes to work interested in disentangling novelty and usefulness in the study of creativity (Amabile, 1982; Lee et al., 2015) by showing that ostensibly similar types of contributions (topic founding) see widely different, mostly local, use based on where these topics emerge. The fact that these patterns of local use persist even in modern times, where ideas can easily disseminate globally, highlights the importance of accounting for geography in the study of how novel ideas emerge and spread. Though other work has focused on producer characteristics such as team size, gender composition, and interdisciplinarity (Ding, Murray, & Stuart, 2006; Larivière et al., 2013; Lee et al., 2015; Uzzi et al., 2013), our results suggest that considering where producers are located in the world offers another important piece to the novelty-usefulness puzzle. Moreover, our application of topic modeling offers a methodological contribution to this line of work by enabling a robust way of identifying novel work (here: articles that were the first to introduce a particular research topic), as well as a new operationalization of usefulness that is different from bibliometric outcomes that were the focus of prior work (Lee et al., 2015; Uzzi et al., 2013).

This study provides a complementary perspective to prior accounts of the development of the field over the years. In particular, we offer an analysis on a scale that human accounts cannot provide by allowing algorithms to identify patterns that human readers simply would not observe—not even with deep reading of the literature (Blei, 2012). Our work is especially closely related to recent bibliometric and other network analyses of the IB literature (Chabowski et al., 2010; Chabowski, Samiee, & Hult, 2013; Sullivan, Nerur, & Balijepally, 2011), which similarly offer opportunities to quantitatively model fields of study. However, large-scale

bibliometric work typically requires the identification of influential work based on impact, from which networks are then constructed (Chabowski et al., 2010), or requires focusing on work around a more narrowly defined concept (Chabowski et al., 2013). Topic modeling supplements this approach by offering a way to identify novel research, independent of the subsequent impact the research left on the field. Moreover, by prioritizing the essential content of the articles, topic modeling minimizes confounding effects of superficial or ceremonious reference to other work. At the same time, bibliometric approaches enable more explicit tracing of knowledge flows and citation chains over time, whereas topic modeling assumes an implicit, fixed, knowledge structure that articles build on to different degrees (precluding tracking whether one article builds on a prior article, per se, or whether both articles simply work within the same general topic). Clearly, each approach has its distinct (dis)advantages, and further work combining these methodologies stands to offer valuable new insights into the development of the knowledge structures underpinning the field.

The question remains why scholarship remains so regionally sticky in so many regions. Building on the above metaphor of the regional multinational, perhaps some home region advantages (or tendencies) exist that are more pronounced in the regions that we observe to be regionally sticky. For instance, because most ideas apparently originate in North-America (see Table 3.2), there may simply not be a need for North-America-based scholars to globalize their mental maps. In contrast, Europe inherently represents a more fragmented and diverse set of universities and national systems, such that there may be a fundamental tendency to look across borders for relevant work. Another possible explanation could be that scholars tend to follow research topics that are, by their very nature, geographically infused. For instance, one might expect that the regional stickiness of East-Asian topics is driven by a theoretical and empirical

focus on East-Asian countries or cultures. However, the dominant research topic for East-Asian scholars (based on the number of articles with it as the primary topic) is centered on leadership effectiveness and job satisfaction—a topic with no inherent geographic focus. Along similar lines, the Europeans' most popular topic involves theories of the firm, the North-Americans' relates to risk reduction through FDI, and the remaining countries' regards differences in values. None of these three research topics are necessarily reliant on any of these three regions, neither theoretically nor empirically.

Yet another answer might be related to the Americanization of many universities around the world, adopting HR and other practices copied from those well-established in North-America (Tsui, 2013; Üsdiken, 2004). Such practices include HR policies regarding tenure track criteria that tend more toward publishing in a field's top journals, which often originate from the United States. As a result, scholars from all around the world have started to target the same outlets as do their North-American colleagues, implying that they have to conform to what is considered right and relevant in the North-American research community, including research topic choice. All these answers are obviously speculative and incomplete, and as such we see great potential for future work to delve deeper into the drivers of regional stickiness of ideas in IB.

One important disclaimer is in order. We study research topic founding and usage in one journal only: *JIBS*. As such, we cannot truly claim that we examine research topic founding and usage in IB scholarship in general, as much goes on in other journals (inside and outside specialized IB outlets), at conferences, through books, et cetera. Hence, future research is needed to further explore the issues related to community-level topic founding and usage. However, notwithstanding this disclaimer, we believe our findings may well be generalizable beyond *JIBS* alone for at least two reasons. First, *JIBS* is the major outlet in IB, with an impressive advance

over all other IB journals. Thus, we may expect that the majority of the key new ideas in IB are launched or introduced in *JIBS*, rather than in another outlet. Second, and more importantly, our aim is to investigate (changes in) regional stickiness of research topics in IB scholarship, rather than providing an exhaustive list of all topics ever studied in IB. For this, our sample of all articles ever published in IB's main journal should suffice.

Another limitation of our approach is that, by focusing on individual pieces of work, we are effectively abstracting away from the individuals producing the work. There are many cases of scholars switching repeatedly between regions over the course of their careers, as well as influential scholars who have student- or co-authorship networks across the globe. Our coding approach does explicitly not account for such individual histories or networks, rather only coding geographic location of authors at the time of publication. However, our results proved to be robust to controlling for founding author mobility patterns, and we suspect that these matters only stand to dampen the regional stickiness identified as international mobility patterns and globalized author networks would probably lead to more globalized, rather than regional, usage of focal authors' work. Future work combining a topic modeling approach with individual co-authorship networks may yield valuable insights as to what is driving (or dampening) the patterns that we identify.

A final remark relates to our use of topic modeling, which we would like to link to further suggestions for future research. This machine learning methodology, fitting well with the emerging Big Data movement (George, Osinga, Lavie, & Scott, 2016), is widely applicable in IB and can be used to analyze any collection of texts. We focus on journal articles, but other examples in the public domain are annual reports, policy pieces, popular press articles, patents, social media content, and websites (DiMaggio et al., 2013; Kaplan & Vakili, 2015; Mohr &

Bogdanov, 2013). In the context of our study's thematic focus on the evolution of scientific scholarship, future work could add studies on other IB outlets, as well as journals from other disciplines. In so doing, we can examine whether our findings are specific for *JIBS* and / or IB, and how founding and usage topic patterns might differ and interact across disciplines. Future research is clearly needed to examine possible answers to these and other questions. With the ever-increasing multinational nature of scholarship in the field, now seems the perfect time for researchers to widen their mental maps without giving up the specialized, region-specific knowledge that they have built. As such, we can only echo Shenkar's (2004: 166) statement that the "real challenge … is integration, something that IB is especially suitable to address."

CHAPTER 4:

Does it pay to be novel in strategy research? Topic founding, topic recombination, and the role of top affiliation in achieving impact

ABSTRACT

To examine whether and how two types of novelty in academic research—topic founding and topic recombination—influence article impact, we apply topic modeling to all articles in the *Strategic Management Journal* (1980–2010). We reason that fellow researchers rely on author affiliation as a quality cue to decide what to read, cite, and build upon—particularly when they face novel contributions. We find that topic founding and topic recombination both strongly increase impact for articles written by authors affiliated to top universities, while neither raises impact for articles written by authors lacking such an affiliation. These findings support the argument that top affiliation functions as a signaling and legitimation device when fellow researchers evaluate novel contributions, and are suggestive of self-perpetuating inequality in the academic reward system.

This chapter is the result of joint work with Zilin He.

Introduction

The maturation of the field of strategic management has been joined with significant introspection by its participants. Recent studies have analyzed the domain of strategic management to trace its intellectual structure (Ramos-Rodríguez & Ruíz-Navarro, 2004), its historical evolution (Hoskisson, Hitt, Wan, & Yiu, 1999), its definition (Nag, Hambrick, & Chen, 2007; Ronda-Pupo & Guerras-Martin, 2012), and general publishing trends and practices of the *Strategic Management Journal* (*SMJ*), the flagship journal in the field (Phelan, Ferreira, & Salvador, 2002). As this line of inquiry continues to expand, researchers are increasingly interested in obtaining deeper insights into pivotal moments for the field by identifying the key works (Furrer, Thomas, & Goussevskaia, 2008; Ramos-Rodríguez & Ruíz-Navarro, 2004) and influential authors (Nerur, Rasheed, & Natarajan, 2008) that have shaped the field.

In science, pivotal moments are often associated with two types of novel contribution: founding a new research topic (Hoskisson et al., 1999; Ramos-Rodríguez & Ruíz-Navarro, 2004) and recombining distant topics to connect and integrate previously disparate subfields (Schilling & Green, 2011; Uzzi et al., 2013). Whereas topic founding introduces a new conceptual toolkit for future research to extend and build upon, topic recombination unearths hidden knowledge structures and harmonizes varying research streams and approaches in the field. Both types of contribution have the potential to carry the field into new territory by breaking away from extant research trajectories (Dosi, 1982). Because their novelty embodies a sense of being "new, unique, or different, particularly relative to theoretical frameworks that have been central to a discipline in the past" (McKinley et al., 1999: 637), such contributions simultaneously satiate the field's increasing demand for novelty (Barley, 2016; Bettis, Ethiraj, Gambardella, Helfat, & Mitchell, 2016; Durand, Grant, & Madsen, 2017).

Topic founding and topic recombination are widely celebrated in strategy research (Nerur et al., 2008; Nerur, Rasheed, & Pandey, 2016; Ramos-Rodríguez & Ruíz-Navarro, 2004), and are increasingly pursued by aspiring strategy researchers (Bettis et al., 2016; Durand et al., 2017). However, little research examines whether these contributions consistently reorient the field of strategic management by attracting attention from fellow researchers, and particularly under what conditions. Does it always pay to be novel? In this article, we investigate the mechanisms through which articles that found or recombine topics achieve impact. Though various author- and article-level characteristics have been shown to shape article impact (Bergh, Perry, & Hanke, 2006; Judge, Cable, Colbert, & Rynes, 2007; Stremersch et al., 2007), researchers have only recently moved beyond relatively descriptive characteristics by studying articles' reference patterns to model novelty (Lee et al., 2015; Schilling & Green, 2011; Uzzi et al., 2013). Complementing these efforts that highlight the importance of novelty for achieving impact, we burrow more deeply into articles' substantive content, semantic meaning, and intended contributions by analyzing the textual structure of a large sample of strategy articles.

To systematically and accurately locate topic founding and topic recombination in strategy research, we use topic modeling (Blei & Lafferty, 2007; Blei et al., 2003) to examine the full texts of all articles published in *SMJ* from its founding in 1980 up to and including 2010. Topic modeling provides a methodology to discover the latent topic structure in a collection of documents, allowing us to delineate research topics that have emerged in the field and to analyze the ways in which strategy researchers introduce and use these topics. Importantly, this methodology does not rely on retrospective accounts or citation data in order to identify novel contributions; instead, novelty is identified solely based on the textual content of an article vis-à-vis the content of other articles in the field. Because of this, we are able to identify not only

novel contributions that left their mark on the field, but also those that went relatively unnoticed in subsequent research. Indeed, not all novel contributions blaze a trail in the field (e.g., Colquitt & Zapata-Phelan, 2007: 1206).

In spite of their heightened potential for achieving impact, we theorize that foundational and recombinatory articles also pose appraisal difficulties to fellow researchers, as these articles are by their very nature distinct from and at times even incongruous with the discipline's established traditions (McKinley et al., 1999; Okhuysen & Bonardi, 2011). In other words, there is considerable uncertainty about the underlying quality of apparently novel articles. Confronted with such uncertainty, researchers often fall back on socially grounded and easily accessible frames of reference to infer quality of published research (Merton, 1973; Sauder, Lynn, & Podolny, 2012). Given the marked stratification of prestige of academic organizations (Judge et al., 2007; Long, Bowers, Barnett, & White, 1998; Medoff, 2006), we focus on one particularly salient cue that may shape the effect of novelty on article impact: whether or not the author team has an affiliation to one of the top universities in the field.

We find that the magnitude of the novelty premium depends crucially on the presence or absence of institutional "seal of approval" by authors' affiliation: the effect of topic founding on citation impact is over four times as large, and that of topic recombination is approximately two and a half times as large, for articles authored by top affiliated teams relative to those by teams without such an affiliation. In fact, neither type of novelty increases impact for non-top affiliated author teams. We take these findings to be indicative of a self-perpetuating inequality in the academic system—one that is intertwined with recent concerns about academia's deep-seated quest for novelty (Barley, 2016; Durand et al., 2017; van Witteloostuijn, 2016)—as ostensibly

comparable contributions achieve widely differing impact, entirely contingent on where the authors of the articles come from.

Theory and hypotheses

Topic founding and article impact

Since its emergence, the field of strategy has witnessed impressive growth in the number of topics explored by its scholarly community (Durand et al., 2017; Hoskisson et al., 1999). Foundational articles that introduce these new topics to the field offer a novel conceptual and linguistic toolkit for future research to build upon. Topic founding thus brings in concepts and vocabularies that are entirely new to the field, or fundamentally reconstitutes the meaning of existing concepts to form a new topic (Cornelissen & Durand, 2012). Wernerfelt (1984) is a prime example of a topic founding article in strategy, introducing the resource-based view of the firm.

Research on scientific and technological change (Fleming, 2001; Singh & Fleming, 2010) suggests that there exists a first-mover advantage for foundational articles compared to follower articles, as they break new ground by starting a new conversation rather than merely adding to a current conversation. A topic founding article rarely exhausts the implications of its fundamental elements. Instead, it increases the number of concepts and terms available in the field that can be used in future work for extension, elaboration, sophistication, or other types of more cumulative and detailed research (Autio, 2005; McKinley et al., 1999). By opening up new frontiers, topic founding therefore offers opportunities for fellow researchers to validate, qualify, and expand upon the topic and to subsequently cite the founding article.

Insofar as a study is new, different, or counterintuitive, it has a heightened potential to deny taken-for-granted beliefs, challenge accepted assumptions, trigger intellectual debates, and

compel fellow researchers to reconsider what they thought they understood (Corley & Gioia, 2011; Mintzberg, 2005). In fact, it has been suggested that there exists a systematic preoccupation with fads and fashions in the social sciences, such that a theory's interest value rather than its truth value determines its popularity and impact (Christensen-Szalanski & Beach, 1984; Davis, 1971). As a result, articles introducing new topics are also more likely to be perceived as interesting by their audience (Davis, 1971).

Articles that merely refine an existing topic face greater hurdles in achieving the same level of impact. Narrow re-use of a topic can result in conceptual exhaustion, as possible combinations are more likely to have been tried by preceding works on the topic, making it difficult (though not impossible) to utilize a topic in a novel manner (Fleming, 2001; Kim & Kogut, 1996). Though topic reuse and refinement by subsequent articles within a topic area can be highly valuable for the accretion of repeatable and cumulative knowledge (Bettis et al., 2016; Durand et al., 2017; Mezias & Regnier, 2007), articles that carefully verify or build upon extant insights tend to be soon forgotten (Davis, 1971) and are more likely to be classified by others as mundane (Lindsay & Ehrenberg, 1993) or uncreative (Madden, Easley, & Dunn, 1995).

> **Hypothesis 1**: *Articles that found new topics achieve greater impact than articles that do not found new topics.*

Topic recombination and article impact

Besides founding a new topic, researchers can also recombine knowledge elements from extant topics to generate novelty and to shape future thinking (Fleming, 2001; Rosenkopf & Nerkar, 2001). Topic recombination is centered on the synthesis of existing topics to provide an integrative theoretical structure that was not there before (Fleming & Sorenson, 2001). It has long been argued that recombination is one of the key sources of novelty across a variety of

fields. For instance, Nelson and Winter (Nelson & Winter, 1982) pose that "the creation of any sort of novelty in art, science, or practical life ... consists to a substantial extent of a recombination of conceptual and physical materials that were previously in existence", while Schumpeter (1934: 65–66) similarly associates innovation with the "carrying out of new combinations." One well-known example of topic recombination in strategy research is Gulati's 'Alliances and Networks' (1998), which recombines elements from existing research on strategic alliances with a social network perspective.

Strategic management has been a multidisciplinary field of inquiry from its inception (Nerur et al., 2016). Due to its tradition of openness to neighboring disciplines and the development of its own theories and research streams (Durand et al., 2017), the number of possible combinations of topics is literally "staggering" (Hambrick, 2004). As the number of distinct topics being recombined in an article increases, so does the probability of creating an atypical or novel connection (Fleming & Sorenson, 2001; Simonton, 1995). In particular, the combination of dissimilar topics has the potential to harmonize or contrast assumptions and approaches that would otherwise have gone unnoticed by the topics' audiences had they remained in isolation (Kaplan & Simon, 1990). As articles connect distant topics, they also reduce the path length in the field's network of topics and bridge previously unconnected topics to encourage follow-up work from different subfields (Schilling & Green, 2011). Recombination thus provides researchers with a new point of departure by setting up a novel integrative theoretical structure or by critically reorganizing existing views into a new configuration (Dosi, 1982; Lee et al., 2015). This suggests that recombinatory efforts accrue a larger stream of citations compared to articles operating within a single topic or a small number of highly similar topics.

Articles that refine a single topic or encapsulate a small number of similar topics search locally to winnow and bound confined regions of existing knowledge space (Colquitt & Zapata-Phelan, 2007; Fleming, 2001). Such incremental contributions thus advance knowledge in a more cumulative, path-dependent fashion (Dosi, 1982), progressively exhausting opportunities for important discoveries without opening up new fishing grounds for fellow researchers (Fleming, 2001; Kim & Kogut, 1996). As they tend to speak, through their narrow scope of recombination, to a small and specialized audience, such articles can be expected to achieve relatively low impact (Schilling & Green, 2011).

Hypothesis 2: *Topic recombination is positively related to article impact.*

Top affiliation as a magnifier of the novelty premium

Because both types of contribution satisfy the field's desire for novelty while providing ample opportunities for future research to build on and add to the original contribution, topic founding and topic recombination yield, on average, a novelty premium in terms of citations. However, not all novel contributions leave a remarkable impression on their field (Colquitt & Zapata-Phelan, 2007), suggesting the existence of crucial contingencies that magnify or suppress this premium by changing how ostensibly similar novel contributions are received.

It is inherently more uncertain to assess the underlying quality of novel research due to the absence of prior similar contributions as a frame of reference (Azoulay, Stuart, & Wang, 2014; Fleming, 2001; McKinley et al., 1999). Furthermore, it is increasingly difficult for researchers to keep up with the enormous growth in the volume of scientific literature over time. Merton (1968: 59) noted already in the 1960s that "no problem … is more defeating than the effort to cope with the flood of published scientific research." Authors have imperfect

information about the quality distribution of others' research, yet they have to decide which of the numerous publications is a significant, high quality contribution that is worth developing and building upon (Medoff, 2006). Strategy scholars face the same challenge: time is an increasingly scarce and valuable resource, and it is impossible to read everything in their area of interest, especially given the ever-increasing quantity and diversity of topics and articles published in strategy (Durand et al., 2017; Hambrick, 2004).

To save time and to reduce uncertainty, scholars often rely—consciously or subconsciously—on readily observable cues that are correlated with unobservable quality when plowing through endless publications in their field (Medoff, 2006; Sauder et al., 2012). These cues are often status-based signals that reflect (possibly with error) what scholars should attend to in the overloaded scientific communication system. Reliance on such cues has been shown to be most likely when quality is uncertain (Kim & King, 2014; Simcoe & Waguespack, 2011), when technical or artistic complexity is high (Lang & Lang, 1988; Podolny & Stuart, 1995), when objective standards are absent (Greenfield, 1989), or under conditions of high search costs and attention scarcity (Simcoe & Waguespack, 2011). As these conditions are particularly salient for novel research, status-based cues should play an important role in attracting fellow researchers' attention to articles that found or recombine topics.

One of academia's most prominent cues stems from the ranking of the different universities in the field (Long et al., 1998; Sauder, 2006). The emergence, legitimation, and propagation of these rankings has led to a clear and stable division between 'top' and 'non-top' universities that is used by universities, researchers, and other relevant stakeholders as an indicator of institutional prestige and status (Judge et al., 2007; Martins, 2005). As affiliations with highly regarded institutions serve as "gestures of approval" (Gould, 2002: 1147), this status

hierarchy provides readers with a simple, time-saving heuristic to sort the ever-expanding list of potentially interesting yet uncertain discoveries (Kim & King, 2014; Sauder et al., 2012).

Past research has consistently demonstrated that authors' (broadly speaking: producers') location in the social status ordering is a lens through which the quality of their work is assessed by a relevant audience. Azoulay, Stuart, and Wang (2014) find that award-winning authors' work published before the award receive a citation boost, though the actual quality of pre-existing work cannot possibly be altered by the award bestowment. This effect is stronger when quality of the contributions is more uncertain, suggesting that more opaquely valuable contributions tend to be under-recognized if there are no social cues to dispel the cloud of uncertain quality. Along similar lines, Kim and King (2014) find that evaluators' expectations about high status actors lead them to unconsciously "see" quality in those actors' offerings, especially when quality is ambiguous, whereas highly quality offerings of low status actors are more likely to be missed. Using a natural experiment, Simcoe and Waguespack (2011) show how the presence of high status authors leads to more attention to internet standards proposals as well as a higher likelihood of proposals being accepted, yet only when there was considerable uncertainty about quality of proposals.

These findings imply that the novelty premium underlying topic founding and topic recombining manifests itself more strongly when it originates from high status scholars, whereas it is suppressed for low status scholars.[27] Articles that introduce new topics or recombine different topics harbor significant uncertainty about the quality of the contribution to readers, compared to articles that make a more incremental and thus more certain contribution. We have

[27] This does not preclude a presumably positive correlation between high status affiliation and latent quality (e.g., Simcoe and Waguespack, 2011). At the heart of our argument, however, is the well-established idea that status hierarchy greatly affects how quality is perceived, recognized, and socially constructed. (Podolny and Stuart, 1995; Sauder *et al.* 2012).

argued that author affiliation serves as an important social cue regarding what readers should take notice of in the vast body of scientific literature. It then follows that when novel contributions are made by authors affiliated to one of the 'top' universities in the field, readers tend to approach such articles with "special care", making it more likely that such novel contributions are appreciated and extended in subsequent research (Merton, 1968). In other words, novel contributions are more likely to garner peer recognition if buttressed by institutional prestige and reputational capital of a top university (Medoff, 2006). Therefore, we predict the positive effects of topic founding and topic recombination to be stronger for articles written by authors with a top affiliation, and weaker when the authors lack such an affiliation.

> **Hypothesis 3a**: *The positive relationship between topic founding and article impact is stronger for articles by top affiliated teams than for articles by teams without such an affiliation.*
>
> **Hypothesis 3b**: *The positive relationship between topic recombination and article impact is stronger for articles by top affiliated teams than for articles by teams without such an affiliation.*

Topic modeling methodology and data

Methodology: Probabilistic topic modeling

We apply latent Dirichlet allocation (LDA: Blei et al., 2003), a generative probabilistic model for collections of discrete data such as texts, to articles published in *SMJ*. Probabilistic topic modeling provides a statistical methodology to discover and analyze latent themes underlying large collections of textual data. The fundamental purpose of LDA is to distill short descriptions of documents in large collections of text while preserving the essential semantic features that are useful for tasks such as classification and novelty detection (Blei et al., 2003), making it highly suitable for our research question.

LDA is based on the idea that each document in a collection (a corpus) is a distribution over a set of topics and that each topic is a distribution over a fixed vocabulary of terms. Thus, while all documents in a corpus share the same set of topics, each document exhibits these topics in different proportions. LDA uses documents and terms in the documents, which are observed, to recover the "hidden" topic structure, including the topics, the distribution of topics per document, and the distribution of terms per topic (Blei, 2012; Blei et al., 2003). Co-occurrences of observed terms in different documents are used to infer the topic structure that most likely generated the observed collection of documents. The intuition behind this is that terms are more likely to originate from the same topic when they are often used together than when they are never or rarely used together. A key strength of LDA is that it does not require any labeling or keyword application by humans before analysis, such that it does not rely on any *a priori* knowledge about the documents. Rather, the topic structure emerges solely and automatically from the texts in the corpus (see Blei et al., 2003, for a more in-depth discussion).

To clarify how LDA operates, Figure 4.1 illustrates the output of our LDA model for two *SMJ* articles ("Alliances and Networks", by Gulati, 1998; "How Much Does Industry Matter, Really?", by McGahan & Porter, 1997). The left half of the figure shows the three most important topics for these articles and a simplified representation of the documents. Specifically, in this illustration, each block represents one word in the articles' abstracts while a colored block indicates that that specific word is one of the twenty most important words for of one of the three topics.[28] The right half shows the articles' actual topic distributions over the 95 identified topics,

[28] The actual topic model operates, of course, in a much more fine-grained manner using the full information of all word- and topic distributions. An intuitive representation similar to the one presented here can be found in Blei (2012: p. 78). We have removed stop words and highly infrequent words from the simplified representation. If a word belonged to the important word for two topics (in this case: firm belonging to both topics 29 and 41) then we did not color the relevant block. Also note that our actual topic model is estimated on the full text of each article, rather than the abstracts.

based on their full texts (topic model estimation is discussed below). From this figure, it is clear that McGahan and Porter (1997) has a clear singular focus within topic 54 (with terms such as 'effect', 'industry', 'variance', and 'corporate'), with a large number of words in its abstract being assigned to this topic. In other words, the article nearly exclusively utilized words that were very strongly associated with topic 54. In contrast, Gulati (1998) clearly combines topics 29 (consisting of terms such as 'network', 'firm', 'tie', and 'social') and 41 ('alliance', 'partner', 'firm', and 'formation'). This is also evident based on its abstract, where a mix of words from the network-focused topic and the alliance-focused topic are used.

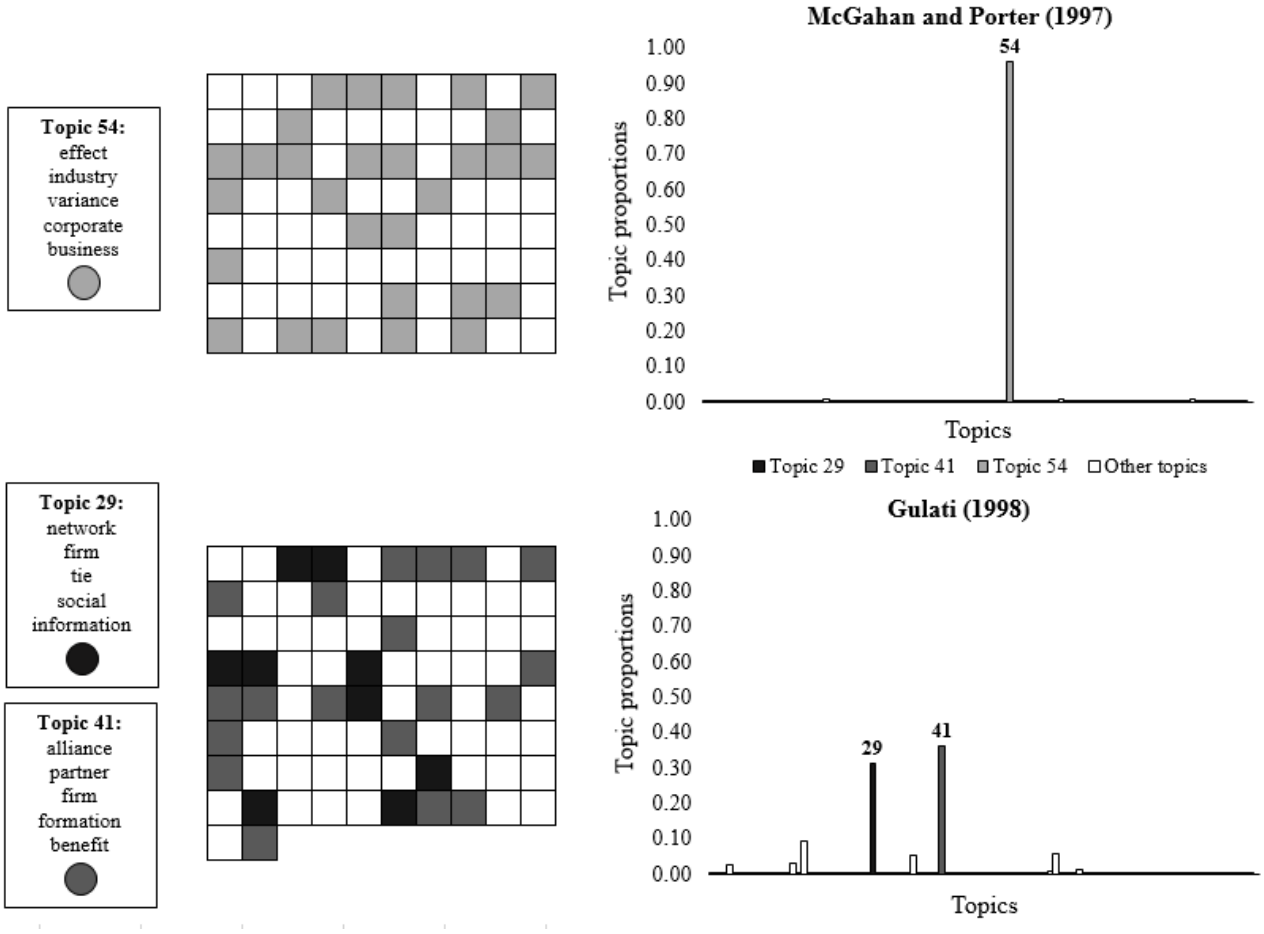


Figure 4.1: Graphical illustration of LDA.

Modeling the field of strategy: Sample, data cleaning, and model choice

We collected the full body of work published in *SMJ* from its founding in 1980 up to and including 2010 (this endpoint was chosen to enable all articles to accrue at least five years' worth of citations). Since its emergence following Schendel and Hofer's (1979) classic volume, the field of strategic management has undergone rapid growth and increasing maturity (Hoskisson et al., 1999; Phelan et al., 2002). *SMJ*, since its founding in 1980, has especially served as the flagship journal of the field, providing researchers with a dedicated forum for publishing strategy research. Because of this, *SMJ* functions as the central repository of knowledge produced by strategy scholars (Nerur et al., 2016), thereby representing major research efforts in the field.[29] We excluded editorials and very short communications of less than five pages, resulting in a sample of 1,673 *SMJ* articles.

We cleaned every article in the sample by manually removing header and footer information, titles, abstracts, acknowledgments, and reference lists, and followed standard practice (e.g., Blei & Lafferty, 2007; Kaplan & Vakili, 2015) by removing highly infrequent words (those appearing fewer than 50 times in total or in fewer than ten articles) and stop words such as 'the', 'but', or 'with', as these sections and words tend to not convey any substantive meaning (Blei & Lafferty, 2007). To further streamline the estimation of the topic models, we manually replaced all plural words with their singular forms. This approach was chosen in favor of automated stemming of words, as such stemming tends to result in topics that are less interpretable and meaningful (Newman, Noh, Talley, Karimi, & Baldwin, 2010). These cleaning steps resulted in a total of 6,893,481 words across the 1,673 *SMJ* articles, with 8,160 unique

[29] See Nerur et al. (2008) and Ramos-Rodríguez & Ruíz-Navarro (2004) for a similar rationale in focusing on articles in *SMJ* when investigating the knowledge structure of and pivotal moments in the field of strategy.

words. The five most frequent words in the corpus were ‘firm’, ‘market’, ‘industry’, ‘performance’, and ‘strategy’.

The crucial choice when using LDA is setting the number of topics to be estimated by the algorithm. As there are no hard decision rules available, researchers typically opt to set the number of topics to 100 in order to keep subsequent interpretation of topics manageable (Blei & Lafferty, 2007; Kaplan & Vakili, 2015). In order to more carefully calibrate our choice of the number of topics, we ran a series of LDA models with varying topic numbers which we then compared in an iterative manner. We started by comparing the outputs of topic models with 25, 50, 100, and 150 topics. For each model, we scrutinized not only whether each topic was coherent and interpretable, but also whether every article in the corpus was meaningfully assigned to topics based on the actual content of the article. This resulted in a second round of models with 75, 90, 100, 110, and 125 topics, and subsequently to further convergence to models with 90, 95, and 100 topics. Based on this final round, we decided to set the number of topics to 95. All these comparisons were made before any other analyses to ensure that the topic number is established independent from the models that test our hypotheses. We estimated our topic models using Variational Expectation-Maximization (VEM, cf., Blei et al., 2003); the final model of 95 topics converged after running 28 iterations and 16.09 hours.

Regression analyses

Dependent variable

We measure *‘Article impact’* as the number of forward citations to the article since its publication (Bergh et al., 2006; Judge et al., 2007; Martin & Irvine, 1983; Stremersch et al., 2007). Citation data were obtained through Thomson Reuters’ Web of Science up to and

including 2015, thus allowing articles to accrue at least five years' worth of citations (analyses with five-year forward citations are reported as a robustness check).

Explanatory variables

We measure *'Topic founding'* by creating a dummy variable that takes on the value one when the article belongs to the set of articles that first used a given topic (based on the highest loading topic assigned to the article by the LDA model) and zero otherwise. For each topic we check in which *SMJ* issue it first appeared, and include in the set of founding articles all those that utilized the topic in the twelve months after first publication (cf., Kaplan & Vakili, 2015, for the same time window to identify topic founding patents). This allows for simultaneous discovery of topics within the same time period but not necessarily published in the same journal issue. Models where we restrict topic founding articles to the very first publication yield the same results for all hypotheses and are available upon request.

We measure *'Topic recombination'* by calculating the extent to which the article combines different topics, corrected for the extent to which each topic being combined is new compared to work in the past decade as well as the similarity between the different topics being recombined. We calculate topic recombination as $recomb_{i,t} = \sum(\theta_{k,i})(1-\bar{\theta}_{k,t})(\theta_{l,i})(1-\bar{\theta}_{l,t})(1-S_{k,l})$, where $\theta_{k,i}$ and $\theta_{l,i}$ refer to article *i*'s assigned topic weights for topics *k* and *l* (each ranging from 1 to 95). $\bar{\theta}_{k,t}$ and $\bar{\theta}_{l,t}$ represent the average topic weight for topics *k* and *l* across all *SMJ* articles published in the ten years before year *t* of publication, capturing the extent to which the article builds on more or less new topics. $S_{k,l}$ denotes the similarity between topics *k*

and *l* in the terms that they utilize.[30] In other words, our topic recombination measure records a higher value when an article combines more topics (as indicated by substantial weights θ on multiple topics rather a high weight for only a single topic), when these topics are relatively new (as indicated by low values of $\bar{\theta}$, meaning that little prior work utilizes the focal topics), and when they are distant from each other (such that $S_{k,l}$ is low, indicating that the two topics build on less similar vocabularies). Note that, when assuming that each topic in our model is distinct from one another and that each topic is entirely new, our formula of topic recombination reduces to the usual Herfindahl-Hirschman index.[31]

For our measure of '*Top affiliated*' authors, we utilized the UT Dallas Business School Research Ranking in identifying top ranked universities. We chose this ranking over other rankings because the UT Dallas ranking is based exclusively on research output of the universities' business school, making it attractive given our focus on research-related variables. Most other rankings take research as a component in their total ranking or are focused on ranking education programs rather than research. We create a dummy variable that takes on the value one if the affiliation of any of the authors on an article has been ranked in the annual top 25 any time between 1990 and 2010, and zero otherwise (we report analyses with alternative cut-off values as a robustness check). This results in a list of 51 unique universities. In testing Hypotheses 3a and 3b, we split the sample based on this dummy variable, as our theory implies that articles authored by top affiliated teams are evaluated differently than those not authored by top affiliated teams.

[30] This is calculated as a pairwise correlation based on a matrix with topics as columns and terms as rows, with each cell recording the probability of the respective term being assigned to the respective topic as produced by the topic model. If two topics receive similar term assignments, their correlation will be high, indicating that the topics build on similar vocabularies.

[31] If $S_{k,l}$ equals zero when $k \neq l$ and both $\bar{\theta}_{k,t}$ and $\bar{\theta}_{l,t}$ equal zero, then $\sum(\theta_{k,i})(1-\bar{\theta}_{k,t})(\theta_{l,i})(1-\bar{\theta}_{l,t})(1-S_{k,l}) = \sum(\theta_{k,i})(\theta_{l,i})(1-S_{k,l}) = \sum(\theta_{k,i})(\theta_{l,i}) - \sum(\theta_{k,i})(\theta_{l,i})(S_{k,l}) = 1 - \sum(\theta_{k,i})(\theta_{l,i})(S_{k,l}) = 1 - \sum(\theta_{k,i})^2$, which is the traditional HHI measure of diversity. We thank an anonymous reviewer for suggesting to correct for topic newness.

This would suggest that not only our effects of interest may vary between the subsamples, but so may the effects of all other variables.

Control variables

We control for a variety of author- and article-level variables that may be related to both article novelty as well as article impact. First, and perhaps most importantly, we include two control variables that proxy for author capability and status, as more capable or higher status authors may do more (or better) topic founding or topic recombination and at the same time attract more citations. To this end, we include the '*Average impact'* across all publications in top management journals (excluding book reviews and very short communications) by members of the author team between 1980 and 2015, excluding the focal article, with impact tallied up to and including 2015.[32] This measure is computed for every team member and we take the highest value within each team. This variable should provide a good proxy for author capability, as average article impact reflects the overall quality of the author's body of work (Eysenbach, 2006; Geller, de Cani, & Davies, 1978). This variable is log-transformed to correct for skewness, although results are unaffected by alternative specifications.

To proxy for individual status, we construct a series of co-authorship networks based on all publications (excluding book reviews and very short communications) in top management journals using ten-year moving windows (that is, the first network is based on publications between 1980 and 1989, the second on 1981 through 1990, and so forth). We then calculate for

[32] We include the following seven top management journals: *Strategic Management Journal, Academy of Management Review; Academy of Management Journal; Journal of International Business; Organization Science; Management Science; Administrative Science Quarterly*. Citation data are obtained via Web of Science. As the same author may appear in slightly different name variants in different journals or issues (e.g. Catherine M. Banbury and Catherine Banbury), we manually consolidated all authors names to avoid undercounting of top journal publications and citations made to them.

each of these networks the '*Betweenness centrality*' of all authors and match these time-varying scores to the authors of the focal article (Freeman, 1977). We use normalized betweenness centrality to foster comparisons across years. If the authors of the focal article do not appear in the network we assign a value of zero. We take the highest value among the team members and log-transform the variable to correct for skewness, though results are unaffected by alternative specifications. Since this measure is based on prior publications, it also controls for the number of publications in the past ten years.

We include the *'Percentage of female authors'* in the team, as articles by female authors may differ from those authored by male authors and may also achieve differing impact (Ding et al., 2006; Larivière et al., 2013). For similar reasons (Lee et al., 2015; Uzzi et al., 2013), we control for author team size with dummies that take on the value one when there are '*Two authors*', when there are '*Three authors*', or when there are '*Four or more authors*', and zero otherwise (sole-authored papers are the baseline category).

At the article level, we control for the '*Percentage of self-citations*' in the focal article's reference list, as those authors who self-cite more often may be more committed to promoting the focal article for visibility (Stremersch et al., 2007). We additionally include the '*Number of pages'* of the article, log-transformed, since longer articles provide more room to develop novel theory while also functioning as an indicator of quality (Bergh et al., 2006). We also control for whether or not the article was the '*Lead article'* in its issue of publication (serving as an editorial seal of approval to the article), and whether or not the article appeared in a '*Special issue*' of *SMJ*, with special issues serving a distinct role in creating and disseminating new knowledge (Olk & Griffith, 2004). Similarly, we control for whether the article was published as a '*Research note*' or communication, as such articles may allow for different opportunities for

novelty creation and set different expectations from the reader. We control for the article's '*Title length*' in characters, log-transformed, as titles serve as the attention grabber for articles and because longer titles are more informative yet indicative of article complexity (Stremersch et al., 2007). Finally, we include a set of '*Year dummies*' to control for any unobserved effects that affect all articles in the sample, such as year-to-year shifts in selection criteria for acceptance at *SMJ* and general trends of publishing and referencing in the field. The year 1990 serves as the baseline category.

Regression model

We model article impact using negative binomial regression as it is of a count nature and exhibits overdispersion. Following recommendations for the interpretation of effects in non-linear models (Greene, 2010), we compare average predicted article impact at different levels of our variables of interest. We report robust standard errors for all models.

Regression sample

Figure 4.2 shows the rate of topic founding in *SMJ* over the full 1980-2010 time period, together with some representative examples of topics. The rate of topic founding is clearly extremely high in the initial years of *SMJ*, as all articles published in 1980 are by construction classified as topic founding articles. Moreover, the initial decade of *SMJ* (and the field of strategy at large) was characterized "by a high degree of disorder" and rapid expansion (Nerur et al., 2016: 1075). Because of this, *SMJ*'s role as a central source of strategic management knowledge became manifest only from 1990 onwards. Put differently, *SMJ*'s status and role in the field, its selection criteria, and publishing and citation practices may not be comparable in

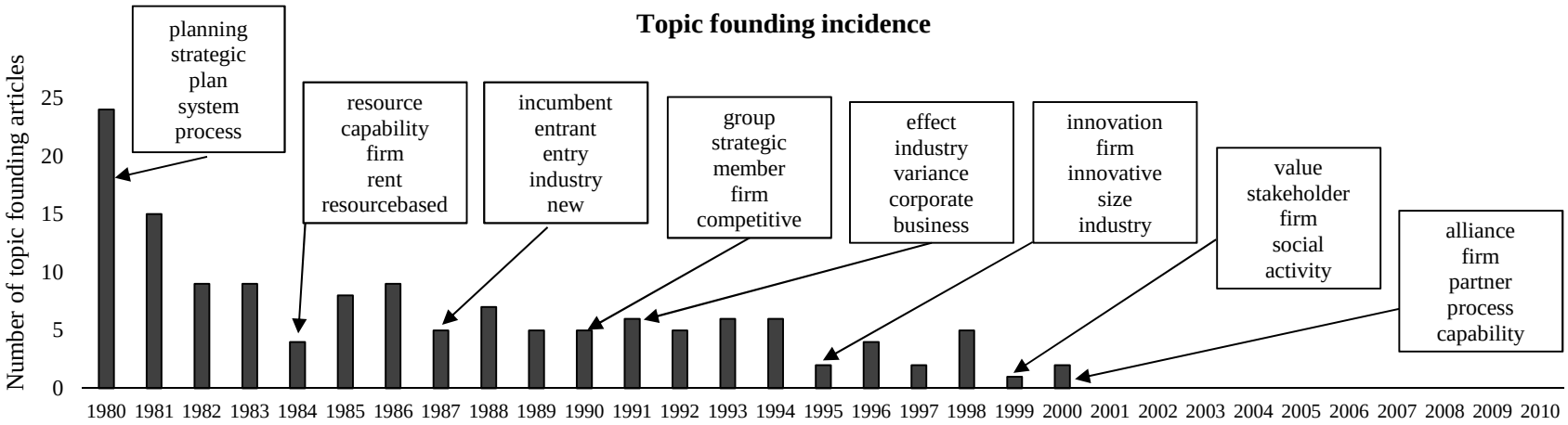


Figure 4.2: Topic founding incidence in *SMJ* (1980-2010) with representative examples of founded topics.

this initial decade relative to later years (see Phelan et al., 2002).[33] To avoid topic founding effects being confounded by journal and field founding effects, we exclude from our regression analyses articles published between 1980 and 1989. Thus, though our topic model is based on the entire 1980-2010 time period, our regression models are based on the 1,344 articles published between 1990 and 2010. In addition to being more conservative, this approach has the benefit of allowing us to create measures utilizing moving windows (most importantly, it enables topic newness correction for the recombination measure).

It is worth noting here that Figure 4.2 corresponds closely with prior work investigating the topics discussed in strategic management over time (Hoskisson et al., 1999; Nerur et al., 2008; Ramos-Rodríguez & Ruíz-Navarro, 2004). Similar to Hoskisson and colleagues (1999), we identify a strong focus on firm-level strategic planning and processes in the field's initial years, which shifts outwards to the level of strategic groups and industries in later years. Our model also captures how the resource-based view of the firm was introduced with Wernerfelt (1984), yet "when the paper appeared in 1984, it was ignored" (Wernerfelt, 1995: 171) and picked up only in later years (see Ramos-Rodríguez & Ruíz-Navarro, 2004). In addition, we identify the founding of topics on firm innovation (in 1995), stakeholders (1999), and alliances and alliance capabilities (2000), suggesting that the pendulum of strategic management as discussed by Hoskisson and colleagues (1999) has swung back towards a theoretical focus outside of the firm. Overall, our topic model therefore seems to have a high level of face validity in terms of the topics it identifies and their emergence over time.

[33] We thank an anonymous reviewer for this suggestion.

Results

Table 4.1 contains descriptive statistics for our sample of 1,344 *SMJ* articles published between 1990 and 2010. Though we observe that articles with top affiliated authors, on average, achieve greater impact, we do not see very pronounced differences in the percentage of articles that found new topics (4% of 803 articles authored by top affiliated teams versus 2% of 541 articles written by non-top affiliated teams) nor in the levels of topic recombination (average recombination equals 0.58 for articles authored by top affiliated teams versus 0.59 for articles authored by non-top affiliated teams).

Table 4.2 shows negative binomial regression results for article impact. Model 0 functions as our baseline model. This model shows that author quality, proxied by the highest average impact (excluding the focal article) among the author team members, is strongly and positively related to focal article impact (average marginal effect = 20.69, $p = 0.000$). Compared to sole-authored papers, articles authored by four or more individuals tend to be cited less often (26.54 fewer citations, $p = 0.093$), and author teams that self-cite at a higher rate attain marginally higher article impact (average marginal effect = 2.51, $p = 0.076$). Longer papers tend to get cited more often (average marginal effect = 74.74, $p = 0.000$), as do lead articles of the issue of publication (20.81 more citations, $p = 0.099$). Publication in special issues of *SMJ* is strongly related to article impact (73.67 more citations, $p = 0.000$).

We introduce the indicator for topic founding articles in Model 1, and find that articles founding new topics, on average, accrue 64.59 more citations compared to articles that do not found new topics (from 130.12 to 194.72 citations, $p = 0.037$), supporting Hypothesis 1

Table 4.1: Descriptive statistics and correlations

		Full 1990-2010 sample (n = 1,344)				Top 25 affiliated (n = 803)				Non-top 25 affiliated (n = 541)			
		Mean	**S.D.**	**Min.**	**Max.**	**Mean**	**S.D.**	**Min.**	**Max.**	**Mean**	**S.D.**	**Min.**	**Max.**
(1)	Article impact	137.10	273.67	0.00	5,585.00	153.56	309.85	2.00	5,585.00	112.67	206.61	0.00	3,433.00
(2)	Founding article	0.03	0.18	0.00	1.00	0.04	0.19	0.00	1.00	0.02	0.15	0.00	1.00
(3)	Recombination	0.59	0.13	0.00	0.79	0.58	0.14	0.00	0.79	0.59	0.13	0.02	0.79
(4)	Top affiliated	0.60	0.49	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
(5)	ln(1+Average impact)	4.34	1.49	0.00	7.28	4.72	1.07	0.00	7.28	3.78	1.82	0.00	6.60
(6)	ln(1+Author centrality)	0.11	0.22	0.00	1.52	0.15	0.25	0.00	1.52	0.05	0.13	0.00	1.06
(7)	% of team female	18.33	30.29	0.00	100.00	19.59	30.80	0.00	100.00	16.45	29.44	0.00	100.00
(8)	One author	0.27	0.44	0.00	1.00	0.22	0.42	0.00	1.00	0.34	0.47	0.00	1.00
(9)	Two authors	0.47	0.50	0.00	1.00	0.5	0.50	0.00	1.00	0.42	0.49	0.00	1.00
(10)	Three authors	0.21	0.41	0.00	1.00	0.22	0.41	0.00	1.00	0.2	0.4	0.00	1.00
(11)	Four or more authors	0.06	0.23	0.00	1.00	0.07	0.25	0.00	1.00	0.04	0.21	0.00	1.00
(12)	Team self-citation	3.44	3.99	0.00	42.86	3.81	4.10	0.00	41.18	2.9	3.75	0.00	42.86
(13)	ln(No. of pages)	2.74	0.39	1.61	3.50	2.77	0.37	1.61	3.50	2.7	0.40	1.61	3.5
(14)	Lead article	0.18	0.38	0.00	1.00	0.21	0.41	0.00	1.00	0.13	0.33	0.00	1.00
(15)	Special issue	0.14	0.34	0.00	1.00	0.18	0.38	0.00	1.00	0.08	0.27	0.00	1.00
(16)	Research note	0.13	0.34	0.00	1.00	0.12	0.33	0.00	1.00	0.15	0.36	0.00	1.00
(17)	ln(Title length)	4.37	0.36	2.77	5.12	4.37	0.37	2.77	5.12	4.38	0.34	3.00	5.08

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(2)	Founding article	0.08															
(3)	Recombination	0.08	0.02														
(4)	Top affiliated	0.07	0.04	-0.04													
(5)	ln(1+Average impact)	0.17	0.03	0.02	0.31												
(6)	ln(1+Author centrality)	-0.04	-0.04	0.00	0.22	0.25											
(7)	% of team female	0.00	-0.00	-0.00	0.05	0.03	-0.02										
(8)	One author	0.03	0.01	0.02	-0.13	-0.21	-0.23	-0.03									
(9)	Two authors	0.01	-0.00	-0.02	0.07	0.07	-0.02	0.04	-0.56								
(10)	Three authors	-0.02	-0.00	0.01	0.02	0.09	0.15	-0.02	-0.31	-0.48							
(11)	Four or more authors	-0.05	-0.01	-0.01	0.05	0.10	0.23	0.00	-0.15	-0.23	-0.13						
(12)	Team self-citation	0.09	0.08	-0.05	0.11	0.18	0.07	-0.09	-0.08	-0.01	0.03	0.11					
(13)	ln(No. of pages)	0.10	-0.06	-0.01	0.08	0.09	0.11	0.10	0.02	0.00	0.00	-0.05	-0.14				
(14)	Lead article	0.08	-0.01	0.00	0.10	0.11	0.07	0.03	0.01	0.02	-0.01	-0.05	-0.01	0.22			
(15)	Special issue	0.21	0.12	0.05	0.14	0.11	-0.06	0.01	0.09	-0.01	-0.06	-0.03	0.13	0.07	-0.09		
(16)	Research note	-0.11	-0.01	-0.02	-0.04	-0.04	0.02	-0.03	-0.10	-0.00	0.08	0.05	0.08	-0.60	-0.16	-0.11	
(17)	ln(Title length)	-0.13	-0.03	0.06	-0.02	-0.03	0.09	0.03	-0.09	0.01	0.05	0.05	-0.10	0.07	-0.04	-0.14	0.02

Table 4.2: Results of negative binomial regression

Outcome: Article impact	**Model 0:** Baseline	**Model 1:** Topic founding	**Model 2:** Topic recombination	**Model 3a:** Top 25 affiliated	**Model 3b:** Non-top 25 affiliated
Founding article		0.40*	0.41*	0.37+	0.14
		(0.16)	(0.16)	(0.19)	(0.20)
Recombination			0.77***	0.83**	0.46
			(0.22)	(0.27)	(0.31)
Top affiliated	0.01	0.01	0.02		
	(0.07)	(0.07)	(0.07)		
ln(1+Average impact)	0.16***	0.16***	0.15***	0.26***	0.11***
	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)
ln(1+Author centrality)	-0.12	-0.13	-0.12	-0.05	-0.45+
	(0.13)	(0.13)	(0.13)	(0.14)	(0.26)
% of team female	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Two authors	-0.01	0.00	0.00	-0.10	0.07
	(0.09)	(0.09)	(0.09)	(0.12)	(0.11)
Three authors	-0.11	-0.11	-0.11	-0.22+	-0.05
	(0.10)	(0.10)	(0.10)	(0.13)	(0.12)
Four or more authors	-0.21	-0.20	-0.18	-0.22	-0.41*
	(0.13)	(0.13)	(0.14)	(0.17)	(0.16)
Team self-citation	0.02+	0.02+	0.02+	0.01	0.02+
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ln(No. of pages)	0.56***	0.57***	0.57***	0.61***	0.58***
	(0.11)	(0.11)	(0.11)	(0.14)	(0.14)
Lead article	0.15+	0.14+	0.13	0.13	0.20
	(0.09)	(0.09)	(0.08)	(0.10)	(0.12)
Special issue	0.48***	0.46***	0.44***	0.21	0.84***
	(0.11)	(0.11)	(0.11)	(0.13)	(0.18)
Research note	-0.05	-0.06	-0.06	0.05	-0.25
	(0.12)	(0.12)	(0.12)	(0.14)	(0.16)
ln(Title length)	-0.15	-0.16	-0.17+	-0.20+	-0.01
	(0.10)	(0.10)	(0.10)	(0.11)	(0.15)
Intercept	3.08***	3.05***	2.66***	2.22***	2.35**
	(0.51)	(0.51)	(0.52)	(0.59)	(0.79)
Year dummies	Yes	Yes	Yes	Yes	Yes
α	0.79***	0.78***	0.77***	0.75***	0.70***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Wald χ-squared[df]	477.18[33]	485.67[34]	506.26[35]	389.80[34]	291.05[34]
Log pseudo likelihood	-7,641.90	-7,637.55	-7,628.62	-4,637.34	-2,944.67
No. of observations	1344	1344	1344	803	541

Notes: Robust standard errors in parentheses. α is the estimate of the dispersion parameter, with significant estimates indicating that the data are over-dispersed and are better estimated using negative binomial regression than Poisson regression.

+: $p < 0.1$; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, two-tailed.

Model 2 then adds the measure of topic recombination. While the effect of topic founding persists, we also find support for Hypothesis 2 as articles that recombine topics achieve greater impact: the average marginal effect of topic recombination equals 102.41 (p = 0.001). As topic recombination cannot increase by a full unit (it ranges from 0 to 0.79, see Table 1), we evaluate its effect size by comparing predicted article impact at meaningful readings of topic recombination: it increases from 106.62 citations to 148.39 citations as topic recombination increases from the 5th percentile (0.312) to the 95th percentile (0.740). Overall, these findings provide strong support for both Hypotheses 1 and 2, as topic founding and topic recombination both greatly increase article impact.

We continue by splitting our sample based on whether or not the article has any authors affiliated to a top university. Model 3a contains regression results for the 803 articles for which the authors have such an affiliation, while Model 3b contains regression results for the remaining 541 articles for which the authors do not have such an affiliation. While topic founding is associated with an increase of 65.12 citations (from 145.39 to 210.51, p = 0.100) for articles authored by a top affiliated team, this increase is only 15.67 (from 107.41 to 123.08 citations, p = 0.530) for those authored by non-top affiliated teams. The citation premium due to topic founding is therefore 4.17 times as large for articles authored by top affiliated teams compared to articles written by non-top affiliated teams. Similarly, topic recombination has a strong and positive effect for the top affiliated subsample (average marginal effect = 123.51, p = 0.004), yet does not significantly increase impact for the non-top affiliated subsample (average marginal effect = 49.16, p = 0.151). The citation premium due to topic recombination is thus 2.51 times as large in the top affiliated subsample compared to the non-top affiliated subsample. These findings are in strong support of Hypotheses 3a and 3b.

We also observe that several control variables have rather distinct effects on article impact in each of the two subsamples. For instance, articles by research teams of four or more authors with none of the authors affiliated to top universities accrue significantly lower predicted impact than sole-authored papers—a pattern that does not emerge for teams when at least one author is top affiliated. Similarly, a positive effect of self-citation emerges only for non-top affiliated research teams. Moreover, while articles written by top affiliated teams do not gain significantly from appearing in a special issue, non-top affiliated authors achieve much higher impact by publishing articles in special issues. Nevertheless, publication as a research note only harms impact for non-top affiliated authors. These findings corroborate the core logic of our moderation hypothesis that articles by top affiliated teams are evaluated differently from those by teams lacking such an affiliation.

Robustness checks

We conducted a number of additional analyses to assess the robustness of our findings. The results of these models are reported in Table 4.3. First, we considered alternative cut-off points for splitting our sample into top- and non-top affiliated articles. When we split the sample based on whether or not the article has any author affiliated to a top 15 university, we find that topic founding has a positive and significant effect in the top affiliated subsample (coefficient = 0.38, $p = 0.053$), yet not in the non-top affiliated subsample (coefficient = 0.09, $p = 0.626$). The coefficient for topic recombination is larger in the top affiliated subsample (coefficient = 0.78, $p = 0.007$), but it is now also significant in the non-top affiliated subsample (coefficient = 0.66, $p = 0.019$), such that the differential returns to recombination

Table 4.3: Results of robustness checks (RC)

Outcome: Article impact	**RC1:** Top 15	**RC1:** Non-top 15	**RC2:** Top 50	**RC2:** Non-top 50	**RC3:** 5-yr cites, main effects	**RC3:** 5-yr cites, top 25	**RC3:** 5-yr cites, non-top 25	**RC4:** Status switches
Founding article	0.38+	0.09	0.38*	0.23	0.36***	0.31**	0.25	-0.03
	(0.20)	(0.19)	(0.19)	(0.21)	(0.11)	(0.12)	(0.21)	(0.88)
Recombination	0.78**	0.66*	0.89***	0.45	0.59***	0.57**	0.49+	1.55*
	(0.29)	(0.28)	(0.25)	(0.40)	(0.18)	(0.21)	(0.27)	(0.67)
Founding article * Top affiliated								2.44+
								(1.39)
Recombination * Top affiliated								-0.53
								(1.02)
Top affiliated								0.41
								(0.60)
ln(1 + Average impact)	0.29***	0.10***	0.23***	0.12***	0.11***	0.20***	0.07**	-0.18
	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)	(0.02)	(0.19)
ln(1 + Author centrality)	-0.03	-0.27+	-0.09	-0.98*	-0.03	-0.01	-0.22	0.00
	(0.17)	(0.15)	(0.13)	(0.41)	(0.11)	(0.13)	(0.23)	(0.39)
% of team female	0.00	0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Two authors	-0.12	0.10	-0.03	0.08	0.00	-0.04	0.03	0.48+
	(0.13)	(0.10)	(0.10)	(0.12)	(0.06)	(0.09)	(0.08)	(0.27)
Three authors	-0.22	-0.05	-0.21+	0.08	-0.06	-0.14	-0.02	0.28
	(0.14)	(0.11)	(0.12)	(0.15)	(0.08)	(0.11)	(0.10)	(0.34)
Four or more authors	-0.18	-0.33*	-0.23	-0.23	-0.09	-0.10	-0.31*	0.36
	(0.20)	(0.14)	(0.16)	(0.23)	(0.12)	(0.15)	(0.15)	(0.43)
Team self-citation	0.01	0.02*	0.01	0.02	0.02**	0.01	0.03**	0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)
ln(No. of pages)	0.54***	0.62***	0.64***	0.57***	0.57***	0.56***	0.59***	0.87***
	(0.15)	(0.13)	(0.12)	(0.17)	(0.08)	(0.11)	(0.10)	(0.24)
Lead article	0.15	0.18+	0.10	0.24	0.14*	0.17*	0.15	0.15
	(0.11)	(0.11)	(0.09)	(0.18)	(0.06)	(0.08)	(0.10)	(0.21)
Special issue	0.26+	0.63***	0.23+	1.01***	0.26***	0.14	0.48***	0.37
	(0.14)	(0.16)	(0.13)	(0.21)	(0.08)	(0.09)	(0.14)	(0.33)
Research note	-0.04	-0.12	0.02	-0.30	0.01	0.07	-0.11	0.33
	(0.15)	(0.15)	(0.13)	(0.19)	(0.09)	(0.12)	(0.13)	(0.23)
ln(Title length)	-0.21+	0.06	-0.14	-0.08	-0.12	-0.14	-0.02	0.08
	(0.12)	(0.13)	(0.10)	(0.18)	(0.08)	(0.09)	(0.12)	(0.23)
Intercept	2.42***	1.75*	1.96***	2.54**	0.38	0.19	0.09	2.12
	(0.62)	(0.72)	(0.55)	(0.89)	(0.40)	(0.48)	(0.63)	(1.46)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Author dummies	No	No	No	No	No	No	No	Yes
α	0.75***	0.71***	0.74***	0.71***	0.52***	0.50***	0.49***	0.23***
	(0.05)	(0.04)	(0.04)	(0.05)	(0.03)	(0.05)	(0.04)	(0.02)
Wald χ-squared	386.76	324.70	433.33	324.70	616.90	367.58	393.29	n.a.
Log pseudo likelihood	-3,906.51	-3,676.18	-5,613.02	-3,676.18	-5,461.92	-3,293.80	-2,129.94	-1,134.05
No. of observations	671	673	978	366	1344	803	541	224

Notes: Robust standard errors in parentheses. Wald χ-squared[df] is missing for RC4 as the number of author dummies makes the model of insufficient rank to perform the model test with robust standard errors. Results persist without robust standard errors, and the Wald χ-squared statistic then equals 331.74 [$p = 0.000$, d.f. = 114] for RC4.
$^{+}$: $p < 0.1$; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, two-tailed.

are less pronounced when splitting the sample in this manner. When splitting the sample based on top 50 universities, we find that the topic founding has a positive and significant effect in the top affiliated subsample (coefficient = 0.38, $p = 0.050$), yet not in the non-top affiliated subsample (coefficient = 0.23, $p = 0.281$). The coefficient for topic recombination is much larger in the top affiliated subsample (coefficient = 0.89: $p = 0.000$) than in the non-top subsample, where it is non-significant (coefficient = 0.45, $p = 0.260$).

We also assessed whether our findings persist when using five-year forward citations rather than the total number of citations by the end of 2015. The analysis provides consistent support for our hypotheses: the main effects of topic founding and topic recombination remain positive and statistically significant (coefficient = 0.36, $p = 0.001$ and 0.59, $p = 0.001$, respectively). As before, topic founding has a significant effect in the top affiliated subsample (coefficient = 0.31, $p = 0.007$) but not in the non-top affiliated subsample (coefficient = 0.25, $p = 0.227$). Similarly, topic recombination is strongly positively associated with impact in the top affiliated subsample (coefficient = 0.57, $p = 0.006$), but has a much less significant effect in the non-top affiliated subsample (coefficient = 0.49, $p = 0.068$). Thus, our hypothesized effects already manifest quickly after publication, though again the differential returns to recombination are less pronounced.

Finally, in order to more firmly establish the causal effect of top affiliation via moderation, we turned to a 'within-author' approach by leveraging the fact that some authors have multiple articles that are allocated to both the top and non-top groups over the course of their careers. Such within-estimation removes many sources of omitted variable bias that plague cross-sectional comparisons, but a second estimation problem arises: because authors themselves often choose whether and when to move between different universities, switching from a non-top

university to a top one or vice versa may be endogenous so that such a status change incorporates expectations of future performance in term of citation impact. Indeed, it is not unusual that the most talented and promising scholars disproportionately seek employment at high status institutions. To address this problem, we restricted this robustness check to authors who switch between the top and non-top subsamples only by virtue of their co-authors changing affiliation, which is most likely outside the control of the focal author. If, controlling for author fixed effects and focusing on this particular group of authors, we still find significant moderating effects of top affiliation, then we will be more confident about the causal nature of our theorized mechanisms.

To perform this check, we first disentangled each article in the sample into separate rows for each author and removed authors with one publication, resulting in 1,659 author-article observations. Among these, there were 195 chronological switching pairs within which one article was top affiliated and the other was not, corresponding to 128 authors. We followed several decision rules in creating these pairs. First, if an author has multiple publications after a status switch, then we only keep the first post-switch publication (e.g., the sequence [top1, non-top2, non-top3] yields only [top1, non-top2]). Second, if the author switches back and forth over time, then we allow for duplicate entries (for instance, [top1, non-top2, top3] splits into [top1, non-top2] and [non-top2, top3]). Third, if an author has multiple publications within the same year, we allow for all possible combinations (e.g. if an author has [top1] in one year, and [non-top2] and [non-top3] in the next year, both [top1, non-top2] and [top1, non-top3] are created).

Then, from the above 195 chronological switching pairs we isolated those in which the observed status switch was not the result of the focal author her- or himself switching affiliation, but rather of one of her or his co-authors switching. A total of 112 such pairs were identified,

resulting in a sample of 224 observations. It is worth noting here that the greatly reduced sample size in combination with author fixed effects to control for any unobserved time-invariant factors provides a substantially more conservative estimate than our earlier analyses on the full sample of articles in *SMJ*. We estimated unconditional fixed effects negative binomial regression models by including focal author dummies in addition to all other control variables. Given that we were interested in assessing effects within authors, we used interactions between the top-affiliation dummy and topic founding and topic recombination, rather than splitting the already very small sample.

We find a positive and marginally significant interaction between top affiliation and the topic founding variable (coefficient = 2.44, $p = 0.080$), indicating that the effect of topic founding is larger when the focal author is part of a top affiliated team, compared to when the author is not. In contrast, we do not find a significant interaction effect between top affiliation and topic recombination (coefficient = -0.53, $p = 0.602$). Meanwhile, the main effect of topic recombination is positive and substantial (coefficient = 1.55, $p = 0.021$), suggesting that topic recombination is rather uniformly rewarded in this rigorously constructed small sample. We interpret this robustness check as providing evidence consistent with those of the main analyses in that topic founding is subject to a stronger moderating effect than topic recombination. In fact, we do not observe the latter moderating effect for this specific small group of authors. This is perhaps because topic founding is subject to larger evaluation uncertainty than is topic recombination, which is consistent with the fundamental nature of the novelty created in each type of contribution: compared to topic founding, topic recombination is relatively less radical in nature, as it explicitly recombines existing research streams that fellow researchers may already be familiar with.

Post-hoc analyses

In order to identify possible avenues through which low status scholars can achieve impact through novel work, we conducted a post-hoc analysis where we interacted all our control variables with the recombination variable for both subsamples. We focus only on the recombination variable, as there are insufficient topic founding articles to conduct this analysis in each subsample. Moreover, our robustness checks in particular seem to point towards recombination as being an especially valuable pathway to impact for low status scholars. For this analysis, we also opted to replace the author number dummies with a continuous operationalization to prevent spreading the data too thin for this control variable. For all reported differences below, we take low values to be the 5^{th} percentile and high values to be the 95^{th} percentile of the relevant variables.

Starting with the top affiliated subsample, we only find a strongly significant and positive interaction effect between self-citations and recombination (coefficient = 0.18, p = 0.003). The average marginal effect of recombination changes dramatically as the percentage of self-citations in the reference list changes from low to high values: with no self-citations, the average marginal effect of recombination equals 19.85 (p = 0.712). When 10.71 percent of the reference list make up self-citations to the author team, the marginal effect becomes 339.18 (p = 0.003). We interpret this result as capturing either a tendency to self-promote more widely, but it may also represent an ability of top affiliated teams to successfully recombine their prior work in novel ways and thus to reinvent their own work.

Turning then to the non-top affiliated subsample, several noteworthy interactions emerge. First, we find that larger authors teams gain less from recombinatory attempts (interaction coefficient equals -0.74, p = 0.082). The average marginal effect for teams with four authors (all

not affiliated to a top university) equals -91.31 (p = 0.294), which is substantially worse than the average marginal effect of 249.82 (p = 0.049) for sole-authored articles. This result seems to further support a signaling effect, as it may be that contributions are discounted or disregarded by audiences when they are produced by large teams who all lack an institutional seal of approval. We also identify a strong interaction effect between being a lead article and recombination (coefficient equals 2.91, p = 0.005). When an article is published as the lead article in the issue, then the average marginal effect of recombination equals 393.81 (p = 0.014), which is much higher than for low-status teams whose article is not published as the lead article (average marginal effect equals 6.36, p = 0.889). Again, this could be indicative of a signaling effect, where being conferred lead article status helps overcome the low status novelty discount, but it could also be that lead articles have a higher quality, on average. Third, we observe a positive interaction between self-citations and recombination (coefficient equals 0.15, p = 0.086). The average marginal effect of recombination changes from 10.49 (p = 0.841) to 234.21 (p = 0.057) as the percentage of self-citations in the reference list changes from low to high values. Similar to the top affiliated subsample, this may be capturing either a tendency to self-promote more widely or an ability to successfully recombine their prior work in novel ways. Nevertheless, it is clear that self-citation strengthens the positive effect of recombination, regardless of top affiliation.

Discussion and conclusion

We examine the effects of topic founding, through which researchers introduce a novel conceptual and linguistic toolkit to the field, and topic recombination, where researchers combine elements from different existing knowledge domains to generate novel outcomes, on the impact that articles leave on the field of strategy. Though both types of contribution have the

potential to redirect and reshape the field of strategy, may open up new 'fishing grounds', and can prevent the exhaustion of research opportunities, little research has been done to examine whether and under what conditions these contributions actually reorient the field of strategic management by attracting attention from fellow researchers. We use topic modeling to measure topic founding and topic recombination, prior to and independent of the subsequent analyses that examine their citation impact. Our findings support the positive effects that these contributions have on impact: topic founding is associated with an average increase of 64.59 citations, while articles with high levels of recombination accrue, on average, 41.77 more citations than those with low levels of recombination.

We further find that top affiliation of the article's author team strengthens the positive effects of topic founding and topic recombination; the effects of topic founding and topic recombination are amplified 4.17 and 2.51 times, respectively, for the subsample of articles authored by top affiliated teams compared to the subsample of articles written by teams without such an affiliation. In fact, neither topic founding nor topic recombination elevates article impact for the subsample of articles without a top affiliation, suggesting that articles by top and non-top affiliated teams are evaluated in a systematically different manner by audiences. Our findings thus support our argument that the top universities in the field function as a signaling and legitimation device for fellow researchers to alleviate uncertainty in evaluating novel contributions.

Contributions and Opportunities for Future Research

This paper joins a recent stream of studies interested in furthering strategic management through introspective modeling of the field. Though prior studies in this line of research (Furrer et al., 2008; Nerur et al., 2008; Ramos-Rodríguez & Ruíz-Navarro, 2004) have focused on

realized pivotal moments and impactful authors in the field of strategic management, we use topic modeling to systematically identify topic founding and topic recombination, independent from the realized impact that these contributions left on the field. This separation enables us to attain more fine-grained insights into why some novel contributions, while others do not, blaze a trail in the field of strategy. Thus, we extend this line of research by providing a more complete picture of the development of the field of strategy.

We go beyond existing studies of the determinants of article impact by showing how not only 'what' an article says is crucial for impact, over and above other article- and author-level characteristics, but that 'where' the individuals who say it come from dramatically alters this relationship. These findings are important for researchers and academic institutions alike, as article impact is a dominant source of scholarly prestige and is related to material and non-materials rewards of various kinds, be it at the level of the individual researcher, university, or journal (Endler, Rushton, & Roediger, 1978; Judge et al., 2007; Stremersch et al., 2007).

Our results are closely related to recent discussion and concern about the 'excessive' pursuit of novelty in strategic management (Bettis et al., 2016; Durand et al., 2017) and other areas of the social sciences (Barley, 2016), posing that the academic reward system risks promoting novelty and impact at the expense of accumulative knowledge growth. Our findings provide new empirical evidence as to why the pursuit of novelty has come into existence. More importantly, according to our findings, the adverse consequences of pursuing novelty may be exacerbated by the differential returns to novelty for top versus non-top affiliated scholars. Our study suggests the existence of two mutually reinforcing Matthew effects (Merton, 1968): one at the author level and the other at the institution level. At the author level, novel research is more positively received when it is conducted by top affiliated authors. Because of this, these authors

gain disproportionately more fame, prestige, and access to resources, which then further reinforce the research ranking at the institution level. In turn, top affiliated authors accrue even more citations for novel research, leaving other authors and institutions further behind over time. The consequences of such self-perpetuating inequality can be grave and our results thus support the increasing call for a redesign of the academic reward system and publication practices (see Bettis et al., 2016; Lawrence, 2003; Medoff, 2006).

We also contribute to creativity research by studying how and under what conditions the two aspects underpinning creativity — novelty (taken as topic founding and topic recombination) and usefulness (taken as article impact) — interrelate. Though it has long been acknowledged that these two aspects are conceptually distinct (Amabile, 1982, 1996), scholars have only recently begun to disentangle them empirically (Lee et al., 2015; Schilling & Green, 2011; Uzzi et al., 2013). We add to this stream of work by demonstrating how social processes can dramatically strengthen or attenuate the influence of novelty on usefulness by showing that recognition for otherwise similar efforts of novelty is crucially contingent on the affiliation of those that produce the novelty. Further research examining the effects of such social processes on the relationship between novelty and usefulness may offer new insights into creativity in other contexts, such as the arts and the sciences more generally.

Finally, this paper adds to the literature on recombination as well as the topic modeling literature by developing a more precise measure of recombination, taking into account not only relative weights and newness of all elements being recombined, but also their pairwise similarity. Besides being fully compatible with the traditional Herfindahl-Hirschman Index, our measure incorporates dimensions of recombination discussed in more recent literature, including how often elements for recombination have been used in the past (Fleming, 2001) and the cognitive

distance between perspectives being recombined (Okhuysen & Bonardi, 2011). By making full use of the output given by topic models we provide researchers with a sophisticated, albeit intuitive, tool to measure recombination. It would be interesting to apply this measure to other bodies of textual data, such as patents (Kaplan & Vakili, 2015) or annual reports (Kabanoff & Brown, 2008) to assess how organizations and individuals recombine different linguistic or thematic elements in the pursuit of a variety of outcomes.

Our results also provide practical implications for researchers interested in carving out a path for themselves. Novelty pays, but its rewards clearly differ substantially contingent on where you are from. Our results taken as a whole suggest that topic recombination may be the most fruitful avenue to pursue for those lacking a top affiliation, as the differential citation premium between those with and without a top affiliation seems consistently less pronounced for topic recombination than for attempts to found new research topics, and even disappears in our more restrictive analyses. This may be indicative of topic recombination being less radical or fundamental in nature, posing less evaluation uncertainty by building on existing elements that are more or less familiar to the audience. Hence, topic recombination can be endowed with legitimacy from the prior literature, such that top affiliation plays a less important role in shaping citation premium underlying such contributions. This empirical pattern mirrors recent calls to focus on consolidating or integrating different research streams in strategic management, rather than an incessant pursuit of new paradigms or topics (Barley, 2016; Durand et al., 2017). Our post-hoc analyses suggest that in particular building on one's prior published work (as captured by the degree of self-citation, which may also represent self-promoting activities) can help low status scholars to reap the rewards from their recombinatory efforts, therefore highlighting the importance of carving out a clear research agenda as a scholar (for both top and non-top

affiliated scholars), which can in turn serve as a foundation for reinventing oneself over the years.

Limitations

As any work, our research is subject to a number of limitations. First, we have constrained our sample to articles published in *SMJ*, which may result in the overlooking of relevant work originating in other journals. However, the focus on a single journal greatly fostered systematic analyses due to the common structure underlying our texts while preventing the difficult decision of identifying what does and does not constitute strategic management research in other journals (cf., Nag et al., 2007). Furthermore, past research has established that *SMJ* is the flagship journal for the field of strategic management (Phelan et al., 2002), publishing articles representative of major research efforts in the field of strategy (Nerur et al., 2016; Ramos-Rodríguez & Ruíz-Navarro, 2004). Thus, we can reasonably assume that most relevant research has been included in our sample. Of course, future research studying a broader sample of journals could provide valuable insights as to the generality of our findings.

A second limitation is that our sample is restricted to published articles, such that selection effects may be at play. In particular, we envision a three-stage selection process leading up to the publication of articles in our sample. First, there is idea gestation, where authors identify topic founding and topic recombination opportunities as thought experiments and eliminate those that do not make sense or have limited potential. Second, only some of these ideas are successfully written up or yield interesting results, while remaining ideas are given up or temporarily shelved. Finally, the manuscripts pass through the review process, where they may be more likely to get accepted due to the field's desire for novelty (van Witteloostuijn, 2016) or less likely due to cognitive difficulties for the appraisal of novel contributions

(Ferguson & Carnabuci, 2017). The challenge of correcting for these three stages of selection may be insurmountable, requiring extensive data not available to us.

Nevertheless, it is first worth noting that in our more restrictive analysis in which author fixed effects are included to account for any unobserved time-invariant heterogeneity, selection bias due to omitted variables is greatly diminished (selection bias is essentially an omitted variable problem, see Greene, 2008). Next, the direction of bias in the estimated effect of topic founding and topic recombination is ambiguous, as it depends, amongst others, on whether novelty makes acceptance more likely or less likely at *SMJ*. Moreover, even if the estimated main effects of topic founding and topic recombination are biased downward or upward, these biases are unable to account for the differential returns to novelty for top versus non-top affiliated scholars, as both should face biases in the same direction. As such, we place more credence in our identified moderating effects.

In conclusion, the pursuit of novelty has the potential to offer tremendous returns to researchers. Our study provides important new evidence on whether and under what conditions these returns are prone to become manifest: they depend crucially on whether or not the researcher is affiliated to one of the top universities in the field. In particular, we find that attempts to found new topics tend to be successful only for top affiliated researchers, whereas differential returns to topic recombination are less pronounced. We hope this paper provides an avenue for further exploration of the social mechanisms at play in shaping the development of the field of strategic management.

GENERAL CONCLUSION

Creativity—the generation of novel and useful ideas and products (Amabile, 1996)—has become of crucial importance in maintaining innovation and economic growth in today's knowledge-intensive economy (Baron & Tang, 2011; Bilton, 2007; Sarooghi et al., 2015). In spite of this importance, academic pursuit of creativity's drivers and consequences has remained relatively unable to overcome the hurdle to translate its simple dual-criterion conceptual definition into an operational one that is suitable for empirical study (Lee et al., 2015). The essays that comprise this dissertation shed new light on how, and especially under what conditions, novelty predicts usefulness—thus offering fine-grained insights into the two necessary conditions for creativity to emerge. In the following, I first outline the core findings and contributions of each chapter, after which I discuss the joint implications of these chapters more generally. I conclude by discussing the limitations of this work, and relate these to opportunities for future research.

Chapter one—*Does foreign language liberate or limit creativity? An experimental study of foreign language use's effects on divergent and convergent thinking*—examines how foreign language use influences individuals' ability to engage in creative thinking tasks. Results show that the effect of foreign language use (in this study: English) on convergent thinking strongly depends on English language anxiety: individuals with high English language anxiety perform worse in a convergent thinking task when placed in an English language condition, compared to high English language anxiety-individuals in a native Dutch language condition (and vice versa for low English language anxiety individuals). In contrast, results from one sample show that individuals with high English language anxiety engage in more divergent thinking when placed in an English language context, compared to high English language anxiety-individuals in a native Dutch setting (and vice versa).

This chapter contributes to the international business literature by showing the effects of foreign language use on new knowledge generation through creative behavior, rather than on the knowledge transfer or integration of interest to prior work (Kroon et al., 2015; Piekkari et al., 2005; Welch & Welch, 2008). Moreover, it offers new quantitative evidence regarding for foreign language use effects by taking an experimental approach to the study of language (Akkermans et al., 2010; see also Bello et al., 2009: 362). By highlighting countervailing language use effects that are moderated by individuals' foreign language anxiety, it also adds new understanding to the conditions under which language standardization may or may not be preferable to individualization (Marschan-Piekkari et al., 1999; Volk et al., 2014). More generally, this chapter contributes to the research question of this dissertation by exploring the conditions under which novel behavior does and does not emerge.

Chapter two—*When everyone is different, no one is? Effects of distinctiveness on performance in homogeneous and heterogeneous creative industries*—delves into the mechanisms that drive the effects of being more or less distinct, compared to industry peers, on financial performance. Results from this study show that organizations and individuals in the creative industries, on average, stand to gain most by taking as distinct as possible positions compared to their industry peers. However, in homogeneous industries, we observe a U-shaped effect that turns into a linear positive effect as heterogeneity increases to average levels. Moreover, distinctiveness loses its performance-increasing function once heterogeneity attains very high levels. Though prior work has taken the countervailing pressures towards conformity and differentiation as unobserved, by providing an explicit formalization of these mechanisms this chapter offers a framework that is able to harmonize and extend contradictory results (with, for instance, Alvarez et al., 2005; Deephouse, 1999; McNamara et al., 2003; Norman, Artz, &

Martinez, 2007, finding inverted U-shaped effects, and Cennamo & Santalo, 2013; Jennings et al., 2009; Zott & Amit, 2007, finding U-shaped effects). Additionally, by emphasizing the importance of the relative strengths of the latent mechanisms driving distinctiveness' effects, this chapter shows the importance for a contingency-based theory of optimal distinctiveness. This chapter adds to the research question underpinning this dissertation by showing how being different from the central norms of one's industry (that is, being novel: McKinley et al., 1999) has widely differing effects on how this novelty is valued, contingent on how industry peers behave, themselves. As such, it emphasizes the need for accounting for others not only in determining what is novel, per se, but also in evaluating the subsequent effects of novelty.

Chapter three—*Regional stickiness of research topics in the scholarly International Business community: A founding topic model and geographic usage regression of the Journal of International Business Studies, 1970-2015*—investigates whether or not novelty generated in the international business community has a tendency to be regionally sticky, or whether it disseminates independent of its geographic origins. The results show that new research topics tend to see disproportional use in their home region compared to other regions of the world, although these patterns do differ between regions and across time. This study contributes to the scholarly community in international business in particular and to academia more broadly by showing that, although globalization is evident in terms of the number and diversity of countries represented by publishing authors, tendencies against true globalization persist and are present in deeply engrained mental maps of authors. The results also offer a new geographic metaphor of knowledge diffusion closely related to the regional multinational (Rugman, 2005; Rugman & Brain, 2003; Rugman & Verbeke, 2004), as scholars' work mainly appears to diffuse locally in a similar way to multinationals operating predominantly within their home-base markets. This

study addresses the research question of this dissertation by showing that even similarly novel contributions see widely different use, largely because they emerge in a specific location of the world.

Chapter four—*Does it pay to be novel in strategy research? Topic founding, topic recombination, and the role of top affiliation in achieving impact*—investigates whether or not more novel works in the field of strategic management tend to also be more useful, per se. Results show that novelty is indeed associated with a citation premium, but only for author teams that have an affiliation to one of the high-status universities in the field. Novelty has no significant effects on impact for author teams lacking such an affiliation. This chapter shows that not only 'what' an article says is crucial for how useful it is taken to be, but that 'where' the individuals who say it are located in the status hierarchy deeply shape how its usefulness becomes manifest. This study contributes to the field of strategy research by adding to its recent discussion on the consequences of the pursuit of novelty in the field, and by offering a new approach to modeling the field as a whole. More generally, this chapter confirms that, though novelty and usefulness are intertwined, social factors strongly condition this relationship.

Considered jointly, the essays in this dissertation have a number of contributions. Results highlight how novelty tends to, on average, positively predict usefulness. These results hint at the existence of a causal chain, as novelty consistently precedes usefulness. This is particularly evident from chapters three and four, where we are able to more explicitly temporally disentangle novelty and usefulness than in the other chapters. However, results also show that this pattern is not straightforward, as a variety of factors substantially condition this relationship. For instance, chapter two shows how highly novel or distinct positions can lead to differing returns, contingent on how distinct others in one's industry are. Such results also emerge from

chapters three and four, where novel contributions in science see widely different use based on their geographic origin and the researchers' position in the field's status hierarchy, respectively. These results consequently point towards the need to disentangle these two pillars of creativity, rather than either assuming them to be uncorrelated (as is done in the unidimensional approaches that attempt to measure creativity through additive scales; e.g., Gong et al., 2009; Oldham & Cummings, 1996; Zhou & George, 2001), or taking creativity to be sufficiently captured by one of the two pillars at the expense of the other (Gielnik et al., 2012; Hollingsworth, 2004; Pirola-Merlo & Mann, 2004; Simonton, 1999; Uzzi & Spiro, 2005; Zuckerman, 1967).

More generally, this dissertation adds to recent discussions on what creativity actually means (Cropley, 2006; Plucker et al., 2004; Runco & Jaeger, 2012). This stream of work acknowledges that, by far, the dominant definition of creativity requires both novelty *and* usefulness to be present (Plucker et al., 2004; Runco & Jaeger, 2012), but whether or not the two pillars are really necessary conditions for true creativity remains an open question. While this dissertation is unable to address the potential role of other conditions, such as quality of execution (Storme & Lubart, 2012: 146), thoughtfulness, cleverness, and interestingness (Long, 2014), surprise (Boden, 2004), or non-obviousness (Simonton, 2012), it does speak to those studies focusing on novelty and usefulness (Diedrich et al., 2015; Plucker et al., 2004; Runco & Charles, 1993). Specifically, since a wide variety of contextual forces condition how much use a novel offering sees, this dissertation raises the question whether or not *only* offerings that are both useful and novel should be considered as creative. Indeed, recent results have shown that novelty is a more important predictor of creativity scores than usefulness (Diedrich et al., 2015; Sullivan & Ford, 2010), and that usefulness sometimes even negatively predicts evaluations of creativity (Caroff & Besançon, 2008; Runco & Charles, 1993). This has led to a view that

novelty may be a first-order criterion of creativity, while usefulness is a second-order criterion—only mattering once novelty has been established (Diedrich et al., 2015). However, the results in this dissertation add a complication to this view: if two similarly novel contributions see widely different use predominantly due to differences in variables unrelated to both novelty and usefulness, then is the less useful contribution really less creative?

Considered as such, this question seems to align with a recent proposal to replace usefulness in the definition of creativity with intention (Runco, 1993; Weisberg, 1993, 2006). Weisberg (2006) argues that the main motivation for including usefulness in determining creativity was to exclude merely bizarre outcomes produced mostly by chance, but that its inclusion actually introduces a plethora of conceptual and empirical problems. For instance, the issue of separating usefulness from subsequent performance is salient in much of the creativity literature, and this dissertation is not exempt from this limitation: though a relatively robust approach to the measurement of novelty is taken, which does not rely on ex post success, the different measures of usefulness in different chapters may indeed be capturing performance. In chapters three and four this should be less of a concern, as the dependent variables are quite directly the extent to which a focal piece saw use in other works, which happens to represent an important performance dimension for scientific work, chapter two is significantly more susceptible to this criticism. Therefore, I certainly see the value of Weisberg's proposition, which also attenuates concerns emerging from the role of contingencies unrelated to both novelty and usefulness. However, requiring intention does introduce the challenge of perceptibility or observability (Plucker et al., 2004: 91)—how can scholars interested in the study of creativity observe (and measure) intentionality?

Perhaps a more apt solution is to consider and address the question of for whom and in what context the creative offering was produced (Plucker et al., 2004: 92). Not only does this help in contextualizing research, but it can especially serve as an anchor in measuring novelty and usefulness, ideally in isolation of subsequent performance. Such work could enable an investigation of creativity's performance implications without resorting to tautology (where something performed well because it was creative, and where its performance is used to determine its creativity). Admittedly, I have adopted operationalizations of novelty and usefulness that were, at times, rather isolated from the context under study. This is an especially salient issue in chapter two, where revenues only tenuously capture the usefulness or value of the producers' work. Though revenues provide an important financial dimension for these producers, other usefulness criteria (such as reviews by gatekeepers and evaluations by audiences) could be investigated in future work. At the same time, one may even pose that usefulness is not a relevant consideration, at all, in these types of industries—especially the arts. This is mirrored in Weisberg's (2006: 122) comment that "value is not useful in dealing with artistic creativity, because of its inherent subjectivity". I am hesitant to disregard consideration of usefulness in these industries altogether, however, because in my view this risks reverting to an outdated view of the creative industries producing no value (see: O'Connor, 2009; Potts & Cunningham, 2008, for some critiques of such views). Rather, future work could stand to gain by further exploring what usefulness and value actually entail in the creative industries (e.g., Hearn, Roodhouse, & Blakey, 2007; Higgs, Cunningham, & Bakhshi, 2008; Throsby, 2001), how different stakeholders emphasize different types of value, and how these relate to novelty and creativity.

Related to the above point of context-specificity, in chapter one, divergent and convergent thinking performance are admittedly very general and abstract in nature. Though this

helped uncover general theoretical mechanisms, I acknowledge that the two creative thinking tasks need not capture creativity in the "real world". Nevertheless, there are clear parallels between these two tasks and the two types of scientific contribution that I study in chapters three and four: topic founding relates to divergent thinking, being centered on the generation of an idea or topic that is new to the field, while recombination is more similar to convergent thinking, as it is concerned with the synthesis of different theories. Do the patterns observed in chapter one generalize to academia? One approach to this question is to compare the work and impact of non-English scientists when they publish in English versus publications in their native language. Do individuals who are more anxious about publishing in the English language generate different types of contributions, compared to the type of work do publish in their native language?

The results in this dissertation also have different practical implications. The similarities in creative processes in the creative industries and academia in particular suggest that the observed patterns could generalize between these two contexts. Indeed, Csikszentmihalyi (1988) posed that academia was no different from the arts as far as gatekeepers and evaluative judgments were concerned. Therefore, chapters three and four offer some specific strategies for entrepreneurs and organizations in the creative industries who aim to produce novel work while maximizing the use that this work sees. Chapter three would, for instance, first suggest a focus on local markets. This could help in escaping the long tail and local niches that are characteristic of these industries (Brynjolfsson, Hu, & Smith, 2006, 2010) by establishing a local userbase which could then serve as a jumping off point for internationalization. Vice versa, chapter two speaks to researchers working within academia, where recent work has identified that there are major pressures for researchers to aim for optimal distinctiveness between novelty and convention (Patriotta, 2017). My results suggest that researchers strive to break new ground

especially in fields that are or have become homogeneous in nature, while a more modest balance between novelty and convention is perhaps best struck in fields where a greater diversity of perspectives and topics are being investigated. Of course, these extrapolated practical implications are speculative, and it would be very interesting to subject them to empirical study.

This dissertation also yields a methodological contribution through its use of topic modeling. Topic modeling allows for a new approach to measuring novelty, independent of the usefulness or performance of the subject under study, by comparing its textual content to the entire corpus of work in its field. Therefore, it highlights one approach to overcoming the challenge of operationalizing novelty in a more empirically and theoretically sound manner. More generally, topic modeling has a variety of potential applications to other bodies of textual data, such as patents (Kaplan & Vakili, 2015), annual reports (Kabanoff & Brown, 2008), corporate speeches (Sussman, Ricchio, & Belohlav, 1983), and popular press articles (DiMaggio et al., 2013). Through its use of the topic modeling approach, this dissertation offers new tools to fields that have seen a linguistic turn in their research, such as international business (Brannen et al., 2014; Tietze, 2008) and organization theory (Kennedy, 2008; Martens et al., 2007).

The focus of this dissertation on the methodology of topic modeling also represents one of its limitations, however. Many approaches exist for the analysis of text, such as content analysis, qualitative coding, word counts, and others, of which topic modeling is only one (see Grimmer & Stewart, 2013, for a review of several approaches). While topic modeling offered a suitable tool for the chapters in which it was used, as we could not rely on pre-defined categories nor could we manually code articles due to the scale of our data, it would certainly be interesting to analyze the texts that serve as the input of our models using alternative approaches. This could be used, for instance, to evaluate whether or not different methods classify the same texts as

being novel to different degrees. I suspect that the core of the results would persist, as those who use highly unusual or novel sets of words compared to their reference group would likely be classified as novel regardless of the exact method used, as the input and comparison level remains the same, independent of the empirical approach.

Another limitation underpinning these chapters concerns the issue of causality, as most of the analytical approaches are essentially cross-sectional in nature. I cannot truly claim that there is indeed a *causal* chain between novelty and usefulness, although I have attempted to address these concerns, for instance by temporally disentangling the measurement of novelty and usefulness in chapters three and four. Data limitations preclude me from more effectively minimizing these issues in chapter two in particular, but whether or not novelty has a causal effect on usefulness does not diminish the contribution of better disentangling these two concepts in the cross-section. Further work to determine a causal link between novelty and usefulness should prove valuable in determining the true nature of their interrelations, for instance by taking an experimental approach similar to the one taken in the first chapter.

With these limitations in mind, this dissertation has yielded several theoretical and empirical contributions to one of the fundamental problems hindering the study of creativity: translating its conceptual definition into an operational one by disentangling its two pillars of novelty and usefulness (Amabile, 1982; Lee et al., 2015). I hope that the insights that these essays offer may stimulate further research that addresses the different intricacies underlying creativity, rather than relying on tautological or overly simplified representations of the creative process. Perhaps its complexity and context-specific nature is one of the reasons why creativity has remained so resistant to automation (Bakhshi et al., 2015). I hope that its study can remain just as future-proof.

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