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**Brain Drain: The Cognitive Neuroscience of Foreign
Language Processing in Multilingual Corporations**

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BRAIN DRAIN: THE COGNITIVE NEUROSCIENCE OF FOREIGN LANGUAGE PROCESSING IN MULTINATIONAL CORPORATIONS

by
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AUTHOR NOTE

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ABSTRACT

This paper adopts a cognitive neuroscience perspective to develop theory about the consequences of foreign language use in organizational settings. In contrast to previous work that has focused on the interpersonal effects of foreign language use, we focus on intra-personal, cognitive processes that affect employee performance. Our model delineates how foreign language processing depletes cognitive resources, which can ultimately result in biased decision making and reduced self-regulation. We discuss theoretical and practical implications of our model for international business research in the context of an increasing number of organizations that have adopted a common corporate language.

INTRODUCTION

In response to language diversity in their organizations, multinational corporations (MNCs) face the challenge of developing effective strategies to handle the complexities of multilingual communication. In recent years, a significant stream of research investigating the effects of a common language policy has emerged. Such a policy is widespread in MNCs (Harzing & Pudelko, 2013) and typically requires employees to exclusively use the official business language, in most cases English, for written and spoken interactions, teleconferences, emails, memos and shared documents. Many studies welcomed language standardization and focused on practical considerations, implications, and recommendations for organizations for how to manage a shared language mandate (e.g., Marschan-Piekkari, Welch, & Welch, 1999a). At the same time, several studies have also highlighted the negative effects of a common corporate language,

focusing predominantly on the negative effects on organizational structures and interpersonal interactions (Marschan-Piekkari, Welch, & Welch, 1999b; Neeley, 2013).

Contrary to the prior focus on organization-level outcomes and interpersonal interactions, the current paper explores the intra-individual effects that foreign language use has on non-native speakers of the common corporate language. Recent research indicates that many organizational members seem to experience the implementation of a common corporate language that is not their native language as detrimental to their work skills, routines, and organizational standing. For example, Neeley, Hinds, and Cramton (2012) observed that many non-native speakers felt that their restricted capacity in the mandated language reduced their communication effectiveness and their general work-related abilities and competencies. As a result, many non-native speakers develop language performance anxieties and feelings of job insecurity (Harzing & Feely, 2008; Neeley et al., 2012).

While previous research focused on a *perceived* reduction in performance when working in a foreign language, research has not yet explored whether foreign language use also leads to an *actual* loss of performance. In addition, previous research into perceived performance loss has focused predominantly on the detrimental effect of foreign language use on interpersonal dynamics (e.g., Neeley, 2013), but not on individual, intra-personal processes. In an attempt to contribute to the field, our paper identifies the intra-personal, cognitive processes that limit organizational members' abilities to perform at their best when they are forced to operate in a foreign language. We build a theoretical model, suggesting the mechanisms responsible for the loss in actual performance and productivity of individuals based on cognitive processes.

After a brief review of the current International Business (IB) research related to language, we apply theories, concepts, and findings from cognitive neuroscience, cognitive psychology, and psycholinguistics to develop a framework for analyzing the intra-personal effects of foreign language processing on work-related behaviors, attitudes, and performance. Thereby we follow explicitly the call for interdisciplinary input into the current discussion of the role of language in IB and contribute to the growing area of research that explores the implications of cognitive neuroscience for research on the performance and productivity of employees in the workplace (e.g., Becker, Cropanzano, & Sanfey, 2011; Senior, Lee, & Butler, 2011; Volk & Köhler, 2012). It is important to point out that we apply these insights to the specific circumstances found in work settings, which are characterized by high degrees of complexity, uncertainty, and social connectivity and therefore pose particularly high cognitive and attentional demands on the limited capacities of the human mind (e.g., Howard, 1995). The primary contribution of our framework is therefore to delineate how foreign language processing increases employees' working memory load and how this in turn can lead to more heuristic biases in higher-order cognition and reduced capacities for self-regulation in organizational settings. This allows us to open the black box surrounding the effects of language standardization on individual employees and to understand the underlying cognitive processes that lead to reduced performance and productivity. Gaining a better understanding of the contingencies and boundaries of a common corporate language will help future research in IB to build theoretical models outlining when

language standardization is more effective than individualization (i.e., the choice of language is left to the individual parties involved) and vice versa and when some combination of both should be applied. As an extension of our theoretical model, we discuss theoretical implications of our propositions for current IB research and make specific suggestions for future research. In addition, we provide innovative practical implications for helping organizations to support their non-native speakers to perform at their best. In this context, we focus on language policies, HRM, and work practices. We would like to highlight that our paper does not at all suggest that foreign language use always results in bad outcomes. Rather, our paper aims to provide a better understanding of the effects of foreign language use on organizational members at the intra-individual level, which allows organizations to take the necessary steps to support their employees and manage these effects more appropriately.

LANGUAGE DIFFERENCES, CULTURE, AND COGNITION

In contrast to national cultural differences, which have been studied in IB research since the 1980s, language differences have been labeled as the “forgotten factor in multinational management” (Marschan, Welch, & Welch, 1997). It is only since the pioneering research by Piekkari and colleagues (Marschan et al., 1997, Marschan-Piekkari et al. 1999a, b) that the relevance of language differences has been recognized in its own right, so that language has been taken “out of the ‘culture box’” (Welch & Welch, 2008:341). This newly emerging line of research can roughly be separated into three categories: (1) research on the consequences of language differences for organizational structures and processes, (2) research on the effect of language differences on interpersonal interactions, and (3) research on the relationship between language, culture, and cognition.

With regard to the first category, previous research has highlighted the advantages of a common language policy for facilitation of formal reporting, enhancement of informal communication, augmentation of the information flow, improvement of coordination, ease of access to documents, promotion of a common corporate culture, and fostering of a sense of belonging (Luo & Shenkar, 2006; Marschan-Piekkari et al., 1999a). However, research that is more recent has shown that language standardization has its own disadvantages that can disrupt and hamper the very processes it is said to facilitate. In particular, a lack of language proficiency in the common corporate language has been shown to be negatively related to communication density, shared vision, perceived trustworthiness, knowledge exchange, and the building of strong, informal knowledge sharing networks across an MNC (Barner-Rasmussen & Aarnio, 2011). In addition, differences in language proficiency can influence career opportunities and positions of power in MNCs, irrespective of actual performance (Piekkari, 2006; Welch & Welch, 2008). Further possible outcomes of language deficiencies in the common corporate language are a sense of isolation and disconnection of subsidiary managers from headquarters (Björkman & Piekkari, 2009), power-authority distortion when non-Anglophone headquarters interact with Anglophone subsidiaries (Harzing & Feely, 2008; Neeley et al., 2012) or even the emergence of shadow organizational structures (Marschan-Piekkari et al., 1999b).

With regard to effects on interpersonal interactions (i.e., category 2), Neeley and colleagues (2012, 2013) observed that non-native speakers often feel apprehensive and limited in their ability to discuss with native speakers on an equal footing, leading to a perceived loss in status. They might even come to distrust native speakers who they suspect abuse their superior linguistic agility to take advantage of them. This can result in behaviors such as avoiding native speakers, clustering with people from a shared language background, and switching to the use of native languages, which in turn creates distrust in native speakers, leading to a vicious cycle of negative stereotyping, distrust, miscommunication, reduced knowledge sharing, anxiety and conflicts (Harzing & Feely, 2008; Marschan-Piekkari et al., 1999a). It is important to point out that Neeley and colleagues (2012; 2013) observed that these negative interaction patterns are not primarily caused by cultural differences, but rather by the perceived differences in language abilities, indicating that language needs to be studied in its own right.

With regard to the third category on the relationship between language, culture, and cognition, there are two predominant positions that offer very different views. The linguistic position, on the one hand, sees language as a system of symbols for objects and common terms, and meaning can be accurately translated across different sets of symbols (i.e., different languages) (Brislin, 1980). The Sapir/Whorf hypothesis, on the other hand, posits that language shapes our perception and interpretation of the world around us (e.g., He, 2011). As such, people who speak different languages do not experience the same reality; they do not live in the same context. A growing number of researchers who have studied the direct link between culture and cognition have made similar arguments. In their influential article, Markus and Kitayama (1991) discussed how views of the self differ fundamentally for individuals from independent versus interdependent cultures, and how these differences in self-construal result in different mental processes. In their article, they review extensive prior research to demonstrate how the basic distinction between independent and interdependent self-construals results in different information processing with regard to cognition, emotion, and motivation. Along the same lines, Nisbett and colleagues have repeatedly argued and shown that individuals from Asian versus Western cultural backgrounds think differently (for an overview see Nisbett (2003)).

The current paper extends these prior avenues of language research in two ways. Firstly, previous research on the consequences of language differences in organizations has adopted an *inter-personal perspective* focusing on communication, social comparison, and social categorization processes between individuals. In contrast, the current paper adopts an *intra-personal perspective* to model the effects of foreign language use on cognitive processes “inside” the individual. Inspired by research that has shown a negative effect of foreign language processing on cognitive abilities (e.g., Takano & Noda, 1993), our paper is the first to systematically focus on the consequences of foreign language use on individual work performance from a cognitive performance perspective.

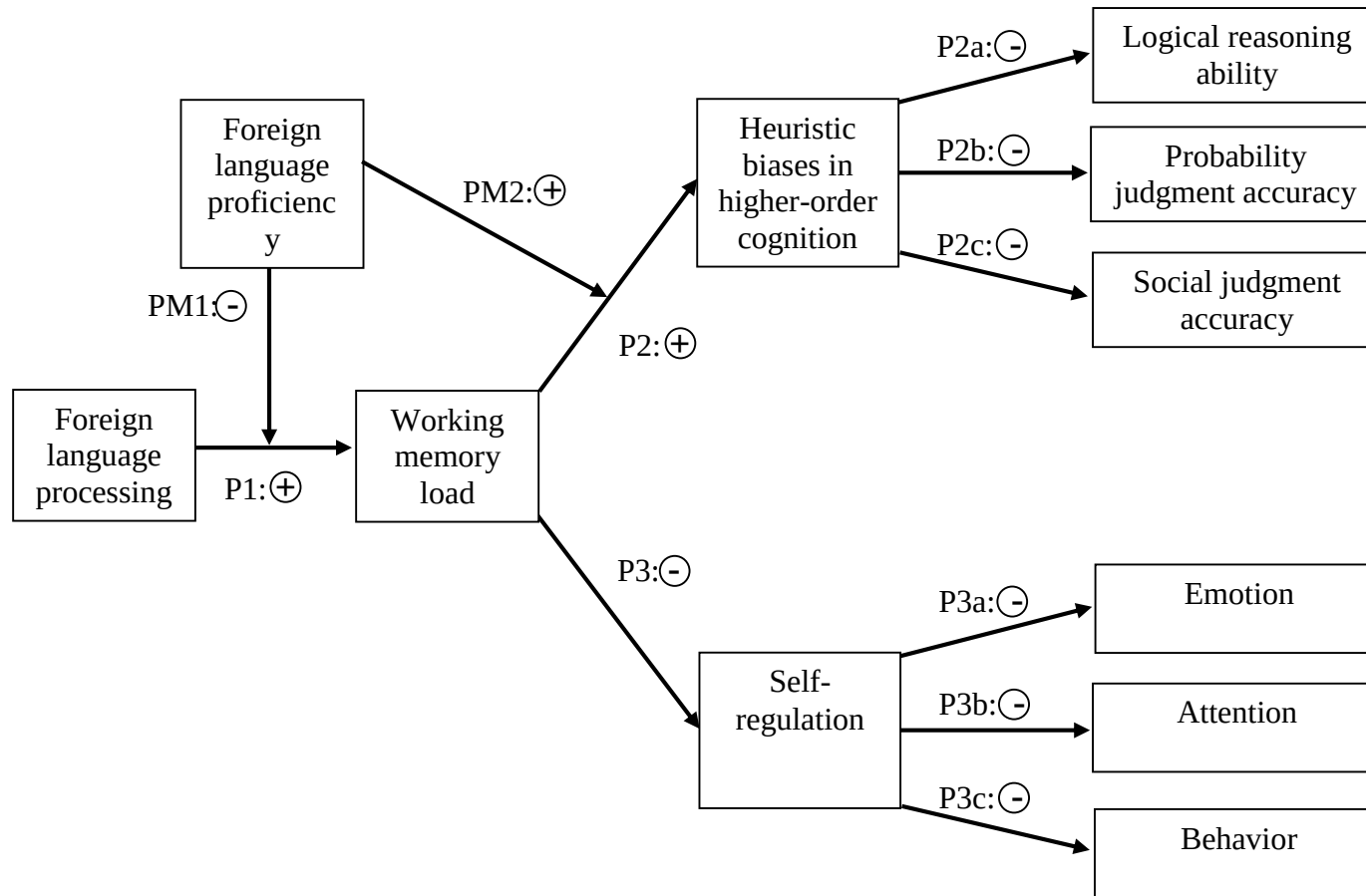
Secondly, previous research on the relationship between language, culture, and cognition has focused on higher-level processes, such as thinking, reasoning, and perception. While we also discuss higher-order cognitive processes as outcome variables, our main focus is on more

fundamental processes underpinning these higher-order abilities in the context of foreign language use. More precisely, cross-cultural studies in neurolinguistics have shown that different languages engage different processing mechanisms and neural pathways (Levinson, 2012). These basic cognitive algorithms are hardwired in humans who have learned the associated language from early childhood, allowing them to process the language fully automatically and often resulting in distinct culture-bound cognitions. Second language speakers who acquired the language later in life do not possess the same hardwired cognitions and rely therefore on more conscious and controlled processing mechanisms. In this paper, we describe these basic mechanisms that underlie controlled foreign language processing and generalize by and large across racial, ethnic, and cultural groups. Thus, while previous studies have concentrated on demonstrating how differences between languages give rise to cultural differences in higher cognitive functions, we focus on more elementary processes that people across cultures share when speaking a foreign language.

In our attempt to extend past theorizing along the directions outlined above, we build a theoretical model that delineates the impact of foreign language use at the intrapersonal level. More specifically, we employ a cognitive neuroscience perspective to explore the inner-workings of individuals during foreign language processing and the resulting performance implications. In our theoretical model (see Figure 1), we explain how foreign language use results in higher working memory load which, in turn, can lead to increased heuristic biases in higher-order cognition and reduced self-regulation abilities. We argue that only an understanding at this micro level leads to a full comprehension of macro-processes, fully concurring with the call for a “more ‘up-close’ ... understanding of the micro-processes” (Brannen, Piekkari, & Tietze, 2012).

Moreover, while we argue that the fundamental working memory processes described in our model are cognitive universals that apply equally across cultures, we see several opportunities to apply our theorizing to the study of the interaction of language, culture, and cognition. These opportunities arise from the fact that there are direct effects of culture on certain components of our model that operate independently of the foreign language-induced processes that are our main focus. We describe these opportunities therefore not in the context of our model but in the discussion section of this paper along with further implications from our theoretical model for future research on the role of language in IB.

Figure 1: Theoretical model of the intra-personal effects of foreign language processing



FOREIGN LANGUAGE PROCESSING AND WORKING MEMORY

In linguistics it is common to refer to native language processing as L1 processing and to the processing of a second (i.e., foreign) language as L2 processing. L2 processing can take different forms including articulation, writing, parsing, phonetic, and graphemic analysis. It occurs in the domains of external, social speech (e.g., talking to others in an L2), internal or self-directed, psychological speech (e.g., talking to oneself, writing notes to oneself, thinking, counting, making mental calculations in an L2), as well as non-speech related domains (e.g., listening, reading, writing in an L2) (Schrauf, 2009). L2 processing is accordingly not restricted to communication situations but also occurs in private psychological domains, and longer L2 exposure leads to more frequent intramental use of this language in private domains (Vaid & Menon, 2000). In the context of organizational language mandates, non-native speakers can therefore be expected to be consistently engaged in L2 processing. This is important because cognitive psychology and cognitive neuroscience research demonstrate that L2 processing, in contrast to L1 processing, ties up scarce cognitive resources.

In this context, it is essential to understand the difference between L1 and L2 processing in the human brain. Central here is the distinction between two types of mental processes and their relation to working memory. These two types of processes have received different labels in the literature, including *system 1* and *system 2*, *automatic* and *controlled*, *implicit* and *explicit*, *experiential* and *rational*, as well as *reflexive* and *reflective* (see Evans (2008) for an overview). All these different labels describe two distinct modes of processing, for which we will use in the following the terms *automatic* and *controlled*.

Controlled processes are conscious, effortful, and slow. They often occur when we perform novel and poorly understood tasks such as driving a gearshift car for the first time. Automatic processes, in contrast, are largely unconscious and accordingly fast and effortless. They occur during the performance of innate or well-developed skilled behaviors such as driving a gearshift car after years of experience. One important difference between these two types of processes is the degree to which they rely on working memory resources (Evans, 2008).

The term working memory refers here to a brain system of limited capacity that temporarily maintains information necessary for complex cognitive activities such as thinking, reasoning, and decision making in a conscious, active, and quickly retrievable state (Baddeley, 2003). Working memory is intimately related to consciousness in that only information that is in the focus of working memory attention is available to consciousness (Baars & Franklin, 2003). The role of working memory is to act as a flexible mental workspace that supports “human thought processes by providing an interface between perception, long-term memory and action” (Baddeley, 2003:829). However, since only between three and five chunks of information can be

maintained simultaneously in working memory, the resources of this brain system are quickly depleted, resulting in working memory overload (Cowan, 2001).

Controlled processes occur consciously and rely thus on working memory. Given the involvement of limited working memory resources, we can only perform a small number of controlled processes in parallel. Put another way, the more controlled processes are running simultaneously, the fewer working memory resources are available for other cognitive tasks. Accordingly, controlled processing increases working memory load and reduces the available working memory capacity. Automatic processes, in contrast, operate mainly below the threshold of conscious awareness. They make, therefore, very little demand on working memory and may run simultaneously with other automatic and controlled processes without increasing working memory load.

To illustrate the role of controlled and automatic processes in an IB context, consider a cross-cultural contract negotiation. All deliberate and conscious decisions made during the negotiation process are based on *controlled cognitive processes*. While deciding on a certain contract term, negotiators have little capacity left for other mentally demanding tasks (such as taking a phone call) without becoming distracted from the negotiation. All processes operating below the negotiators' conscious awareness, such as emotions and psychophysical responses related to the potentially uncomfortable cross-cultural setting of the negotiation, are based on *automatic processes*. Consequently, as long as these affective and psychophysical responses (e.g., becoming excited, anxious, and alienated, starting to sweat, getting goose bumps, and blushing) remain unconscious, cross-cultural negotiators' judgments might be affected by these experiences but they would not become overly distracted from the actual negotiation task.

The difference between controlled and automatic processes reflects the distinction between L1 and L2 processing. L1 processing is generally highly automatic. We speak and comprehend our L1 fast and effortlessly without paying much attention because we have acquired it implicitly through innate learning mechanisms in the so-called "critical period" for language learning during postnatal maturation (Lenneberg, 1967). L2 processing, on the other hand, is generally highly controlled. Neuroimaging studies have shown that L2 processing, relative to L1 processing, significantly increases neural activity in frontal brain regions implicated in controlled processing and working memory functions (Abutalebi, 2008; Chee, Hon, Lee, & Soon, 2001). One of the underlying reasons is that L2 processing involves competition between the L2 and the L1 that requires effortful inhibitory control to suppress L1 activation (Abutalebi & Green, 2007).

L2 processing is accordingly more conscious and controlled than L1 processing for both low and high proficiency foreign language speakers (Hahne, 2001), unless L2 acquisition occurred also during the critical period until age 5. Research has consequently shown that, depending on the age of L2 acquisition and the level of L2 proficiency (Abutalebi, 2008), L2 processing has generally a strongly depleting effect on working memory and leaves fewer working memory resources for other cognitive tasks (McDonald, 2006).

Proposition 1: *Foreign language processing increases organizational members' working memory load, leaving fewer processing capacities for other cognitive tasks.*

The moderating role of foreign language proficiency. The level of L2 proficiency plays an important role in the outlined relationship between L2 processing and working memory load. In the context of the performance of skilled tasks such as language use, controlled and automatic processing depends on the level of task proficiency. Take for example typing on a computer keyboard: beginners rely on controlled processing; they consciously execute their hand and finger movements, are fully focused on finding keys by sight, and have limited capacity for performing other tasks in parallel. This is the classic hunt-and-peck method. In contrast, well-practiced typists who learned touch-typing rely on automatic processing. Their hand and finger movements are largely unconscious and they can easily engage in other parallel activities such as listening to a Dictaphone or reading a text that needs to be transcribed.

As automaticity in the domain of task performance is a function of task proficiency, it develops as a result of repeated practice and training. Tasks that once required highly controlled processing (such as typing) become less controlled and more automatic with practice. Along these lines, research has demonstrated that higher L2 proficiency is related to more automatic L2 processing and—since automaticity reduces working memory involvement—to decreased neural activity in the frontal cortex areas which accommodate working memory (Chee et al., 2001). Consequently, we propose that the relationship between L2 processing and working memory load outlined in proposition 1 is moderated by L2 proficiency (Service, Simola, Metsaenheimo, & Maury, 2002), such that for people with low L2 proficiency there will be a stronger relationship between L2 processing and working memory load than for people with high L2 proficiency. We call this proposition M1, where M stands for moderator:

Proposition M1: *Foreign language proficiency moderates the relationship between organizational members' foreign language processing and working memory load, such that for people with low L2 proficiency there will be a stronger relationship between L2 processing and working memory load than for people with high L2 proficiency.*

Application to IB research. After each set of propositions, we illustrate potential applications to IB research in a separate section. This will assist the reader to see how our theoretical conceptualizations that heavily draw on neuroscience and cognitive psychology relate to IB research. In the following, we illustrate how propositions 1 and M1 might apply in an IB context.

One of the core topics of interest in IB is cultural adaptation. Prior research has found a positive effect of the ability to cognitively adapt to foreign cultural norms and values on various outcomes in multicultural settings such as the success and duration of expatriate assignments, effective

global teamwork, or cross-cultural negotiations (e.g., Maertz, Hassan, & Magnusson, 2009). In a recent longitudinal study, Molinsky (2013) found a relationship between language proficiency and cultural adaptation among foreign-born students in the United States. Molinsky followed participants over the course of three different situations that required cultural adaptation and observed that the group of participants who were most successful in the adaptation process (full transformation group) contained a very high percentage of English native speakers (i.e., 71 percent). On the flipside, only 33 percent of the group of participants who were least successful in the cultural adaptation process (stagnation group) were native speakers. In addition, the group of participants who were only partially successful in the cultural adaptation process (partial transformation group) contained a relatively small percentage of native speakers (i.e., 38 percent). Finally, Molinsky observed a very small group of non-native speakers who made some progress towards cultural adaptation but eventually failed.

While Molinsky (2013:704) acknowledged a potential role of language proficiency on cultural adaptation, he did not provide a clear rationale for this effect but argued that “although it seems reasonable to conclude that poor language fluency likely exacerbates the challenges of cultural retooling, future research is clearly needed to tease apart the differential effects of culture and language” (2013, p. 704). Our model can help to make predictions about the role of language in the cross-cultural adaptation process. Based on our model, we predict that high language proficiency allows individuals to spend more cognitive resources on the cultural adaptation process, making it more likely that the process will be successful.

In this context, it is important to understand that cultural adaptation is cognitively demanding and creates cognitive dissonance, in particular if the foreign cultural norms and values are in contrast to one’s own ingrained cultural beliefs (Maertz et al., 2009). One’s own cultural norms, beliefs, and attitudes represent so-called prepotent response tendencies (see Volk & Becker (in press) for a discussion of prepotent response tendencies in a management context). Prepotent response tendencies are fundamental human tendencies that dominate human cognitions and emerge either from innate, genetic predispositions or through a lifetime of experience and learning (e.g., Kolb & Whishaw, 2008). Suppressing prepotent response tendencies, for example by producing cultural cognitions that are inconsistent with one’s own ingrained cultural beliefs, requires effortful cognitive control and attention and thus contributes to working memory load (e.g., Norman & Shallice, 1986). In line with this argumentation, one of the strategies that Molinsky’s participants used to achieve cultural adaptation was *Suppressing* defined as “a combination of forcibly silencing inner discomfort about behaving contrary to one’s values and beliefs while simultaneously “acting the part” externally in order to conform” (p.700), which reflects our above description of the suppression of prepotent response tendencies.

At the same time, L2 processing can take up a significant amount of working memory capacity. Thus, both the processing of a foreign language and cross-cultural adaptation compete for scarce working memory resources. Based on our model, we therefore predict that L2 processing hampers the process of cross-cultural adaptation in a given situation (proposition 1). Based on our model we also predict that low proficiency in the non-native language makes cultural

adaptation harder than high language proficiency (proposition M1). Thus, while language proficiency was certainly not the only driving factor behind cultural adaptation processes in Molinsky's study, we propose that future research on cultural adaptation would benefit from including working memory load in their set of process variables and from examining how cultural adaptation processes and foreign language processing interact and interfere with each other. This is likely to create a more fine-grained understanding of the cultural adaptation process and, consequently, improve cultural adaptation interventions.

CONSEQUENCES OF INCREASED WORKING MEMORY LOAD: HIGHER-ORDER COGNITIONS AND SELF-REGULATION

In this section, we discuss potential consequences of increased working memory load during L2 processing. We focus specifically on (1) heuristic biases in higher-order cognition and (2) reduced self-regulation and highlight important implications for IB research and practice. Heuristics are mental shortcuts that help our cognitive system to make judgments and decisions fast and with limited analytic input. However, they often introduce biases and systematic errors into higher-order cognition due to their narrow focus (Evans, 2006; Kahneman, Slovic, & Tversky, 1982). Self-regulation refers to the cognitive processes involved in the pursuit of desirable goals such as being less resentful, which requires holding the specific goal in consciousness to allow for active interventions whenever behavioral or cognitive discrepancies between goals and current states exist (Karoly, 1993). Both heuristic biases and self-regulation mechanisms are of high relevance in organizational settings. For example, there has been a longstanding interest among management scholars in the potential effects of managers' and employees' cognitive information processing biases on organizational outcomes (e.g., Das & Teng, 1999). Similarly, organizational researchers have devoted considerable attention to the study of employees' emotion- and behavior-regulation abilities and the importance of self-regulation for overcoming motivational deficits in the pursuit of effortful work goals (e.g., Porath & Bateman, 2006). In the following, we will first discuss the relationship between working memory load and heuristic biases, before we turn to the effects of working memory load on self-regulation.

WORKING MEMORY LOAD, HIGHER-ORDER COGNITION, AND HEURISTICS

Higher-order cognitive processes—such as thinking, reasoning, and decision-making—require substantial information search and processing to gain knowledge of the existence, probabilities, and consequences of all environmental factors and variables that may be relevant in a given situation (Simon, 1979). These higher-order cognitions are working memory-dependent controlled processes as introduced above. Given the complexities of our social and work environments with an almost infinite amount of information, on the one hand, and the limited cognitive processing capacities of our working memory, on the other hand, we often have to rely on heuristics to reduce the time and effort involved in higher-order cognition (Hastie & Dawes, 2001).

Heuristics, also called ‘rules of thumb’, are cognitive simplification mechanisms that ignore part of the available information by selectively focusing attention on specific situational aspects that appear most relevant (Evans, 2006). The selectively enhanced information is related to relevant prior knowledge and intuitive beliefs (e.g., what has worked before in a similar situation) to rapidly cue default inferences, judgments, or decisions with only shallow analytic input. These simplifying heuristic processes operate largely at a preconscious, automatic level with very little working memory involvement. As a consequence, they are immediate and effortless.

Whereas heuristics are very useful to reduce the complexity of our surrounding world, their narrow focus often comes at the cost of introducing biases and systematic errors such as overconfidence, stereotyping, over-projection of own opinions on others, or false assessment of probabilities into higher-order cognition (Kahneman et al., 1982). Evans (2006:383) explains that:

“[B]iases can arise because the heuristic system fails to represent logically relevant features of the problem or represents features that are logically irrelevant to the problem. The evidence suggests that such heuristically generated biases can be inhibited, at least to some extent, by analytic system intervention.”

The latter point is important for our context as it highlights that controlled cognitive processes can revise or replace default heuristic representations (Evans, 2006; 2008). Consider, for example, prejudice in multicultural teams: Being teamed-up with a person from a certain culture might prime in some employees an immediate negative feeling due to a previous adverse experience with people from this culture. This negative judgment may result in a decision not to collaborate with this person, unless the fact that an inappropriate heuristic was applied is consciously recognized and the resulting avoidance behavior inhibited by cognitive control. Revising or replacing the heuristic is possible, but requires working memory resources for two reasons. Firstly, the fact that a biased heuristic was applied must be consciously recognized which requires working memory attention. Secondly, overriding the biased heuristic requires effortful cognitive control. Put differently, when working memory resources are strained—for example, in highly complex situations that already largely deplete our available working memory resources—it is less likely that heuristically generated biases and systematic errors are detected and corrected (Evans, 2006).

The relationship between working memory, heuristics, and biases in higher-order cognition has two important implications for our discussion of the consequences of increased working memory load during L2 processing. First, because working memory resources are strained during L2 processing, non-native speakers will more often be required to rely on error-prone heuristics instead of detailed analytic thinking when processing complex information in the non-native language. Second, for the same reason, during foreign language processing non-native speakers will be less likely to recognize and inhibit biases and systematic errors in higher-order cognitive processes. We therefore propose:

Proposition 2: *When organizational members are engaged in foreign language processing, heuristically generated biases and systematic errors in higher-order cognitive processes are more likely to arise and are less likely to be recognized and suppressed.*

Over the past decades, the "heuristics-and-biases" research program initiated by Tversky and Kahneman (1974) has identified numerous heuristically generated judgment biases. The so-called "fast-and-frugal heuristics" research program established by Gigerenzer et al. (1999) has suggested that simple heuristics, in contrast, can also produce unbiased judgments that are at times even more accurate than those resulting from more complex cognitive strategies. While it is heatedly debated to what extent people actually use such fast-and-frugal strategies in their cognitions (Hilbig, 2010), we do not deny that L2 processing induced heuristics can produce unbiased outcomes. However, we also hold that there is extensive evidence that heuristics more often than not produce biased judgments and, more importantly, that if they do, these biases are less likely to be detected and corrected by controlled system intervention during foreign language processing.

The moderating role of foreign language proficiency. So far, we have discussed two aspects of the relationship between L2 processing and heuristically generated biases, namely that L2 processing increases working memory load and that heuristic biases are more likely to arise and less likely to be detected and corrected when working memory resources are strained. However, the human working memory is a cognitive system with a certain capacity and the depletion of this capacity occurs incrementally with increasing cognitive complexity and processing demands. As long as the capacity of this mental workspace is not fully occupied, another aspect of the relationship between L2 processing and heuristically generated biases comes into play.

As discussed above, default heuristic representations that are biased can be revised or replaced by controlled cognitive processes. Recent research has suggested that the level of fluency in information processing affects how thoroughly (i.e. controlled) the processed information is analyzed. Alter, Oppenheimer, Epley, and Eyre (2007:569) argued that "(m)etacognitive experiences of difficulty or disfluency appear to serve as an alarm that activates analytic forms of reasoning that assess and sometimes correct the output of more intuitive forms of reasoning." In several experiments, they demonstrated that disfluency caused by information that was presented in a degraded font or in difficult-to-read lettering led to more logical reasoning and a reduced reliance on heuristics. Applied to a foreign language context their reasoning suggests that reduced fluency in a second language triggers more elaborate thought and reasoning. In a similar vein, it has been suggested that the use of a foreign language may lead to reduced emotional resonance "that moves people from the immediate intuitive system to a more deliberate mode of thinking" (Keysar, Hayakawa, & An, 2012:661). L2 processing can therefore make it more likely that people engage in a controlled rather than automatic mode of information processing. This implies that they are better able to detect heuristic biases and counteract them

than when they process the same information in their native language. We call this the “*increased analytic processing effect*”.

In line with this argumentation, Keysar et al. (2012) found in a laboratory study that the use of a foreign language led to reduced susceptibility to decision-making biases. More precisely, they found that framing effects disappeared when information was presented in a second language. Given that metacognitive experiences of difficulty or disfluency in a foreign language as proposed by Alter et al. (2007) and a related reduced emotional resonance to a foreign language as proposed by Keysar et al. (2012) are likely to be stronger in lower proficiency than in higher proficiency speakers, it can be expected that the *increased analytic processing effect* is negatively related to language proficiency.

Thus, there are two effects of L2 processing. On the one hand, the depleting effect on working memory resources as outlined in proposition 2 makes the detection and correction of heuristic biases less likely when people use their L2 instead of their native language. On the other hand, the increased analytic processing resulting from reduced fluency or reduced emotional resonance can make it more likely. However, as outlined above, the *increased analytic processing effect* can only occur as long as sufficient working memory resources are available for additional controlled processing. As soon as working memory resources are strained due to high cognitive complexity and multiple parallel processing demands, the human brain has little choice but to fall back on automatic processing and the use of potentially biased heuristics. At this point, it is important to reemphasize that our theory is aimed at explaining the consequences of L2 processing in work settings, which, in comparison to other life contexts, are characterized by particularly high cognitive and attentional demands. In such settings, even native speakers often operate at their full cognitive capacity. We therefore argue that in most work settings the residual working memory capacity, if present at all, only suffices to allow for an *increased analytic processing effect* that mitigates, but not completely offsets, the effect described in proposition 2. In fact, in many cases increased analytic processing will not be possible because all available working memory resources are devoted to work-related tasks.

Yet, the effect cannot be ignored and we therefore propose a moderating effect of L2 proficiency (as an indicator of the *increased analytic processing effect*) in the relationship between L2 induced working memory load and heuristic biases outlined in proposition 2. More precisely, while in absolute terms cognitive load and biases increase with reduced proficiency, in relative terms the bias to load ratio decreases because the mitigating effect of the increased analytic processing effect increases as well. We therefore propose that for people with lower L2 proficiency there will be a weaker relationship between L2 induced working memory load and heuristic biases than for people with higher L2 proficiency. In line with our first moderator proposition, we call this proposition M2:

Proposition M2: *Foreign language proficiency moderates the relationship between foreign language induced working memory load and heuristically generated biases in organizational*

members' higher-order cognition, such that for people with lower L2 proficiency there will be a weaker relationship between L2 induced working memory load and heuristic biases than for people with higher L2 proficiency.

Three specific examples of biases in higher-order cognition. In the following, we provide three specific examples of heuristic-based biases to illustrate more concretely how increased cognitive load from foreign language processing might affect specific higher-order cognitive processes. All of the described biases operate in the same way as described above: Automatic processes cue default intuitive judgments at a preconscious level. A bias arises if assessments based on heuristics are inconsistent with evidence, but can be corrected by controlled cognitive processes (Kahneman & Frederick, 2002), provided that sufficient working memory resources are available.

Starting with **logical reasoning ability**, deductive reasoning is the process of deriving valid conclusions from preexisting premises. One of the most important biases in deductive reasoning is the so-called belief bias, which arises when logical conclusions conflict with one's beliefs of the world (Evans, Barston, & Pollard, 1983). The most famous example of a belief bias is probably the alleged statement Thomas Watson (chairman of IBM) made in 1943: "I think there is a world market for maybe five computers." One might argue that in 1943 existing premises already indicated the likely future success of computers. However, Watson's strong beliefs based on prior knowledge prevented him from deriving logical conclusions from these premises. As the example already indicates, an important consequence of the belief bias is the inhibition of out-of-the-box thinking, which requires the pursuit of lines of thought that question the current orthodoxy (Stanovich & West, 1997). When the logical thing to do is something revolutionary that challenges the prevailing dogma—for example, to invest in a radical innovation—belief-based reasoning will make it harder to see value in such novel, innovative ideas that negate one's traditional beliefs.

Another example of higher-order cognitive processes prone to biases is **probability judgments**, which are at the core of all decision-making related to uncertain events. One of the most important biases that affect the accuracy with which people are able to judge the probability of an event is the availability heuristic (Tversky & Kahneman, 1974). This heuristic refers to the pervasive human tendency to judge the probability of an event based on the ease with which occurrences of the event can be retrieved from memory. Since frequently occurring events are easy to remember, people tend to falsely assume that easy to remember events are also very frequent. However, easy to remember events (e.g., airplane crashes, shark attacks) are often those that are rare but highly salient due to recent occurrence, emotional impact, or high familiarity (Tversky & Kahneman, 1974). As a consequence, in an IB context the availability heuristic can lead to judgmental biases such as the underestimation of political, social, and economic risks in foreign markets based on the experience of enduring stability in the (highly familiar) home market. The availability heuristic is only one example of the many biases that potentially affect people's judgments and decision making under uncertainty (Kahneman et al., 1982).

Our final example relates to **social judgment accuracy**. Social cognition refers to the higher-order cognitive processes that underlie social interactions and determine how we make judgments about the intentions, dispositions, and behaviors of others. In cross-cultural settings, the most prominent biases in social cognition are stereotypes, which reflect generalized beliefs about the characteristics of members of cultural groups. Stereotypes, no matter whether benevolent or malevolent, can have negative consequences when their use goes unreflected. Bodenhausen, Sheppard, and Kramer (1994:49) pointed out that “Stereotypes can be viewed as judgmental heuristics that are relied upon by social perceivers whenever they lack the ability or the inclination to think more extensively about the unique personal qualities of outgroup members”. People lack the ability and inclination to think more extensively about others whenever their mental resources are occupied by the processing demands of competing cognitive tasks. Research has thus demonstrated that stereotyping increases when people are under high cognitive processing load (Macrae, Milne, & Bodenhausen, 1994).

As stated in proposition 2, we suggest that foreign language use increases working memory load such that non-native speakers suffer from reduced cognitive processing capacities during L2 processing. As a result, they will be more likely to fall back on heuristic-based biases to cope with cognitive processing demands and are less likely to detect and correct these biases during L2 processing. While the strength of this effect might depend to some extent on the moderating effect described in proposition M2, its general occurrence during L2 processing is very likely. We therefore propose:

Proposition 2a: *When organizational members are engaged in foreign language processing, they are more likely to rely on belief-based reasoning, resulting in a reduced ability for logical deductive reasoning.*

Proposition 2b: *When organizational members are engaged in foreign language processing, they are more likely to be biased in their assessments of probabilities, resulting in less accurate probability judgments.*

Proposition 2c: *When organizational members are engaged in foreign language processing, they are more likely to be biased in their assessments of other people, resulting in less accurate social judgments.*

It is important to note here that prior research has suggested that being biased may not always have negative performance consequences. For example, Mitchell et al. (2007) argue that in the entrepreneurship domain being affected by biases such as illusion of control, overconfidence, or overestimation of success chances is related to entrepreneurial success. However, Mitchell et al. (2007:21) also point out that this is a function of “being the right person, in the right place, at the right time”. Thus, being overconfident and overestimating success chances may be beneficial

when pursuing a business opportunity that presents itself in a strategic window requiring bold and risky decisions. However, in the long run overconfidence and underestimation of risks is unlikely to be a successful strategy for people making important decisions on a daily basis such as managers in MNCs. In the following, we focus on negative performance consequences of biased judgments and decision-making but would like to point out that there are instances where being biased may in fact have positive performance effects.

Application to IB research. In line with our previous discussion of how propositions 1 and M1 apply to IB research, we will in the following discuss IB implications from proposition 2. We will focus here on the more specific propositions 2a, b, and c and demonstrate how they might apply in an IB context. As already mentioned before, while the strength of the below described effects might depend to some extent on the moderating effect described in proposition M2, their general occurrence during L2 processing is very likely.

For example, based on proposition 2a we posit that foreign language processing might negatively affect one of the central aspects of entrepreneurship, namely opportunity recognition. International entrepreneurship researchers have emphasized the importance of entrepreneurs' social networks for identifying international business opportunities (Zahra, Korri, & Yu, 2005) and the role of linguistic distance as a major obstacle to the transmission of information about new opportunities within these networks (Ellis, 2011). Our model extends this perspective by suggesting that the exchange of information within social networks in a foreign language does not only hamper information transmission but also increases the likelihood that entrepreneurs are biased in the evaluation of the information they eventually receive. For example, because of a belief bias they may be less able to engage in out-of-the-box thinking and to see value in innovative and unorthodox business opportunities, while processing information in the foreign language. Thus, depending on the language in which entrepreneurs receive information about a promising business opportunity, it is more or less likely that they will recognize the true potential of this opportunity. Future international entrepreneurship research might therefore benefit from a stronger focus on foreign language processing as a cognitive antecedent of international opportunity recognition.

With regard to the effects of probability judgment accuracy (proposition 2b), we posit that foreign language processing might negatively affect the performance of multinational top management teams (TMTs). A major question of TMT research in IB is when and why TMT nationality diversity leads to positive or negative performance outcomes. One popular hypothesis states that multinational TMTs benefit from the diverse cognitive cultural schemas of their members, which can result in better judgments and decision making in an international context (Nielsen, 2010). Our model extends this perspective by suggesting that the positive effects of cognitive diversity might be weakened by a negative effect of foreign language processing. According to our model, those multinational TMT members who are non-native speakers of the common team language have a heightened susceptibility to judgment and decision-making biases during foreign language processing. For example, their decision quality may be compromised by availability heuristics and the resulting biased probability judgments.

We suggest that future research can benefit from an exploration of the effects that foreign language use has on the effectiveness and performance of multinational TMTs. Language is likely to be an important moderator that determines whether nationality diversity leads to positive or negative outcomes. Along these lines, recent attempts have been made to establish language as an important dimension of diversity in groups and teams in an IB context (Piekkari, Oxelheim, & Randøy, 2012).

Looking at the specific implications of social judgment accuracy (proposition 2c), we posit that interventions designed to reduce stereotyping in multicultural teams can be negatively affected by foreign language processing. Many of these approaches are built on the premise that initial stereotypes of team members about their culturally diverse colleagues need to be reframed, either into positive aspects of distinction or into irrelevant characteristics that fade into the background under a shared group identity or superordinate goal (Cramton & Hinds, 2005). Yet, overcoming stereotypes requires conscious awareness and cognitive reappraisal, which, according to our model, is complicated by the cognitively depleting effect of foreign language processing. From a practical standpoint, this implies that in order to overcome stereotypes, managers need to make time for non-native speakers in which they can process relevant stimuli in their native language. From a research perspective, we should explore, for example, whether team building interventions targeted at reducing stereotypes and increasing cultural awareness might benefit from explicitly including processing and reflection opportunities for non-native speakers in their native language. This might be counterintuitive given that many multicultural team interventions focus on creating common team cultures in the shared language. Our model suggests that in order for these interventions to work effectively, opportunities for L1 processing are crucial.

WORKING MEMORY LOAD AND SELF-REGULATION

A reduced capacity for self-regulation is according to our theorizing another important consequence of L2 processing. Self-regulation describes the cognitive processes involved in the pursuit of desirable goals such as maintaining a healthy diet, refraining from smoking, or being less resentful or choleric. The ability to exercise self-regulation is indispensable in both personal and professional settings as Heatherton (2011:373) pointed out: “Without it people could be impulsive, emotional wrecks, lashing out upon the smallest provocation, blurting out the first thing that comes to mind, and engaging in whatever behavior feels good at the time.” Research has shown that effective self-regulation is related to better interpersonal skills and relationships, improved mental health, and increased job success (Tangney, Baumeister, & Boone, 2004). For example, in multinational teams cross-cultural differences in expectations, attitudes and norms between team members can easily lead to confusion, anger and frustration. The ability to suppress such negative feelings, to be patient and to behave in a constructive and benevolent manner towards team members from other cultures often requires self-regulation.

Theories of self-regulation emphasize the importance of goal setting and maintenance (Karoly, 1993). Any self-regulatory process requires the setting of goals that define the desired end state of the regulation process (e.g., being patient in cross-cultural interactions). These goals must be maintained in consciousness to allow for active modifications of behaviors and cognitions whenever a discrepancy between goals and current states exists (e.g., when feelings of impatience emerge). We have explained above that only information that is in the focus of working memory attention is available to consciousness. Successful self-regulation requires, therefore, the active and consistent representation of goals in working memory. Self-regulatory goals can be maintained in working memory as long as sufficient processing capacities are available. However, when competing cognitive tasks absorb working memory resources self-regulatory goals will be lost from working memory, resulting in under-regulation or regulation failure (Hofmann, Friese, Schmeichel, & Baddeley, 2010).

Two main implications arise from the above discussion in the context of L2 processing. First, due to the increased working memory load during L2 processing, it is more likely that self-regulatory goal representations will be lost from working memory. Second, even if self-regulation goals are maintained in working memory, it is less likely that discrepancies between goals and current states are consciously recognized. Applied to the organizational context we therefore propose:

Proposition 3: *When organizational members are engaged in foreign language processing, their ability for self-regulation is reduced.*

It is important to point out that the moderating effect of language proficiency that applies for the relationship between L2 induced working memory load and heuristic biases (proposition M2) does not apply here. The effect described in proposition M2 is based on the fact that people engage in increased analytic reasoning, which allows for better detection of biases. In contrast, successful self-regulation depends on sufficient working memory capacity for goal maintenance, which is, if at all, further reduced by increased analytic processing.

Three specific examples of self-regulation. Similar to the previous section on heuristics, we now provide three specific examples for self-regulation mechanisms that suffer from foreign language processing in order to illustrate the mechanism described in proposition 3. The examples relate to emotion regulation, attention regulation, and behavior regulation and they all follow the basic mechanism explained in proposition 3.

Emotion regulation refers to the cognitive processes that regulate the latency, magnitude, and duration of emotions. Impaired down-regulation of emotions can result in antisocial behaviors such as aggression and violence, but also in depression and increased anxieties (Heatherton, 2011). Yet, it can also be beneficial to enhance emotions if they are well matched to a given situation. In fact, organizational members often use emotions strategically during interpersonal

interactions, regulating them up and down as necessary to achieve work-related goals (Côté, 2005). Emotion regulation is also an important aspect of emotional stability, which has been shown to predict expatriate success. Emotional stability is important for dealing with the stress involved in relocating to a foreign environment, facilitates psychological adjustment, and reduces desires to return prematurely (Shaffer, Harrison, Gregersen, Black, & Ferzandi, 2006).

Emotions evolve from core affective processes that operate automatically below the level of conscious awareness, unless they get into the focus of working memory attention. Once represented in working memory, cognitive processes such as attribution and appraisal facilitate the development of affective reactions into full-blown emotions that can be consciously regulated (Russell, 2003). Emotion regulation, however, is impaired if insufficient processing capacities are available to represent both the emotion itself as well as the goal that defines its regulation in working memory (Wegner, Erber, & Zanakos, 1993).

Attention regulation refers to the ability to maintain task-relevant information in the focus of attention while resisting the involuntary capture of attention by task-irrelevant stimuli (Kane, Bleckley, Conway, & Engle, 2001). Impaired attention regulation is associated with increased susceptibility to distraction and consequently reduced mental concentration and attentiveness. In an IB context, prior research has argued that culturally incongruent management practices require increased attention regulation (Newman & Nollen, 1996). Violations of established behavioral expectations and routines resulting from management practices that are inconsistent with an employee's cultural values are distracting from actual work tasks and, consequently, lead to reduced performance. Thus, expatriates and other employees who are consistently confronted with work practices that are inconsistent with their own cultural values are likely to require increased abilities for attention regulation to perform well.

What information is in the focus of a person's attention depends on top-down and bottom-up processes which both compete for control. Top-down processes are consciously initiated and focus attention deliberately on task-relevant information. Bottom-up processes emerge from environmental cues, which means they are not consciously initiated but triggered by salient stimuli in the physical and social environment. Since bottom-up allocation of attention occurs automatically without conscious initiation, attending to bottom-up information is effortless and requires few cognitive capacities. Top-down allocation of attention occurs consciously and requires effortful control to lock attention on task-relevant information while suppressing the attention-capturing power of bottom-up influences (Knudsen, 2007). Due to their conscious nature, top-down processes depend on working memory while bottom-up processes do not. Research has therefore shown that reduced working memory capacity negatively affects people's ability to inhibit interference from distracting, task-irrelevant stimuli (Conway, Cowan, & Bunting, 2001).

Behavior regulation refers to the self-regulatory processes involved in the attempt to act in a way that is compatible with accepted standards of proper, desirable, and civilized behavior. The inhibition of inappropriate behavioral responses requires the control of habitual and impulsive

schemas (Hofmann, Friese, & Strack, 2009). This is particularly relevant in social interactions as Hofmann et al. (2010:211) pointed out: “habitual and impulsive behavioral schemas (e.g., picking one's nose) may often be incompatible with a given self-regulatory goal (e.g., appearing intelligent to others).” Hence, for a competent appearance in social interactions, for instance in meetings with customers, it is important to control unappealing habits like chewing on pencils, finger or foot tapping, or leg bouncing. Behavior regulation is also implicated in the regulation of emotional expressions which is important for various occupational groups including customer service employees (displaying friendly facial expressions), bill collectors (displaying decisive facial expressions), and therapists (displaying neutral facial expressions). Behavior regulation is often also important for the production of socially appropriate behaviors in cross-cultural interactions. For example, von Hippel and Gonsalkorale (2005) showed in an experimental study that (non-Chinese) subjects with high self-regulation capacities were more likely to eat a chicken's foot when it was cued as the socially appropriate thing to do.

Similar to emotion and attention regulation, working memory plays an important role in successful behavior regulation (Hofmann et al., 2009). Resource intensive working memory attention is necessary for maintaining the regulation goal in consciousness and for recognizing discrepancies between the goal and the current behavior. As suggested before, L2 processing, which occupies scarce working memory resources, reduces the available processing capacities for self-regulation. Habitual and impulsive reactions that are normally inhibited are therefore more likely to break through when working memory resources are strained during L2 processing. We therefore propose:

Proposition 3a: *When organizational members are engaged in foreign language processing, their ability for emotion regulation is reduced, resulting in a decreased flexibility with which emotions can be adjusted to achieve personal and professional goals.*

Proposition 3b: *When organizational members are engaged in foreign language processing, their ability for attention regulation is reduced, resulting in increased distractibility and inattentiveness.*

Proposition 3c: *When organizational members are engaged in foreign language processing, their ability for behavior regulation is reduced, resulting in a reduced capacity for inhibiting habitual and impulsive reactions in social interactions.*

Application to IB research. In line with our previous discussions of applications to IB research, we will in the following discuss IB implications from proposition 3. Here again, we focus on the more specific propositions 3a, b, and c and demonstrate how they might apply in an IB context.

For example, based on proposition 3a (emotion regulation), we posit that employees' ability for effectively managing conflict in teams might be negatively affected by foreign language

processing. The conflict management literature distinguishes between task conflict, which can positively affect team performance by improving information exchange, and relationship conflict, which can have a negative effect due to its dysfunctional impact on team processes. In a recent paper, Jiang, Zhang, and Tjosvold (2013) found that emotion regulation abilities are important for effectively using task conflict to improve team performance and for reducing the negative effects of relationship conflict. The authors argued that any type of conflict generates negative emotions in a first instance, which impairs cognitive processing. According to the authors, emotion regulation helps individuals to control their emotions and to improve problem solving by increasing cognitive, rather than emotional processing. We outlined before that emotion regulation requires working memory resources, which are in limited supply during L2 processing. Thus, employees engaged in L2 processing may have insufficient resources available for emotion regulation. Consequently, they will be less likely to effectively manage conflict in settings in which they need to operate in a non-native language. Being that conflict is at the heart of many contexts relevant to IB research (e.g., M&As, global teamwork, TMT processes), we pose that it is crucial for future research to evaluate the role that L2 processing plays for conflict in multilingual settings and its effect on performance and team outcomes.

With regard to attention regulation (proposition 3b), we posit that the decision quality of executive teams might be negatively affected by foreign language processing. In a recent study on the effects of changing the operating language of non-Anglo-American executive boards to English, Piekkari et al. (2012) found that boards got ‘quieter’ which had a negative effect on the quality and speed of decision-making. While the authors described lack of language proficiency and a resulting inability to express ideas as a main reason for the observed decrease in debates and discussions among board members, our model offers some additional explanations. When board members have to process information relevant to the decision at hand in the shared (i.e., foreign) language—especially when the decision involves multiple issues (i.e., is more complex) and when their language proficiency is low—they will have a harder time following the discussions and paying attention to all the pieces of information discussed. As a result, they are likely to grow quiet. They simply cannot process the information fast enough and are likely to get frustrated in the process. In addition, they will quickly grow very tired due to the toll that the increased cognitive processing takes. Therefore, taking themselves out of the discussion and reducing effortful attention might be a way for them to reduce their cognitive load. Future decision-making research in IB should explicitly examine foreign language processing as a boundary condition for attention regulation in decision-making processes.

With regard to behavior regulation (proposition 3c), we posit that employees’ ability to adapt their behavior to foreign cultural settings might be negatively affected by foreign language processing. In our *Applications to IB research* for proposition 1 and M1 further above, we already argued that foreign language processing might negatively affect the process of cross-cultural adaptation. While this example focused on the cognitive aspects of adjusting to foreign cultural norms, we will in the following focus more on the behavioral self-regulatory aspects of cross-cultural adaptation. Molinsky (2007:623) defines cross-cultural adaptation in single interactions (which he labels ‘code switching’) as: “the act of purposefully modifying one’s behavior, in a

specific interaction in a foreign setting, to accommodate different cultural norms for appropriate behavior.” The process Molinsky describes is an act of self-regulation—that is the process of setting goals (adapting behavior to foreign cultural norms) that must be maintained in working memory to allow for active modifications of deeply ingrained behavioral patterns that stem from one’s own cultural background. While Molinsky’s model focuses on the psychological challenges of adapting behavior across cultures including feelings of embarrassment, our model extends this view by specifically focusing on foreign-language settings. We argue that L2 processing reduces self-regulation abilities, which implies that the cross-cultural adaptation of behavior in a foreign language setting (where it happens most often) is more challenging than in a native language setting. This involves in particular the challenge of keeping the self-regulatory goal of adapting behavior to foreign cultural norms in mind and recognizing discrepancies between the goal and the current behavior while being cognitively busy with L2 processing. In doing so, we offer a complementary perspective on the role of language in cross-cultural adaptations that goes beyond simple communication problems.

DISCUSSION

Contrary to the perceived complexity of addressing cultural differences, language barriers have long been thought to be easily resolved by instigating a lingua franca, in most cases English. And indeed, as outlined above, previous literature has established a series of advantages of a common language mandate. While we are not disputing those advantages, our paper (like others before) focuses on the potential negative consequences of a common language mandate. In particular, we honed in on the individual-level effects of foreign language use on individuals’ cognitive performance, taking an intra-personal rather than an inter-personal perspective, the former having been largely ignored in IB language research so far. By focusing on cognitive processes, we established a conceptual model delineating how foreign language processing leads to an increase in working memory load which, in turn, results in an increased use of potentially biased heuristics in higher-order cognition and a reduced capacity for self-regulation. While we focused on the MNC as our organizational context for theorizing, our model and the resulting implications apply equally to any type of multilingual organization including purely domestic organizations with diverse employees from multiple language backgrounds. In the following, we will extend our theorizing by discussing the cultural side of cognition and how it relates to our conceptual framework. We then discuss some critical perspectives before we explore practical implications.

IMPLICATIONS OF OUR MODEL FOR RESEARCH ON CULTURAL COGNITION

Previous research has established that culture, through language, influences higher-order cognitive processes. This research has shown that when growing up with a certain language in the context of a related culture people develop specific language processing mechanisms that often result in a unique set of culture-bound cognitions (e.g., Levinson, 2012). People who learn the same language later in life do not possess the same hardwired mental algorithms and

therefore have to rely on less automatic and more controlled cognitive processes that draw on working memory and executive functions. The reliance on working memory during controlled processing and the negative effects of working memory overload are cognitive universals that apply equally across racial, ethnic, and cultural groups (e.g., Cabeza & Nyberg, 2000). Thus, while there are undeniable cultural differences in language induced higher-order cognitions, the fundamental working memory processes involved in the processing of a foreign language as outlined in our model are culturally invariant. This is not to say that cultural factors are irrelevant for our treatment of the subject, quite the opposite. While the lower-level constituent elements of foreign language processing are shared by most people, there are direct effects of culture on certain components of our model that operate independently of the L2-induced processes that are our main focus.

For example, cultural factors can have a direct effect on working memory load. As explained above, several researchers have argued that culture affects cognition and information processing (e.g., Markus & Kitayama, 1991; Nisbett, 2003; Hong, Morris, Chiu, & Benet-Martinez, 2000). In their seminal paper, Markus and Kitayama (1991) explain that individuals from independent and interdependent cultures process information related to their self-concept differently. While people from independent cultures view themselves as different from others and try to determine how they are unique, individuals from interdependent cultures view themselves as part of a group and strive for harmonious relationships within their group. It has been suggested that in interdependent cultures with their concern for social harmony people may not only avoid the expression of strong emotions but in fact experience strong emotions much less frequently than people from independent cultures (Markus & Kitayama, 1991). If this is indeed the case, then people from interdependent cultures need to devote fewer cognitive resources to emotion regulation, leaving them more mental capacities for other tasks including foreign language processing. On the other hand, previous research has also suggested that in interdependent cultures the norm of being attentive and sensitive to the needs of others can have depleting effects on cognitive resources. Liu and Hsu (1974) (cited in Markus & Kitayama, 1991), for example, argued that among Chinese people the constant attention and consideration required to respect and take account of others occupies scarce cognitive resources. Interestingly, Liu (1986) suggested that this ever-present need to attend to others is so demanding that it can impair verbal fluency.

Applied to our model, the above reasoning suggests that culture can have a direct effect on working memory load, although it is not clear whether the cumulative effect is positive or negative. Applying a cognitive lens, future research should determine whether and when individuals from interdependent cultures experience higher or lower mental strain than individuals from independent cultures. Findings could have important implications for our understanding of higher-order cognitive processes and self-regulation during foreign language processing. This could mean, for example, that employees from interdependent cultures who are working in a foreign language could experience even higher cognitive strain when they additionally need to attend to others in social situations (as suggested by Liu and Hsu's (1974) research). Or, on the contrary, as suggested by Markus and Kitayama (1991), the fact that

employees from interdependent cultures are less affected by emotions could mean that they feel less strain during foreign language processing because they have generally more cognitive resources available than their colleagues from independent cultures. Depending on the cumulative outcome of these contrary effects, this may result in more serious problems of self-regulation and cognitive biases for individuals from interdependent cultures compared to individuals from independent cultures or vice versa. However, as outlined above, this is a direct effect of culture-related variables on working memory load that does not alter the processes described in our model.

Our model also has implications for research on cultural cognition in the context of the conceptualization of culture as internalized knowledge structures representing networks of cultural constructs and implicit theories (Hong et al., 2000). Several studies have shown that language can serve as a prime that activates cultural knowledge structures associated with that language, resulting in a cultural accommodation effect in both bicultural and mono-cultural individuals (Akkermans, Harzing, & van Witteloostuijn, 2010; Bond & Yang, 1982). For biculturals, the cognitive processes underlying this language-induced cultural accommodation are well understood. Biculturals have internalized through socialization two cultural meaning systems, which take turns in guiding cognition. Which of the two meaning systems dominates depends on the degree to which they are more or less accessible because of recent exposure to the related culture or some equivalent representing the culture such as cultural icons or language (Hong et al., 2000). For mono-cultural individuals, the cognitive processes underlying cultural accommodation are less clear. While it has been suggested that by learning a second language mono-cultural individuals also acquire cultural knowledge associated with that language, the precise mechanisms by which these cultural knowledge structures become operative are not well understood (Akkermans et al., 2010).

Our model offers a possible explanation here by proposing a conceptualization of cultural knowledge structures as heuristics that, when activated by relevant stimuli, can guide cognition in mono-cultural individuals. We have argued that foreign language processing increases the likelihood that people rely on heuristics when processing information. We further argued that heuristics are initiated by situational cues that appear most relevant in a given situation and that these cues are related to relevant prior knowledge to elicit default judgments and decisions with limited analytic input. This reasoning implies that in relevant situations language itself can serve as a cue that activates a related heuristic—that is, the cultural knowledge that was acquired during the learning of the language. In this context, it is important to note that culturally determined heuristics, just as any other heuristics, can introduce biases and systematic errors into judgment and decision making. Take, for example, high uncertainty-avoidance cultures. If a language related to an uncertainty-avoidance culture serves as a cue that activates high uncertainty-avoidance values, then this can lead to biased judgments of risks and related decisions.

The conceptualization of cultural knowledge structures as heuristics helps us better understand which factors increase the likelihood that foreign language use triggers a cultural accommodation effect in mono-cultural individuals (e.g., Akkermans et al., 2010; Harzing, Maznevski, et al., 2002). According

to our model, three factors facilitate this effect. First, as there are numerous potential heuristics that can be employed in a given situation, the cultural knowledge structures associated with the language must be situationally relevant to be recruited as the appropriate heuristic. In line with this argument, several survey studies found a language-induced cultural accommodation effect for questions relating to cultural values, but not for questions unrelated to culture (Harzing, Maznevski et al., 2002). Second, as heuristics are experience-based and develop through practice and learning over time (Gigerenzer & Gaissmaier, 2011), sufficient cultural exposure (e.g., during the learning of the language) is required for the underlying cultural knowledge structures to evolve into language-induced heuristics. In line with this argument, prior research has shown that the effect of foreign language use on cultural accommodation increases with the level of previous exposure to the culture in question (Akkermans et al., 2010). Third, as heuristics are more likely to be employed when mental processing capacities are reduced, greater cognitive load can be expected to facilitate the activation of cultural knowledge structures when the first two conditions are fulfilled. This last point implies that people are more likely to accommodate when they are “mentally busy” due to multitasking or other parallel processing demands. To the best of our knowledge, no previous studies have tested the effect of additional cognitive load during foreign language use on the cultural accommodation effect. Examining cultural accommodation effects through a cognitive processing lens will aid in better understanding the mechanisms leading to cultural accommodation in general and in the context of relevant IB areas such as expatriate assignments or multi-cultural teamwork more specifically. In the following section, we will discuss some critical perspectives related to the propositions we are making in our paper.

CRITICAL PERSPECTIVES

Some of the propositions we are making in our model may seem contradictory to existing research in the cross-cultural management and diversity literatures. Take, for example, our proposition that foreign language processing reduces the ability for out-of-the-box thinking. One could argue that since foreign language use is widespread in multinational teams, this proposition is in contrast to reasoning that cognitive diversity in terms of differences in knowledge, information, and perspectives can promote creativity and innovation in heterogeneous teams (e.g., Cox & Blake, 1991). Our model does not challenge this reasoning; it merely implies that during foreign language processing multinational team members’ ability to recognize and appreciate the value of their colleagues’ differing perspectives may be reduced. Based on our propositions, we believe that creativity and innovation can be further facilitated in heterogeneous teams by taking the negative consequences of foreign language use into consideration and by creating conditions in which non-native speakers can sometimes revert back to their native language to optimally process information. In the practical implications section of this paper we will discuss further how this can be achieved.

It has also been suggested that learning a second language widens one’s horizon and reduces ethnocentrism, which could be argued to conflict with our proposition that social judgments are more biased during foreign language processing. Similarly, it could be argued that learning a foreign language

facilitates cross-cultural adaptation, which seems to contradict our proposition that foreign language processing hampers attempts at the cross-cultural adaptation of cognitions and behaviors. We agree that foreign language learning can reduce ethnocentric biases and foster cross-cultural adaptation. However, this is a long-term effect comparable to what Molinsky (2007) termed long-term adaptation. The effects we are describing are more related to what Molinsky described as short-term adaptation in single interactions. During L2 processing, L2 speakers are more likely to fall back on simplifying and often biased heuristics to facilitate social judgments, especially when their language proficiency is low. Similarly, while being cognitively busy with the processing of a foreign language, people may be unable to suppress their prepotent cultural beliefs and adapt to foreign cultural norms or focus on appropriate behavior regulation in a situation with culturally discrepant norms. For example, in a meeting with a Chinese business partner one may easily forget to properly acknowledge the partner's business card while trying to produce a few words in Mandarin, despite being generally aware of the importance of this ritual.

There are also a number of research question related to the topic of our paper that would be very interesting to explore but would go beyond the scope of our paper. For example, it would be interesting to explore how factors other than working memory load such as emotional and affective responses to foreign language settings might lead to an increased use of error-prone heuristics in decision making. Furthermore, while we kept our propositions general in order to develop a broad theoretical framework with wide applicability, it would be interesting to develop more situation specific propositions in the future. For example, it would be interesting to develop propositions about specific heuristics and biases and their behavioral consequences in various organizational environments that require L2 processing such as global virtual teams.

When discussing critical perspectives it is also important to point out that there are critical views on the value of neuroscience and, in particular, neuroimaging approaches in second language research. While our conceptual framework and theorizing is not about neuroimaging, we do refer to research that is based on neuroimaging studies and thus feel that it is important to mention the criticism related to these studies. Most prominently, de Bot (2008) provided a comprehensive discussion of what neuroimaging studies of the multilingual brain can and cannot show. His criticism relates in particular to neuroimaging research investigating the acquisition, development and maintenance of a second language. He criticizes that many studies in this area are flawed on various levels including the selection of participants, set-up of experiments and operationalization of control variables. This, in combination with the general limitations of neuroimaging research, led de Bot to come to a negative conclusion concerning the contribution of these studies. While some second language researchers clearly disagree with de Bot's rather negative evaluation of the field (e.g., Sabourin, 2009), we do agree with a number of his observations. However, we would like to point out that the main focus of the neuroimaging studies we are referencing is not on neuroscience research related to second language acquisition, development and maintenance that was mainly criticized by de Bot. For example, the studies we are referencing do not focus on processes in the classic language areas of the brain such as Broca's, Wernicke's and Geschwind's area or the arcuate fasciculus. Rather, they approach the topic of L2 processing from a workload perspective. We argue that including such a cognitive processing perspective in their theoretical models will help IB researchers build better and more precise theories regarding core IB issues. In addition, it will likely make our practical implications appear more realistic, valid, and relevant to MNCs. Picking up on this last suggestion, we discuss some of the practical implications from our model for MNCs in the next section.

PRACTICAL IMPLICATIONS FOR MNCS

The negative effect of foreign language processing on organizational members' cognitive capacities has important practical implications for companies implementing a common language policy: non-native speakers of the corporate language will be cognitively depleted faster and more often, which will add to their already high general workload and amplify the detrimental effects of high job strain. These effects have been extensively demonstrated and include, for example, reduced job performance, higher absenteeism, elevated burnout risk, and even increased drug abuse (e.g., Barling, Kelloway, & Frone, 2005). An important practical implication of our framework is therefore that companies need to find ways to mitigate the negative effects of foreign language processing on organizational members' mental capacities in order to reduce their overall work stress and prevent them from "running out of steam". In the following, we will discuss how companies can achieve this by (1) changing language related policies, (2) rethinking their HRM practices for hiring and training, and (3) changing work practices to support employees.

LANGUAGE POLICY IMPLICATIONS

Many companies have implemented a language standardization strategy to improve knowledge transfer, collaboration, and teamwork among their employees. While we fully appreciate the rationale for this trend, our theoretical model suggests that language standardization comes with clear disadvantages for employees and organizations, in terms of increased stress and conflict and decreased performance. Yet, as Fredriksson, Barner-Rasmussen, & Piekkari (2006:409) already indicated, the introduction of a corporate language does not in reality "render the firm monolingual". For the case of Siemens, the authors found for example that although English was designated as the official corporate language, in practice both English and German were used frequently. Instead of regarding this practice as an inconsistent and half-hearted application of a corporate policy, we agree with Fredriksson et al. that it might in fact be opportune to leave room for some ambiguity to provide actors with a certain degree of flexibility. Hence, we urge organizations to reconsider whether all communication and all interaction has to happen in the common corporate language. Are there instances in which operating in the native language is possible and would in fact lead to better outcomes?

We posit that individuals perform better in their native language when working on complex, cognitively demanding tasks. Especially when tasks require substantial working memory capacity, which is reduced during foreign language processing, employees should be allowed to work in their native language. Take, for example, tasks requiring creativity. Research has shown that creative performance is a function of working memory capacity, with lower capacity resulting in reduced creativity (De Dreu, Nijstad, Baas, Wolsink, & Roskes, 2012). Employees with tasks requiring creativity such as product designers, R&D personnel, or marketers should therefore have more leeway to freely choose their working language. We are far from suggesting that a full-fledged abandoning of the common corporate language policy is a realistic option or even

optimal solution. Rather, we think that organizations should be more mindful of their strategic choices with regard to language standardization versus individualization to maximize their employees' potential. For example, organizations might consider conducting a comprehensive linguistic audit to specify which persons or groups need to communicate across national boundaries and to assess their current levels of language proficiency (Björkman & Piekkari, 2009).

HRM IMPLICATIONS

In addition to policy changes that might allow employees to work in their native language from time to time, we also suggest specific HRM practices that can improve task and team performance. In particular, we focus on (1) providing training to increase non-native speakers' foreign language proficiency, and (2) hiring bilinguals and other employees that are highly proficient in speaking multiple languages.

Firstly, we propose that HR considerations should include a stronger investment in language training. With regard to reducing cognitive load during foreign language processing, proposition M1 of our model states that foreign language proficiency moderates the relationship between organizational members' foreign language processing and working memory load. More precisely, higher proficiency in a foreign language is related to more automatic processing of this language and, hence, reduced working memory involvement and cognitive depletion. The most natural way to address the negative effect of foreign language processing on organizational members' cognitive capacities is therefore to provide appropriate language training. This argumentation is in line with recent calls for more language training in companies and business schools (Björkman & Piekkari, 2009; Luo & Shenkar, 2006; Neeley et al., 2012). We respond to these calls by demonstrating that the potential benefits of language training go beyond improving employees' communication abilities to also include reduced work stress and job strain when working under a foreign language mandate.

In this context, it is worthwhile to emphasize the importance of authentic learning experiences. When developing language trainings, companies should design authentic learning tasks based on real-life tasks (Reigeluth, 1999) that simulate the cognitive challenges employees face in their work roles. This way, employees will learn how to cope with the constraints and challenges of foreign language communication in real-life business situations with multiple cognitive processing demands.

Having said that language training can help reduce the cognitively depleting effects of foreign language processing, it is important to keep in mind that second language speakers will rarely reach the proficiency, and hence automaticity, levels of native speakers. Language training can therefore only reduce but not eliminate the mentally exhausting effects of foreign language processing. Consequently, we suggest that HR should consider hiring more bilingual employees, but also employees who are highly proficient in the common corporate language. Previous research has already pointed out the value of biculturals for organizations as bridges between cultures due to their deep socialization in more than one culture (Brannen & Doz, 2012; Brannen

& Thomas, 2010). We extend this work by pointing to the special value of bilinguals for cognitively demanding tasks that need to be performed in foreign language settings such as a bi-national product development team of a cross-cultural joint venture. Bilinguals who learned the L2 during the critical learning period for language acquisition during postnatal maturation will not suffer from cognitive performance losses in such settings. The same holds, to a lesser extent, for employees who are not bilingual but highly proficient in the required languages.

IMPLICATIONS FOR WORK PRACTICES

We suggest that managers can reduce the strain from foreign language processing on employees by (1) increasing their available cognitive capacities, and (2) providing opportunities for mental restoration to facilitate the recovery of their scarce cognitive resources.

With regard to increasing available cognitive capacities of employees, it is important to eliminate cognitively demanding psychological stressors in the work environment. There are a number of stressors that have been shown to increase working memory load and, hence, reduce available cognitive capacities. One of these stressors is anxiety, which produces intrusive worrying thoughts that attract working memory attention and leave fewer processing capacities for other cognitive tasks (Eysenck & Calvo, 1992). Prior research has also shown that high levels of stress occupy cognitive resources by activating unwanted thoughts that compete for working memory attention. Chronically stressed people have therefore significantly reduced levels of working memory capacity (Eysenck & Calvo, 1992). By providing psychologically safe and low-fear work environments characterized by moderate levels of stress (Zak & Nadler, 2010) organizations can help their members to increase their available cognitive capacities. As indicated above, scholars concerned with creating safe communication environments made similar calls for psychologically safe work environments (Neeley et al., 2012). However, we call for psychologically safe work environments for very different reasons than communication effectiveness, namely to mitigate the depleting effects of foreign language processing.

With regard to providing opportunities for mental restoration, we have argued before that L2 processing is always cognitively depleting even for those with high proficiency levels. In order to reduce the work stress and job strain of organizational members working under a mandated foreign language, companies are advised to provide work environments that facilitate the quick recovery of depleted cognitive resources. Interesting research in environmental psychology describes specific activities and environments that have a mentally restorative effect. The underlying attention restoration theory posits that effortless attention-holding stimuli, which put effortful cognitive processing to a hold and allow for reflection, help to recover depleted cognitive resources (Kaplan, 1995). The activities and environments that empirical research has identified to have a mentally restorative effect include viewing pictures of nature, real nature views, walks in a park, and meditation (see Kaplan & Berman (2010) for a review). Other research has shown that consuming glucose (brain fuel) has a replenishing effect on depleted mental resources (Masicampo & Baumeister, 2008).

All these interventions can be easily integrated into organizational settings to facilitate the quick recovery of depleted mental resources of employees working under a foreign language mandate. Companies can allow for time and support recreational activities such as nature walks or meditation during lunch breaks. Offices can be equipped with plants and nature photographs or drawings. Many companies already offer complementary fruits and soft drinks, which can help employees to regularly restore their blood glucose levels. The importance of the latter point should not be underestimated. In a recent study, Danziger, Levav, and Avnaim-Pesso (2011) reviewed the decisions of eight parole judges in Israel to test the common metaphor that justice is “what the judge ate for breakfast”. And, indeed, the authors found that shortly after a food break 65% of parole requests were approved (which is arguably cognitively more demanding than just denying parole) but the rate dropped gradually to almost zero just before the next food intake, just to go up to 65% again after the next meal.

CONCLUSION

In the current paper, we have provided a theoretical model describing the important effects that foreign language processing has on working memory capacity which in turn affects higher order cognitive processing and self-regulation, two important individual-level predictors of performance and productivity. By applying findings and insights from cognitive neuroscience, cognitive psychology, and psycholinguistics, we have introduced a novel theoretical lens that has widespread implications for future IB research. Based on our model, we conclude that the cognitive side of language plays a crucial role in MNC settings that we need to consider in our existing IB models. In addition to implications for research, we provided many practical implications for multilingual organizations, including implications for language policies, HRM, and work practices. The wide range of managerial implications demonstrates the practical importance and relevance that underscore the role of language in MNCs. In conclusion, we hope that by introducing this genuinely novel approach to language research in IB we were able to spark other researchers’ interest in studying the cognitive underpinnings of foreign language use to enrich our understanding of the micro processes involved.

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