

Please cite as:

Suzuki, Y. (2023). Introduction: Practice and automatization in a second language. In Y. Suzuki (Ed.), Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology (pp. 1-36). New York, NY: Routledge.



<https://www.taylorfrancis.com/chapters/edit/10.4324/9781003414643-1/introduction-yuichi-suzuki?context=ubx&refId=0d99c313-cc10-4a7a-9b91-1761cfc0e9da>

Chapter 1. Introduction: Practice and Automatization in a Second Language

Yuichi Suzuki

Abstract

Throughout the history of applied linguistics, “practice” and “automatization” have frequently elicited negative connotations with mechanical, mindless drills of structural patterns and superficial parroting of dialogues in the audiolingual era. At the start of the 21st century, however, the concept of practice was updated and expanded to capture a wide range of activities aimed at second language (L2) knowledge and skill development (DeKeyser, 2007). The goal of this opening chapter is to provide a fresh perspective on this obsolete coupling of practice and automatization. First, I explain recent theorizations of practice and automatization from the skill acquisition theory perspective. Second, I offer five principles of effective practice that are rooted in cognitive psychology: (a) deliberate, (b) systematic, (c) transfer-appropriate, (d) feedback, and (e) desirable difficulty. As these principles are central to the current edited volume, I present a survey of empirical research on these topics conducted in different contexts/rooted in different teaching approaches. Finally, I provide an overview of this edited volume, explaining how each chapter contributes unique insights into the evolving concepts of L2 practice and automatization.

Introduction

The old adage “practice makes perfect” applies to a wide range of skills. A large amount of time and effort are typically required to attain high-level skills in sports, music, art, and formal education. Practice is undeniably a recurring popular theme in the history of applied linguistics (e.g., Boers, 2021; DeKeyser, 2007; Fries, 1945; Johnson, 1996; Jones, 2018; Lado, 1964; Levelt, 1978; Lightbown, 2019; Lyster & Sato, 2013; McLaughlin, Rossman, & McLeod, 1983; Paulston, 1970; Segalowitz & Hulstijn, 2005; Stevick, 1986; Suzuki, Nakata, & DeKeyser, 2019b; Ur, 2016). However, “practice” has been mistrusted. Lightbown (1985) rightfully pointed out that “practice does not make perfect” because “practice” in the sense of mechanical drills (often associated with audiolingualism) cannot equip a learner with communication skills. In order to rectify the unfortunate association between practice and mindless drills, DeKeyser (2007) proposed a definition of practice that is more compatible with research in applied linguistics and cognitive psychology. He defined practice as “specific activities in the second language, engaged in systematically, deliberately, with the goal of developing knowledge of and skills in the second language” (p. 1). This conceptualization of practice in the 21st century is broader than mechanical drills and pattern practice but narrower than merely receiving comprehensible input and using language for communication, opening up many interpretations from different theoretical positions. Thus, a theoretical and practical consideration and discussion is warranted regarding what practice means and how second language (L2) learning can be optimized, which aligns with an overarching goal of instructed second language acquisition (SLA) research (Loewen & Sato, 2017). With this conceptualization of practice, researchers and teachers all agree that practice is a viable way to improve L2 skills; the real question is what kind of practice—including how much, for whom, for which language structure and skill, and in what context—is essential and facilitative for L2 learning. This volume aims to address this central issue by updating and extending the concept of practice with the hope of advancing this research program in applied linguistics and SLA.

While practice is an old concept, even more obsolete is a coupling of “practice and automatization,” to which the current volume aims to bring a fresh perspective. As already clarified, “practice and automatization” is not mechanical drilling for achieving automatic response to formal cues. Although automatization is characterized as the gradual improvement of practiced skills, it is not a simple linear progression from non-automatic (controlled) to automatic language processing. Automatization entails restructuring, expanding, and finetuning different types of linguistic knowledge. Understanding how different types of practice bring about these qualitative changes in

automatization is a critical component in L2 learning because automatic language processing is the foundation for fluent production and comprehension skills (DeKeyser, 2001; Segalowitz, 2010; Segalowitz & Hulstijn, 2005).

Given the fundamental role of automaticity in a set of complex L2 skills, the last decade has witnessed renewed attention to automaticity from a skill acquisition theory perspective (DeKeyser, 2020). Automaticity refers to the capacity to perform behaviors smoothly and efficiently, expending little mental effort. It has been a major subject of cognitive psychology research as it applies to various daily activities and routines such as typing, walking, driving, gaming, reading, solving math problems, and so on (e.g., see Moors, 2016 for a review). In a view of L2 learning as cognitive skill acquisition, there have been recent conceptual and methodological advancements in L2 research on automaticity and automatization (Elgort & Warren, 2014; Hui, 2020; Hui & Godfroid, 2021; Hulstijn et al., 2009; Lim & Godfroid, 2015; McManus & Marsden, 2019; Suzuki & Sunada, 2018). This volume aims to refine the scope of research on automatization and synthesize literature on the experimental tasks and measurements of automaticity in SLA.

The theorizing of practice and automatization has come of age. Updating these often-linked concepts will contribute to a deeper understanding of core issues in SLA and applied linguistics. This introductory chapter aims to achieve three objectives. First, I update the concepts of practice and automatization from a skill acquisition theory perspective. Second, I offer five principles of effective practice, derived from cognitive psychology theories, that are interpreted for different contexts/teaching approaches. Finally, an overview of this edited volume is provided, explaining how each chapter contributes unique insights to the evolving concepts of L2 practice and automatization.

Updating “Practice” and “Automatization”

On Practice: Cognitive/Educational Psychology and SLA

Practice is a long-standing theme in the applied linguistics and SLA literature. From the 1940s to the early 1970s, audiolingualism influenced how practice was defined as drills for forming automatic habits through mimicry and memorization of structural patterns and dialogues (e.g., Fries, 1945; Lado, 1964). In order to overcome the limitations of mechanical drills, explicit grammar explanation and a more systematic use of drills, including communicative drills, expanded the notion of practice with a goal of producing new utterances creatively (e.g., Paulston, 1970; Stevick, 1986). When communicative language teaching gradually gained traction in the late 1970s and 1980s (e.g., Howatt, 2004), the importance of practice was overshadowed by simplistic and negative “strawman” descriptions of audiolingualism such as “drill and kill,” “mindless

parroting,” “stimulus-response” activities—often for the sake of promoting newer language teaching approaches (see Castagnaro, 2006; Mayne, 2022, for detailed historical documentation). Nevertheless, an information processing model in cognitive psychology has offered an alternative view of L2 practice as a form of complex skill acquisition through repeated performance for flexibly orchestrating automatic, as well as controlled, L2 skills (e.g., Johnson, 1996; Levelt, 1978; McLaughlin et al., 1983). In the 21st century, research advancements have further extended and refined our theoretical and practical understanding of the roles of practice in acquiring different knowledge and skills by different types of learners under diverse contexts (e.g., Boers, 2021; DeKeyser, 2007; Jones, 2018; Lyster & Sato, 2013; Ur, 2016; Segalowitz & Hulstijn, 2005; Suzuki et al., 2019b).

I begin the discussion about practice in applied linguistics and SLA research with DeKeyser’s (2007) edited volume because it provided the contemporary definition of practice. DeKeyser (2007) redefined the concept of practice as “deliberate” and “systematic.” In his volume, prominent L2 researchers expressed their views on what constitutes effective L2 practice from different theoretical angles such as input, interaction, output, and feedback, as well as how practice activities can be individualized based on learner-related factors such as age, proficiency, prior level of knowledge, and cognitive aptitudes (see individual chapters in DeKeyser, 2007, for details). Leow (2007) endorsed the role of attention deliberately directed to the linguistic rules underlying exemplars during input-processing practice such as structured-input and problemsolving activities. Muranoi (2007) argued that output practice such as text reconstruction activities and task planning can trigger cognitive processes, such as noticing and conscious reflection, that facilitate L2 learning. Ortega (2007), advocating meaningful task-based interactive activities in foreign language 9781032539904_pi-282.indd 3 16-Jun-23 4.32.16 PM 4 Yuichi Suzuki classrooms, described optimum practice as “interactive, truly meaningful, and with a built-in focus on selective aspects of the language code that are integral to the very nature of that practice” (p. 182). Although the role of practice has been sparsely featured in input-rich classrooms such as immersion and contentbased language teaching classrooms, Ranta and Lyster (2007) illuminated the importance of systematic output and feedback practice in Canadian immersion programs. More broadly, DeKeyser (2007) argued that a study abroad context is the ultimate opportunity for practice. In principle, study abroad programs can provide more extensive opportunities for input, interaction, and output practice than foreign language classrooms. To capitalize on the advantages of that environment, DeKeyser opined that L2 learners participating in study abroad need to possess functional-level knowledge so that they can

engage in practice effectively in socially rich communicative environments.

Since DeKeyser (2007) set a research agenda for L2 practice, a significant number of empirical studies, as well as another edited volume (Jones, 2018) and a special issue (Suzuki et al., 2019b), have been published. In particular, L2 researchers show growing interest in investigating L2 practice by applying findings from a strand of contemporary cognitive/educational psychology or “science of learning” (Horvath et al., 2016). Insights from cognitive psychology research are used by SLA researchers to better understand how language is learned, processed, remembered, and used (Lightbown, 2008, 2019); the interface of cognitive psychology and SLA research generates key issues for L2 researchers, including identifying optimal timing of practice, the relevance of explicit instruction, the role of feedback for different stages of learning, the necessity of deliberate (intentional) guided practice for successful learning, and individualization of instruction for different types of learners and different components of language knowledge as well as different types of skills. These issues are particularly relevant to many instructed settings where only limited classroom hours and few opportunities to use L2 outside the classroom are available (see Marsden & Hawkes, this volume). Under such circumstances, deliberate and systematic practice is one viable way of maximizing L2 classroom learning. Given the advancement of the research agendas, the time is ripe for updating and expanding the scope of inquiry to stimulate further research (for a state-of-the-art review, see the “Principles of Effective Practice” section).

While the praxis of practice varies considerably in different contexts (e.g., foreign language classrooms, bilingual immersion programs, and study abroad), a major contribution of discussion surrounding “practice” is elucidating the beneficial roles of various (largely conscious) cognitive mechanisms in SLA (Leow, 2015). Researchers in this current volume elaborate on cognitive underpinnings for optimal practice such as raising awareness, using metalinguistic rules, noticing, hypothesis testing, monitoring, and reflection (see Suzuki et al., this volume). These explicit learning processes are studied in relation to automatization during skill acquisition in cognitive psychology and SLA research. Hence, automaticity (i.e., the result of the process of automatization) is a characteristic of practiced, efficient skills and of relevance to the central theme of this volume. The literature on these topics will be reviewed next.

On Automatization and Automaticity

Acquisition of skills is a major goal of L2 learning. In SLA, skilled performance is often analyzed in terms of complexity, accuracy, and fluency (Housen & Kuiken, 2009). In particular, fluency in both comprehension and production skills is often linked to the concept of automaticity (cf., cognitive fluency: Segalowitz, 2010). Automaticity is

characterized as fast, efficient, stable, effortless, ballistic, and unconscious (Moors, 2016; Moors & De Houwer, 2006). These behavioral signatures are not all-or-nothing phenomena. L2 learners show different levels of automaticity in many layers of language processing (e.g., decoding, phonological, lexical, morphological, syntactic processing); at any of these different levels, slow, inefficient, unstable, effortful, controlled, and conscious processing impedes accurate and fluent comprehension and production skills (Suzuki & Elgort, this volume). Furthermore, higher automaticity in lexical and grammatical processing can be the foundation for learning by reading, listening, writing, and speaking (e.g., Elgort & Warren, 2014; Hanzawa & Suzuki, in press; Segalowitz & Freed, 2004). Hence, establishing automatic language processing is a critical step for becoming a skilled L2 user; understanding automatization—extended and gradual learning processes that lead to automaticity—is important.

Because automatization is underpinned by multiple knowledge representations, there is more than one route to automaticity (Ashby & Crossley, 2012). With this premise, there are many important issues that need to be investigated regarding automatization of knowledge and skill through practice (DeKeyser, 2001; Segalowitz, 2003; Segalowitz & Hulstijn, 2005): what the optimal practice activities are for different language areas (e.g., pronunciation, vocabulary, grammar, pragmatics) and for different skills (e.g., comprehension vs. production, accuracy–fluency–complexity development); how different kinds of knowledge (declarative vs. procedural; explicit vs. implicit) develop and facilitate automatization in different learning environments; how practice influences the way existing knowledge (e.g., declarative and explicit knowledge) is retrieved and how it facilitates restructuring and fine-tuning of novel, more efficient knowledge representations (e.g., procedural and implicit knowledge); how much (repeated) practice is needed for automatizing the use of exemplars and rules; how the developmental trajectory differs for different linguistic structures and skills; and the extent to which automatization in one skill contributes to L2 development in other skills.

There are two influential psychological perspectives on L2 learning: skill acquisition theory (DeKeyser, 2020) and usage-based approaches (Ellis & Wulff, 2020). In both theories, language is acquired and used through the domain-general cognitive architecture for the acquisition and use of other kinds of knowledge and skills, such as learning about historical facts, how to solve mathematical problems, and how to play sports. According to skill acquisition theory (DeKeyser, 2020), domain-general long-term memory systems—declarative and procedural—underpin automatization. Declarative knowledge refers to knowing about something (i.e., object of thought), while procedural knowledge is tied to execution of skills. It is relatively easy for L2

learners to accumulate declarative knowledge of exemplars (e.g., single words, formulaic sequences, sentences) and rules (e.g., word-order rule, case systems, agreement systems). For instance, they can consciously commit language into declarative memory through perusal of L2 materials, teachers' explanations, reading and listening from input materials, etc. However, next comes the trickiest part, proceduralization, i.e., creating a procedural knowledge representation for performing a specific mental action by drawing on declarative knowledge. There are two major contexts of proceduralization (Sato, this volume). In an ideal situation, learners access the relevant declarative knowledge for using the desired target skills (e.g., reading, listening, writing, and speaking) to comprehend and express meaning that is relevant for them. Hence, in order to achieve the desired automatization, contextualized practice involving use of the target skill for meaning making in a specific context is important even in early stages of proceduralization (Lightbown, 2019; Lyster & Sato, 2013). In contrast, when they only practice form-meaning mapping in a constricting drill (e.g., fill-in-the-blanks), they acquire procedural knowledge merely for such L2 use (e.g., quickly retrieving memorized vocabulary and rules for certain cues on a paper-and-pencil test). This latter case is the pitfall of proceduralization; the same kind of subsequent practice only leads to automatization of narrow skills that apply to limited contexts with little relevance to real-life language use.

Therefore, a closer inspection of the exact content of procedural knowledge is warranted in L2 learning. This content can have various levels of granularity, from items/exemplars (e.g., sounds, spellings, words, phrases, collocations, formulaic sequences, idioms) to more abstract syntactic rules; hence, learning processes presumably differ for exemplars and rules (e.g., Boers, 2021; DeKeyser, 2001, 2007). While acquiring declarative knowledge of many exemplars (e.g., frequent multi-word sequences) is certainly useful, such declarative content also needs to be seamlessly integrated with communicative intent, i.e., creating procedural knowledge. Procedural knowledge is (re)structured efficiently when a language form such as "I was wondering if..." is combined with specific functions in specific contexts (e.g., asking a polite question in an email, making a polite request at service encounter). Furthermore, proceduralization of abstract rules (e.g., word-order rules assigning grammatical functions such as subject and object) is also important for broad, novel, and creative L2 use, because syntactic rules with varied exemplars are called upon for a range of contexts (DeKeyser, 2001). Thus, what is needed for successful L2 use in various contexts is not just making fluent use of exemplars but also automatization of relevant rules that express intended meaning and are applicable to many utterances in various contexts.

What, then, are the optimal practice conditions that are conducive to automatization of rules? Based on skill acquisition theory, automatization is the fine-tuning of procedural knowledge (e.g., leading to faster, more stable and efficient skill using). Because proceduralization presupposes declarative knowledge, automatization (in the broadest sense of learning trajectory) is guided by declarative knowledge at the very beginning. In laboratory research, McManus and Marsden (2019) trained French L2 learners on imparfait verbal morphology in comprehension practice (i.e., connecting forms to meanings), involving 552 exemplars over four training sessions across three weeks (3.5 hours). They found that carefully applying declarative knowledge (derived from explicit information about the target structure in both L1 and L2) was instrumental in automatization (evidenced by faster RT and smaller coefficients of variance). McManus' (2019) subsequent research further revealed that learners who received explicit information about L1 and L2 gradually relied less on rule-based declarative knowledge and focused more on relevant L2/L1–L2 form–function mapping (as opposed to direct L1 translation of the imparfait verbal morphology), after they engaged in extensive comprehension practice.

In classroom research, Sato and McDonough (2019) documented incipient automatization of oral production skills. Over five weekly sessions, L2 classroom learners engaged in three output practice activities (e.g., spot-the-difference task, interview) that naturally and frequently elicited the use of wh-questions at either the beginning or end of each regular class (15 minutes for each session). Analyses of speech during the practice activities showed that prior declarative knowledge about how to construct wh-questions assisted the learners in using the target structure accurately and fluently (evidenced by faster speech rate and fewer pauses). Interestingly, the role of declarative knowledge was significant only in the first training session and no longer relevant in the fifth (final) training session.

Taken together, these findings suggest that pedagogical rules work as a declarative crutch and initially assist in engaging in rule-guided comprehension and production skills. After extensive practice, those skills can be executed more automatically without relying on the declarative crutch. This interpretation is also consistent with a neuroscience model of automaticity (e.g., Kovacs & Ashby, 1992) and Ullman's neurobiological language acquisition model (e.g., Ullman, 2020). The neural circuits for declarative (e.g., prefrontal cortex, hippocampus) and procedural (e.g., basal ganglia) are recruited in earlier phases of learning; continued practice allows these two declarative and procedural systems to train cortical–cortical representations associated

with automatized skill (e.g., premotor cortex, left inferior frontal gyrus); this cortical representation, once established, is directly accessed during fluent skill use (Suzuki, Jeong et al., 2023).

Another route of automatization is emphasized in other cognitive approaches to L2 acquisition. According to usage-based approaches, implicit (unconscious) learning from usage (i.e., communicative language experience in social environments) can lead to automatization (Ellis, 2015). In this approach, language learning is exemplar based; non-declarative (implicit) learning mechanisms such as statistical learning, priming, and contingency learning play a major role in building language networks of linguistic exemplars and regularities. Rule-like regularities emerge and are abstracted through bottom-up processing of many exemplars (Ellis & Wulff, 2020). Extensive L2 usage presumably contributes to automatization, which is often described in research on implicit learning processes as entrenchment, memory consolidation, and/or chunking (Schmid, 2017). However, “implicit learning would not do the job alone.” (Ellis & Wulff, 2020, p. 78) because implicit learning occurs very slowly and is unlikely to be sufficient to learn all aspects of an L2. Ellis (2015) argues that explicit learning through noticing allows for conscious registering of linguistic construction in input, which is subsequently consolidated implicitly through statistical learning. Hence, a synergy between explicit and implicit learning is likely required for automatization of L2 skills, as acknowledged by both usage-based approaches (Ellis & Wulff, 2020) and skill acquisition (DeKeyser, 2020). The question is what aspects of language can be acquired and automatized through implicit learning and explicit learning mechanisms, how effectively, and in which contexts.

Since explicit and implicit learning processes are different, the resulting automatized knowledge representations are presumably different (see DeKeyser, 2017 for a review). Explicit learning via declarative knowledge results in automatized (speeded-up) explicit knowledge (e.g., DeKeyser, 2017), whereas implicit learning brings about automatized implicit knowledge (e.g., Ellis & Wulff, 2020). These two knowledge representations are distinguished based on the consciousness (aware vs. unaware) criterion, but a long-standing question regarding the interface between them is to what extent (automatized) explicit knowledge influences the acquisition of implicit knowledge. In order to tackle this interface issue, we need valid measures that can differentiate implicit knowledge from explicit knowledge that is typically assessed by acceptability judgment tasks (see Roehr-Brackin, 2022, for a review). Suzuki and DeKeyser (2017) developed a battery of finely tuned tests for implicit knowledge (e.g., 9781032539904_pi-282.indd 8 16-Jun-23 4.32.17 PM Introduction 9 eye-tracking while listening task, word-

monitoring task) and explicit knowledge (e.g., acceptability judgment tasks). The behavioral data from 100 advanced L2 Japanese speakers living in Japan suggested that both automatized explicit and implicit knowledge can develop in tandem and automatized explicit knowledge plays a significant causal role in the development of implicit knowledge. While acknowledging the importance of taking learner individual differences in aptitude for explicit learning into account, Suzuki and DeKeyser concluded that “because full automatization of explicit knowledge and attainment of implicit knowledge require considerable time and effort, realistic goals for L2 classroom instruction and learning include the attainment of proceduralization and partial automatization, which build on initial declarative learning” (p. 782).

From a neurocognitive view, however, the neural network supporting automaticity (i.e., the end products of explicit and implicit learning) is likely to boil down to a single procedural system (Ashby & Crossley, 2012): cortical representations such as left inferior frontal gyrus and premotor cortex presumably underlie highly automatized skill (see Suzuki, Jeong et al., 2023, for neural evidence of an incipient representation that supports the development of automatic grammar processing among advanced L2 learners). This knowledge representation network, which is drawn upon for accurate and fluent L2 skills, can be evaluated by using multiple criteria (e.g., speed, efficiency, stability, uncontrollability [ballistic], unconsciousness), and the degree of automatization is assessed with behavioral measures such as reaction time and speech/writing processing measures (see Part III of this volume). In sum, a central research question posed in the framework of practice is how different types of practice conditions influence different facets of automatization that are mediated by declarative/procedural, explicit/implicit, and exemplar/rule knowledge representations.

Principles of Practice for L2 Teaching and Learning

Extending DeKeyser’s (2007) conceptualization of practice, I will elaborate the five principles of effective practice that are central to the current edited volume: (a) deliberate; (b) systematic; (c) transfer-appropriate; (d) feedback; and (e) desirable difficulty. In order to further stimulate this strand of L2 research, I propose that a combination of these principles, as well as each of them separately, can be investigated systematically in SLA research. These core principles are rooted in cognitive psychology. Since target content and skills studied in psychology research are typically simple and do not necessarily scale up to the complexity of L2 learning, this framework is used in this volume to flesh out the concept of practice for SLA.

I primarily draw on skill acquisition theory to interpret the empirical findings in

the following sections with the premise that explicit learning is a viable and efficient mechanism for automatization in many classroom settings (DeKeyser, 2017, 2007; Leow, 2015). While implicit learning may be important for developing communicative competence, implicit learning from usage depends far more on massive input, which does not always fit the reality of instructed L2 learning settings. While implicit knowledge is typically associated with idealized monolingual native speakers' competence (for the problems of the native speaker's concept, see, e.g., Dewaele, 2018), proficient L2 users also utilize automatized (e.g., speeded-up) explicit knowledge for fluent comprehension and production (Saito & Plonsky, 2019; Spada, 2015; Suzuki & DeKeyser, 2015). Furthermore, metalinguistic awareness to reflect on the structural properties of language, often related to literacy development, is also integral to language learning for both young and adult learners (Roehr- Brackin, 2018). Despite the controversy over the precise role of automatization via explicit learning mechanisms in L2 learning, I take the following position for this chapter: in communicative language use, automatized explicit knowledge often complements and functions similarly to implicit knowledge and is a more realistic goal for L2 users, particularly in instructional settings. This perspective is only one way of looking at language learning but hopefully provides a valuable theoretical and practical point of view.

Deliberate practice

Two renowned psychologists restated “practice makes perfect” to “almost always, practice brings improvement, and more practice brings more improvement.” (Newell & Rosenbloom, 1981, p. 1) This is still a simplistic view of practice. Merely practicing a skill does not guarantee the acquisition of expert-level complex skills, as we all know by our everyday experience, such as amateur athletes playing sports for decades and never reaching professional levels.

One important departure from the simplistic view of “practice makes perfect” is a seminal work by Anders Ericsson, who emphasized the importance of deliberate practice. Deliberate practice is characterized as follows (Ericsson & Pool, 2016): (a) setting a specific goal; (b) requiring full attention and effort on performance; (c) immediate formative feedback; (d) repeated engagement of the same or similar tasks; and (e) individualized training program with adaptive difficulty. Informed teachers or coaches play an important role in designing optimal sequences of deliberate practice.

These characteristics of deliberate practice diverge from “naive” practice activities such as playful interaction and mindless mechanical drilling. In a recent meta-analysis of deliberate practice for achieving expert performance (see Harwell & Southwick, 2021, for a discussion), the contribution of such deliberate practice has been

estimated to be 20–30% of various outcomes in multiple domains such as music (e.g., violin, piano), games (e.g., chess, scrabble), sports (e.g., bowling, darts, volleyball, running, basketball), education (e.g., spelling bee, computer programming), and professions (e.g., soccer refereeing, aircraft piloting). Given the prominent roles of other factors (e.g., cognitive abilities, motivation) accounting for variance, the explanatory power of deliberate practice (20–30% of total variance) is impressive. While deliberate practice is not the only way for skill improvement, it is a useful concept that can be applied to L2 practice research.

In L2 learning, deliberate practice refers to conscious and intentional learning with the aim of developing accuracy and fluency in skills, supported by procedural knowledge. Yet, a considerable amount of declarative knowledge is also typically accumulated as a result of deliberate practice (e.g., through consulting external resources such as dictionaries and grammar reference books). Since it would be difficult for novice learners to engage in extended interaction or free output activities, deliberate practice in the narrow sense (“isolated” practice activities) is useful to strengthen faster and more reliable retrieval of linguistic knowledge. Recently, several research syntheses have revealed that intentional vocabulary practice activities such as fill-in-the-blanks, flashcards, and controlled production activities are beneficial for longterm retention (e.g., Boers, 2021; Webb et al., 2020). Furthermore, when learning an L2 that is typologically different from learners’ L1 in specific ways (e.g., orthography, phonology, morphology, and syntax), repeating focused practice allows learners to work on their weak points, which may be due to cross-linguistic influence to improve specific aspects of language skill (McManus, 2021).

In addition to isolated practice, L2 learners benefit from contextualized practice—repeatedly engaging with context-rich texts in a variety of ways. This includes retelling, reading aloud, shadowing, memorizing, and participating in creating meaning in dialogues, intensive reading, dictation, dictogloss, etc. These are often called language-focused activities and have been found effective for learning many linguistic exemplars in a short period time (Boers, 2021; Nation, 2007). Among them, reading aloud (i.e., oral reading of passages) and shadowing (i.e., listening to and repeating passages simultaneously) are rarely discussed in the mainstream SLA research but are widely used in Asia (Butler, 2017; Hamada & Suzuki, 2022); they add a unique variety of deliberate practice that aims at improving four language (sub)skills. One eye-opening anecdote comes from my observations of reading aloud practice in junior high school in Japan. In these successful English classes, beginner-level students were engaging in oral reading of story passages many times (e.g., a total of 20–30 times) distributed over several classes.

Were these seemingly “mechanical” activities considered useless? No, quite the opposite—deliberate practice of reading aloud was valuable; crucially, both teachers and learners understood that the efficient skills gained through repeated practice (e.g., decoding of grapheme–phoneme mapping, internalizing linguistic exemplars, enhancing articulation) would be an anchor for further extensive communication activities. If a goal of learning is to master interactive communicative skills, improving a set of subskills through this type of deliberate practice may be of transitory importance in the entire learning process, but possibly crucial for some learners to gain the foundational skills for engaging in communicative L2 use more confidently. Therefore, the role of deliberate practice activities should be not dismissed but rather embraced on the condition that they are linked to subsequent communicative activities as quickly as possible (e.g., DeKeyser, 1998, 2007; Johnson, 1996; Paulston, 1970).

The benefits of this type of deliberate practice for skill acquisition have been investigated only sporadically in SLA. Dai and Ding (2010) investigated the effect of deliberately memorizing an English text through various practice activities (e.g., recitations) on writing skill development among Chinese university students. After the continued in- and outside-class practice over 4 weeks, the learners used more varied and accurate formulaic sequences in their writing than those in a control group who studied the same text but without deliberate memorization. In speaking skill development, deliberate practice is also beneficial. In Fitzpatrick and Wray’s (2006) case study, six master’s students (L2 English learners) in the UK deliberately memorized model sentences that would be used in near-future situations that they would likely to encounter (e.g., discussing a course assignment with a classmate). After the learners individually memorized about ten model sentences tailored by the researchers for their specific needs, they attempted to use memorized sentences in real social interactions. Interestingly, the memorized sentences were not reproduced verbatim in the interaction; some portions of them were integrated with existing linguistic structures. For instance, when a learner memorized the sentence “I’m not really sure what they want us to include,” they might integrate “want us to include” to a new syntactic pattern such as “I’m wondering if the teacher [wants us to include] this.” This may indicate the integration of new linguistic resource gained through deliberate practice with existing knowledge, causing restructuring of knowledge and contributing to fluent use—a potential sign of incipient automatization. While this study is a small case study and more empirical work is needed (see a replication by Cutler, 2020, in the context of a Japanese company), deliberate practice can push learners to restructure their existing knowledge and may gradually feed into the (re)creative process of development of formulaic and rule-like knowledge, which

is susceptible to individual difference factors such as inductive learning ability.

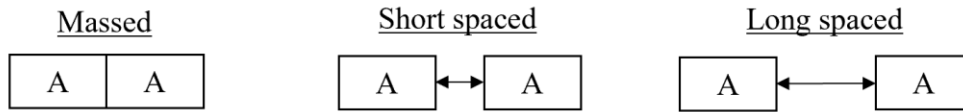
Deliberate practice contrasts with incidental learning (e.g., reading and listening for pleasure) with fleeting attention and lower-level awareness to target linguistic knowledge and skill. Although focused language-directed practice (e.g., flash-card vocabulary practice, retelling, dictation, dictogloss, oral reading and shadowing activities) is effective to develop and hone target knowledge and skills (Boers, 2021; Nation, 2007), it is effortful and may not be as enjoyable as obtaining captivating information (e.g., watching a movie for entertainment). While little research has explored the perception of deliberate practice in L2 learning, a conative factor such as grit (i.e., perseverance and passion for longterm goals) was found to influence learners' willingness to engage in deliberate practice among L1 children studying for the National Spelling Bee contest (Duckworth et al., 2011). Duckworth and colleagues found that the children rated deliberate practice (memorizing words alone), compared to leisure verbal activities, to be most effortful and least enjoyable; however, more gritty learners engaged in more deliberate practice and achieved better performance in the contest (see, e.g., Sudina et al., 2021 for a recent theorization of L2-specific grit in different L2 learning contexts).

While higher motivation drives learners to engage in practice, higher motivation may also result from deliberate practice. When L2 learners engage in goal-directed practice activities over time, they gradually grow confidence and then realize the benefits of deliberate practice (see Suzuki et al., this volume). This type of motivation, according to self-determination theory (Ryan & Deci, 2017), is likely intrinsic, which stems from achieving high “competence” and the feeling that their learning is effectively guided by deliberate practice. In sum, deliberate practice forms a solid declarative and procedural base of L2 knowledge and skills; it is also mediated by learners' perception and mindset toward a given activity—whether an activity is seen as tedious and mandatory versus rewarding and meaningful work they can learn from.

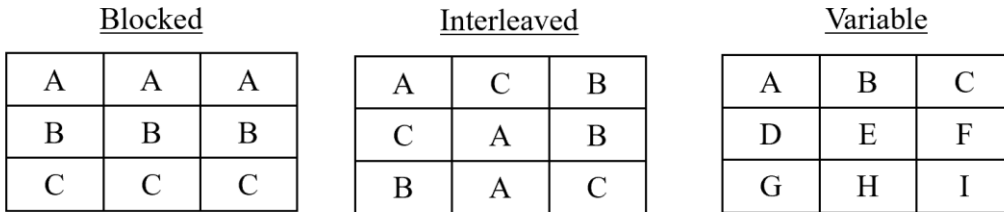
Systematic practice

Systematic practice is all about timing. L2 practice can be enhanced by changing (a) practice distribution; (b) practice sequence/variability; and (c) the timing of language-focused support. Figure 1.1 illustrates how practice-related variables (e.g., linguistic structure, skill, activity, task, lesson, and context) can be distributed, sequenced, and varied, as well as decision points when language-focused support can be provided.

(a) Practice Distribution



(b) Practice Sequence/Variability



(c) Language-Focused Support Timing

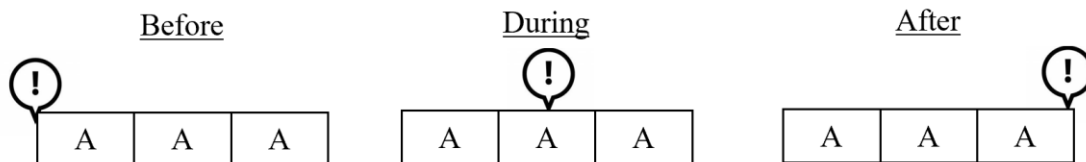


Figure 1.1. Some major dimensions of systematic practice

Note. The alphabet letters indicate practice-related variables such as linguistic structure, skill, activity, task, lesson, and context.

(a) Practice distribution. Without increasing study time, changing temporal distribution can enhance learning. Spacing practice activities over multiple short sessions leads to better learning and retention than massing them all in one longer lesson. This superiority of spaced practice over massed practice is referred to as the distributed practice effect, which has been extensively documented in cognitive psychology research (Cepeda et al., 2009). In a meta-analysis of 37 L2 studies (31 of which were published after 2010), Kim and Webb (2022) found (a) a medium-to-large advantage for spaced practice over massed (no spacing) practice and (b) a small-to-medium superior effect of longer-spaced practice relative to a shorter-spaced practice. This impressive synthesis has just scratched the surface of this domain; the majority of studies included in the meta-analysis focused on measuring the acquisition of declarative knowledge through narrow, deliberate practice of vocabulary and grammar.

Nevertheless, a small number of L2 studies focused on the acquisition of procedural (non-declarative) phonological, lexical, and grammatical knowledge. In

contrast to Kim and Webb's (2022) meta-analysis finding, these studies tend to show that shorter-spaced practice is often as effective as or sometimes even more beneficial than longer-spaced practice (e.g., Kasprowicz et al., 2019; Li & DeKeyser, 2019; Nakata & Elgort, 2020; Suzuki, 2017). Because proceduralization requires more repeated practice than the learning of declarative knowledge, practice with shorter intervals or even massed practice sometimes ensures successful retrieval of declarative knowledge—a precondition for proceduralization.

As the development of L2 skills (i.e., reading, listening, speaking, and writing) presupposes declarative and procedural knowledge to a different degree, the impact of practice distribution presumably manifests itself in different aspects of L2 skill. In three recent studies on distributed practice for L2 speaking development (none of which was included in Kim and Webb's meta-analysis), for instance, massed practice (e.g., repeating the same speaking task in one class) accelerates utterance speed and reduces disfluent pauses (Bui et al., 2019; Suzuki & Hanzawa, 2021), whereas spaced practice (e.g., repeating the same task over one week) allowed learners to increase the use of more complex sentences and engage in more speech monitoring (Bui et al., 2019) and diversify lexical usage (Kobayashi, 2022).

In a broader perspective, the time factor is also striking in curriculum design. In many foreign language classrooms, instructional hours are only 2–3 hours per week spread over many years (e.g., Collins & Muñoz, 2016). As the quantity and quality of practice are not often sufficient to develop procedural knowledge in this context, intensive courses where instructional hours are concentrated (e.g., 5–6 hours per day over several months) may create a more optimal condition for proceduralization. This idea is supported by empirical research conducted in Quebec in Canada (Lightbown, 2014) and European countries (Muñoz, 2012). An exemplary study was conducted in Spain by Serrano (2011), who compared two different distributions of 100+ class hours in a regular curriculum (two 2-hour classes per week, distributed over the academic year) and in an intensive curriculum (five 5-hour classes per week, condensed in 4.5 weeks in the summer). The participants in these programs were university students with either intermediate (B1 level in Common European Framework of Reference [CEFR]) or advanced proficiency (B2/ C1 levels). Findings indicated that the intensive curriculum resulted in higher learning gains (vocabulary and grammar knowledge, as well as receptive and productive skills) among intermediate EFL learners only. According to Serrano (2011), intensive and consistent practice opportunities afforded by the intensive curriculum favored proceduralization for intermediate learners who needed to practice without long lags, so that they could retrieve their declarative and partial procedural

knowledge for further consolidation. This finding is in line with the aforementioned studies on proceduralization of linguistic knowledge in more controlled experimental research (e.g., Li & DeKeyser, 2019; Suzuki, 2017). At different levels of L2 learning, a guiding question continues to revolve around identifying the optimal practice distribution for the acquisition and retention of different kinds of knowledge and skills for different learners.

(b) Practice sequence/variability. The sequence and variation of practice also make use of timing factors. There are many decision points for sequencing pedagogical activities in L2 learning, e.g., from simple to complex, oral to written modality, familiar to unfamiliar contexts, monologic to interactive, etc. Cognitive psychology has a vested interest in the optimal sequencing of learning events by blocking the exemplars in the same category (AAA-BBB-CCC) or interleaving exemplars from different categories (ACB-CAB-BAC) at once. For instance, while blocked practice is prevalent in mathematics textbooks (e.g., presenting several problems in the lesson on solving equations), evidence suggests that interleaving different kinds of problems (solving graph problems as well as equations) is superior to blocking for long-term learning (Rohrer et al., 2020). A meta-analysis by Brunmair and Richter (2019) confirmed the advantage of interleaved practice on inductive learning where concepts and rules are learned by studying exemplars. Yet, the advantage of interleaving differed greatly for the types of materials: from medium-to-large effect size observed for paintings and other visual materials, to small effect for mathematical tasks, and null effect for expository texts.

To what extent does interleaving effect apply to different aspects of L2 learning? In L2 grammar acquisition, interleaving exemplars with different rules seems to be superior to blocking exemplars by the same rules for acquiring declarative knowledge learned through fill-in-the-blank grammar exercises (Nakata & Suzuki, 2019). This is likely because interleaved practice can facilitate the discrimination of the distinctive characteristics of constructions that resemble each other, such as English tense–aspect–mood systems (past tense, present perfect, hypothetical conditionals) or relative clause constructions (subject and object relative clauses). Furthermore, hybrid practice, whereby blocked and interleaved practice were combined, can promote the gradual transition from declarative to procedural knowledge in controlled oral practice (Suzuki & Sunada, 2019).

While the controlled format of grammar learning activities in these L2 studies resembles the kinds of practice activities (e.g., solving math problems) in psychology research (Brunmair & Richter, 2019), Suzuki (2021) extended the scope of research to L2 speaking practice. In his study, EFL learners engaged in story narration tasks (six-frame cartoon) nine times over three study sessions under either blocked (Day 1: Task AAA,

Day 2: Task BBB, Day 3: Task CCC) or interleaved condition (Day 1: ABC, Day 2: ABC, Day 3: ABC). In contrast to most results from the grammar learning experiments, it was blocked practice that led to higher fluency gains (e.g., faster articulation rate) that are associated with the underlying proceduralization. The superiority of blocked practice was attributed to recycling of linguistic structures that were activated during the first task performance and were then reused in the subsequent performance in the blocked practice condition (see “Transfer-Appropriate Processing” section).

While the practice sequencing keeps the types of tasks constant (the number of type and frequency of Task A, B, and C was the same between blocked and interleaved practice), increasing “variation” in task types can enhance the effects of repeated practice. Motor skill research suggests that changing 9781032539904_pi-282.indd 16 16-Jun-23 4.32.17 PM Introduction 17 practice conditions frequently contributes to the acquisition of skills that are transferrable to other conditions (Schmidt & Bjork, 1992). For instance, variable throwing practice (involving hitting multiple targets with a bean bag) resulted in superior performance on the transfer test relative to constant throwing practice (focusing on the same target) (Kerr & Booth, 1978). However, for L2 speaking fluency development, de Jong and Perfetti (2011) found the advantage for constant practice over variable practice. They compared a high variable practice schedule (Task ABC-DEF-GHI) with all different tasks of the same type (monologue speech on different topics every speech delivery) against a constant practice schedule (Task AAA-BBB-CCC). Results showed that only the constant practice condition led to L2 fluency development. In other words, changing from one task to another made a learning condition too variable and difficult for learners to hone in on the target linguistic skills.

Although variable practice is essential to enable learners to use L2 in new contexts, variability can become a friend or foe for L2 skill acquisition. Constant practice allows learners to fine-tune the same skill in a familiar learning condition, whereas varied practice brings out more diverse knowledge and skills in new learning conditions. Given that only a handful of empirical SLA studies are available on this point, the optimal integration of sequence and variability must be further explored.

(c) Timing of Support. Providing language-focused support at the right time is critical. While research has been conducted extensively on the effectiveness of explicit and implicit instruction (e.g., Goo et al., 2015; Norris & Ortega, 2000), scant empirical attention has been paid to the timing of form-focused instruction. Language-focused support should be provided judiciously to enhance accuracy of L2 skills (while balancing fluency and complexity) and cover a wide range of linguistic domains (pronunciation, vocabulary, formulaic sequences, grammar, and pragmatics). Language-focused support

takes many forms in classrooms: (a) explicit instruction (Kachinske & DeKeyser, 2019); (b) corrective feedback (Li et al., 2016); and (c) providing model input for consulting (Hoang & Boers, 2016; Khezrlou, 2021; Lynch, 2018).

In order to investigate the effects of explicit instruction timing, Kachinske and DeKeyser (2019) conducted a laboratory study with L2 Spanish beginnerlevel learners. They engaged in comprehension-based grammar practice on target structures (Spanish word-order and ser/estar distinction). The timing of providing explicit information was manipulated: before and/or during grammar practice. Their findings suggested that, when learners were provided with the explicit information during practice, they attained better outcomes with less burden on their cognitive aptitudes (working memory and language analytic 9781032539904_pi-282.indd 17 16-Jun-23 4.32.17 PM 18 Yuichi Suzuki ability). Provision of explicit information prior to practice can reduce the number of learning trials (hence, more efficient) to get the rule right in this type of grammar practice, as demonstrated by research on processing instruction (e.g., Henry et al., 2009). In a L2 French classroom research, Michaud and Ammar (2019) compared the pre-task, within-task, and post-task explicit instruction on a complex structure (subjunctive). Intermediate-to-advanced (CEFR B1/ B2) learners used the French subjunctive to perform the main advice-giving tasks (e.g., making a video to give advice on how to prepare for winter). The findings revealed that within-task explicit instruction was more effective for learners with less prior knowledge of the target structure, while pre-task instruction was more effective for learners with higher prior knowledge. A follow-up stringent analysis (i.e., ANCOVA, using the pre-test score as a covariate), however, could not confirm this interesting interaction between instruction timing and prior knowledge (see Michaud & Ammar, 2023). Future research needs to explore optimal timing of explicit instruction by paying attention to the type of practice, difficulty of structures, and proficiency, etc.

Timing of corrective feedback also influences L2 learning. In the study conducted by Li et al. (2016), the timing of oral corrective feedback was manipulated such that corrective recasts on the passive construction were provided during the dictogloss tasks in the immediate corrective feedback condition, whereas in the delayed corrective feedback condition, corrective recasts were provided after the tasks were completed. Timing was operationalized differently in Fu and Li's (2022) study: dictogloss tasks were performed three times in which corrective feedback on the English past tense was provided only in the first training session (immediate) or in the final third session (delayed). Despite the different operationalizations, immediate feedback was more effective than delayed feedback on grammar acquisition. Immediate feedback presumably reduced incorrect usage of target structure at an earlier stage of learning; the subsequent

practice served as an opportunity for fine-tuning the linguistic knowledge representation.

Taken together, the findings from explicit instruction and corrective feedback timing suggest that the sooner correct declarative knowledge is established, the sooner this correct representation can be proceduralized. This type of evidence, if replicated and generalized, has important implications in teaching, as there may be many cases where learners spend prolonged time in figuring out the linguistic patterns on their own, leaving insufficient time to proceduralize, let alone automatize, the rule.

Input models can be exploited effectively in conjunction with repeated receptive and productive practice. Reading/listening texts are useful for learners to incidentally pick up (“mine”) and/or deliberately exploit (“model”) linguistic exemplars such as formulaic sequence for developing a balanced development of production skills in terms of complexity–accuracy–fluency (e.g., Hoang & Boers, 2016; Khezrlou, 2021). Text models are useful linguistic resources, functioning as a declarative crutch to enhance L2 production planning, reflection, and monitoring in task repetition practice. Although the right timing of provision of model texts has yet to be examined in the SLA field, Lynch (2018) argues that making model texts available before and after task performance is beneficial and well perceived by L2 learners. Form-focused instructional support should be provided when learners need it the most, but when that is still needs more research.

Finally, the role of systematic practice is also highlighted in study abroad programs (e.g., DeKeyser, 2007). As study abroad programs often begin after certain periods of at-home classroom instruction, instruction targeting linguistic aspects (as well as promoting social and cultural understanding) is an essential component that promotes a smooth transition from classroom to study abroad context (e.g., Pérez-Vidal, 2014). Sustained linguistic support can be provided pre-departure, on site, and after return to ensure the quantity and quality of input and interaction practice for substantial skill development (see McManus, this volume).

Transfer-appropriate

Transfer of learning and knowledge is considered to be an important issue in all areas of education (Bransford & Brown, 1999; Haskell, 2001). For instance, does learning one musical instrument provide an advantage when learning another instrument? Transfer presumably occurs via some common skill components (e.g., hand motions) for playing different instruments (e.g., trumpet and flute). The term “transfer” here does not refer to cross-linguistic influence from L1 to L2; it concerns the extent to which the effect of practice transfers to other linguistic structures, knowledge, skills, activities, tasks, and contexts (James, 2018; Larsen-Freeman, 2013). Does linguistic knowledge learned

through controlled practice transfer to the ability to perform in a more open-ended communicative task? To what extent can different L2 skills be practiced so that acquisition of one form of knowledge contributes to the development of another form of knowledge? How can contextualized practice in one context (e.g., asking questions about products at a shop, giving directions on the street) promote the ability to use knowledge in different contexts (e.g., asking questions about service at a hotel, giving directions at the station)? Ultimately, to what extent can learners apply what they learn in the classroom to the real world?

A key concept to understand transfer of learning is transfer-appropriate processing (Lightbown, 2008; Morris et al., 1977). According to this account, the retrieval of knowledge is influenced by how information is initially encoded. Learning is maximized when the cognitive processes engaged in during the initial learning match those engaged in during the outcome test. 9781032539904_pi-282.indd 19 16-Jun-23 4.32.17 PM 20 Yuichi Suzuki In line with the goal of developing communicative skills, practice conditions need to ensure enough elements (e.g., expressing personal meaning, attending to linguistic accuracy under communicative pressure) to support the transfer from practice to outcome. This transfer-appropriate processing idea for L2 grammar instruction was tested by Spada et al. (2014). In their classroom research with intermediate (B1 level in CEFR) learners in Canada, they found that spontaneous use of grammatical knowledge is achieved when form-focused instruction is integrated with communicative tasks, rather than being decontextualized form-focused practice (see File & Adams, 2010 for a different pattern of findings in integrated and isolated vocabulary instruction). As acknowledged by the authors, this conclusion is considered tentative at best given several methodological limitations (e.g., lack of a control group); other important factors such as prior levels of grammatical knowledge and general proficiency can also influence the optimal integration of form-focused instruction with communicative tasks.

What are the crucial elements of knowledge that enable the transfer from one practice task to a new task? Based on skill acquisition theory, declarative and procedural knowledge play complementary roles in transfer of skills (DeKeyser, 2018). Declarative knowledge is a general-purpose resource that can be accessed in different contexts. As a case in point, Saito (2013) demonstrated that only when explicit instruction on English /r/ is integrated in meaning-oriented practice (debate, public speech, argument creation), pronunciation improvement was generalized to unfamiliar contexts that were not covered in the learning material. This transfer was presumably mediated by the solid declarative knowledge developed through effective explicit instruction with information about the

manner of articulation and exaggerated pronunciation models.

In contrast, procedural knowledge is less transferable, because it is the result of compilation of multiple procedures for a behavior with a specific purpose. Yet, procedural knowledge of the lexical items and syntactic structures that are practiced in one task can still be applicable to a new task. Suzuki, Eguchi, et al. (2022) re-analyzed the data from the aforementioned experiment by Suzuki (2021) on repeated speaking practice and found that learners in the blocked task repetition group, who showed higher fluency improvement on a new (transfer) narrative posttest, recycled a higher proportion of the same lexical trigrams (chunks such as “behind the bicycle”) and abstract syntactic structures with the same parts of speech (e.g., prepositional phrase: “preposition + determiner + noun”) during practice. This suggests that immediately repeating the same task on the same day could enhance the proceduralization of concrete exemplars and more abstract (rule-like) structures for fluent speech production. In contrast, interleaved task repetition resulted in less recycling of the same lexical and abstract trigrams during practice, which could account for the less pronounced fluency improvement on the transfer posttest. While varying the stories of narrative task may allow for using a more variety of linguistic structures, immediately repeating the same narration is an effective strategy for promoting proceduralization and possibly automatization of exemplars and rules that learners have used (see Lambert, this volume, for another option of task sequencing).

To further promote the transfer of procedural knowledge from one task to another, we also need to increase the matching elements across tasks such as topic (e.g., giving a speech about tourism vs. democracy), task similarity (e.g., narrative vs. interactive task), skill modality (e.g., oral vs. written), contextual cues where exemplars and rules are used (e.g., expressing temporal or locative information using a prepositional phrase), and pragmatic intention (e.g., explaining an unforgettable event to a friend). To maximize transfer of learning, it is useful to take into account these elements for sequencing practice activities. As an initial attempt, Nikouee (2021) carefully sequenced 14 practice activities targeting the English past-tense rules for L2 learners at a Canadian university. These activities were graded from guided practice (e.g., listen to what happened at a birthday party, narrate a one-picture story about summer vacation) to more open-ended production practice (e.g., answering interview questions about their last birthday, narration of an imaginary story about a summer trip). These activities are interlinked to each other by ensuring common elements in terms of topic content, context, communicative intention, and skill modality. The learners who engaged in these practice sequences showed higher fluency improvement than the control group who only

completed written grammar exercises (e.g., gap-filling, sentence completions). Practice activities that are linked to subsequent ones by ensuring common elements throughout judicious task sequencing can gradually increase learners' control by letting them express their own personal meaning freely for communication. At the same time, learners' affective and motivational factors (e.g., interest, self-efficacy, engagement) need to be aligned so that learners actively use, expand, and transfer declarative/procedural knowledge and exemplars/rules within and outside classrooms. Given the limited empirical work on transfer of learning in L2 research, this is an open area of research that needs a more comprehensive approach investigating a set of cognitive, conative, and affective factors that may contribute to successful transfer of learning.

Feedback

In education research, providing information on learners' performance or feedback is "one of the most powerful influences on learning" (Hattie & Timperley, 2007, p. 104). Feedback promotes the alignment between current learners' knowledge/skills and desired goals. While there are different types of affective-oriented feedback (e.g., praise, punishment, rewards), corrective feedback that brings changes in cognitive In education research, providing information on learners' performance or feedback is "one of the most powerful influences on learning" (Hattie & Timperley, 2007, p. 104). Feedback promotes the alignment between current learners' knowledge/skills and desired goals. While there are different types of affective-oriented feedback (e.g., praise, punishment, rewards), corrective feedback that brings changes in cognitive processes is the focus here. Useful feedback helps learners to understand what their errors are, why they made those errors, and how they can avoid them to improve their performance.

Corrective feedback has been found effective, according to a recent comprehensive meta-analysis in education (Wisniewski et al., 2020), which included several key meta-analyses on corrective feedback research in SLA. Focusing on L2 research, Brown (2021) compiled 20 meta-analyses of corrective feedback and made a crucial point: while both oral and written corrective feedback exert positive influence on many aspects of L2 learning, the average effect size varied considerably from one meta-analysis to another. Hence, the core challenge is identifying the optimal moderators of corrective feedback (see Nassaji & Kartchava, 2021, for a comprehensive review): (a) different types of feedback (e.g., input-providing such as recasts vs. output-inducing such as prompts); (b) the frequency and distribution of feedback (e.g., selective/ focused/ vs. comprehensive/un-focused); (c) mode of feedback (computer mediated vs. face-to-face);

(d) timing of feedback (e.g., immediate vs. delayed). Furthermore, the effectiveness of these different types of feedback depends on a large array of linguistic and learner-related factors; there is still a long way to go before researchers fully understand these complex interactions. Among several SLA theories guiding us to navigate these interactions, skill acquisition theory accounts for the functions of corrective feedback in three developmental stages (e.g., Leeman, 2007; Lyster & Sato, 2013; see also Sato, this volume): knowing that a learner's knowledge is wrong (declarative), knowing how to do it right (procedural), and knowing how to do it better (automatization).

In L2 education, there are many ways of providing feedback for developing declarative knowledge. In deliberate, isolated practice, the learner provides a response to an item and receives feedback consisting of a correct answer (e.g., correct L2 word forms, pronunciation, and grammatical structure) and sometimes metalinguistic information (e.g., explanation about the rules). For instance, during deliberate practice, a notoriously persistent problem in pronunciation can be successfully tackled by individualized feedback with precise and detailed diagnostic information from a smartphone app. In Zhu et al.'s (2022) intervention study, English L2 learners with L1 Chinese received explicit phonetic instruction on difficult features for them (dark /ʌ/ and interdental fricatives /ð/and/θ/). They then engaged in 10-minute daily solitary practice over one week outside the classroom using an augmented reality app. This app analyzed their pronunciation, particularly the lips and tongue movement, and provided feedback on the articulatory gestures. The experimental group was found to develop higher awareness and more accurate pronunciation, at least of the dental fricatives (not of the dark /ʌ/). A higher production accuracy (procedural knowledge) was related to higher declarative knowledge about the articulation gestures. This illustrates that feedback reminding learners about relevant declarative knowledge during practice can raise awareness and promote monitoring and thus potentially aid proceduralization.

Feedback can also build on declarative knowledge to initiate proceduralization. In this case, output-inducing corrective feedback moves such as prompts are particularly useful. Here is an excerpt of peer interaction between two English L2 learners at the Japanese university:

Shun: But, actually, he won in World Cup. So, he can have confidence. He must have confidence. *If he have confidence,*

Wataru: *If he have? He have? (Prompt)*

Shun: Oh! *If he had confidence,* we can believe him.

Presumably, Shun's signal prompted Wataru to activate his declarative knowledge of the past tense marker and created an opportunity to reformulate his utterance through "negotiation of form." Modified output following prompts in meaningful interaction is a kind of contextualized practice afforded by corrective feedback. According to Lyster and Sato (2013), prompts during interaction can contribute to restructuring of existing knowledge and promoting proceduralization by pushing learners to self-correct their utterance. Self-correction during speaking is an overt manifestation of a learner's monitoring process where declarative knowledge is drawn on for proceduralization (Kormos, 2006). Because the monitoring process reflected by self-correction contributes to complexity-accuracy-fluency development (Golonka, 2006), output-prompting feedback is a valuable option in L2 learning along with other types of corrective feedback (e.g., recasts, explicit correction).

Furthermore, the timing of corrective feedback is also critical for successful proceduralization. While there are multiple ways of manipulating the timing of oral corrective feedback (see "Systematic Practice" section), new technology also affords an immediate (sometimes automated) corrective feedback on writing skills. Shintani and Aubrey (2016) compared the relative effects of immediate and delayed corrective feedback on the use of a complex grammatical structure (English hypothetical conditional) in a writing task. While L2 learners engaged in a writing task with an online collaborative writing program (Google Docs), the teacher provided error correction on the hypothetical conditional in real time (synchronous feedback) or after the draft was completed (asynchronous feedback). The number of errors on the target structure decreased during the writing process only in the synchronous feedback group; higher accuracy was also observed in this group on a new writing task three weeks later. The relevant declarative knowledge, activated by simultaneous error correction during the writing tasks, presumably promoted proceduralization. Feedback for 9781032539904_pi-282.indd 23 16-Jun-23 4.32.17 PM 24 Yuichi Suzuki proceduralization can "indicate the need for greater attention and reliance on declarative knowledge as well as the need to change the scope of a given rule or procedure." (Leeman, 2007, p. 117).

In order to pave the way for automatization of procedural knowledge, corrective feedback is still critical to encourage self-monitoring and self-correction in more open communicative practice (Sato & Lyster, 2012). Extensive task repetition promotes automatization of exemplars, rules, and fluent speech (Bygate, 2018); however, rushing automatization may compromise the development of accuracy, as suggested by Thai and

Boers (2016). Under increased communicative and/or time pressure, L2 learners often draw on their strong prior knowledge (e.g., automatized L1 routines) and end up creating inaccurate L2 knowledge representations even when they receive extensive meaningful exposure (Lyster & Sato, 2013). Without judicious feedback, the incorrect exemplars and rules can become automatized and therefore entrenched. Johnson (1996) argued that providing constant corrective feedback before, during, and after task performance is essential in promoting noticing, correcting, and monitoring under real operating conditions—meaningful L2 use. All in all, feedback is essential for practice to build new mental knowledge representations and to restructure, fine-tune, and consolidate knowledge.

Desirable Difficulty

Guided by the four principles of practice, I have provided an overview of evolving research on L2 practice. In essence, optimum practice entails a set of deliberate learning components that is integrated into transfer-appropriate contextualized practice in a systematic manner with judicious feedback, in order to support the development of knowledge and skills that are both durable and transferable to a variety of contexts. These four principles are not mutually exclusive but complementary; in this final section, I present an overarching theoretical framework that unifies these four principles for optimizing L2 practice.

Evidently, practice of a narrow, brief, simple, mechanistic, superficial, routine, or playful kind does not optimize L2 learning. Practice should be desirably difficult. The idea of desirable difficulty is not new. It was originally proposed by Robert Bjork, an expert on memory and learning (Bjork, 1994). In Bjork's framework, creating desirably difficult learning conditions for learners leads to lower performance during practice, but despite the initially slower rate of learning, challenging practice eventually enhances long-term retention and transfer of learning.

By applying this desirable difficulty framework to L2 practice, Suzuki et al. (2019a) proposed that practice should be tailored to individual learners by taking into account three factors contributing to L2 difficulty: (a) practice condition; 9781032539904_pi-282.indd 24 16-Jun-23 4.32.17 PM Introduction 25 (b) linguistic difficulty; and (c) learner-related difficulty. All other things being equal, the level of learning difficulty is increased by manipulating practice conditions. Key parameters for increasing difficulty levels of practice condition covered in this chapter are distributing repeated practice opportunities (rather than massing), increasing the variation of the conditions (rather than constant/ same conditions), interleaving different exemplars/rules

and tasks (rather than blocking), and reducing linguistic support in contextualized practice (rather than linguistic scaffolding). However, the difficulty should be interpreted in relative terms; simply increasing the difficulty of practice is not necessarily desirable. Two empirical studies reviewed in the “Systematic Practice” section, Suzuki (2021) and de Jong and Perfetti (2011), compared two practice conditions for fluency development training. Suzuki focused on blocked versus interleaved practice, whereas de Jong and Perfetti compared constant versus variable practice. Because interleaved and variable practice typically induce more learning difficulty, it can be predicted that they would result in higher transfer of learning (i.e., in these studies, fluent speech on a new task). However, the results showed the opposite patterns. From the desirable difficulty perspective, interleaved and variable speaking practice might have been too challenging and cognitively demanding (hence, undesirably difficult) for the given learners. It is thus important to create learning conditions that ensure effortful but successful practice performance (see Koval, 2022, for an illustration in L2 vocabulary learning).

Second, different linguistic structures benefit differently from practice. Linguistic difficulty differs across domains (e.g., vocabulary, pronunciation, grammar, pragmatics) as well as more fined-grained features within each linguistic domain. In the domain of grammatical structures, for instance, key linguistic variables are formal complexity and functional complexity (Housen & Simoens, 2016). Higher formal complexity, for instance, can refer to the number of allomorphs (e.g., -ed and -s have more allomorphs than -ing) and/ or the number of structural operations (e.g., passive sentences require more transformations than active sentences). Higher functional complexity is associated with a higher number of meanings and functions expressed (e.g., English articles have more functions and are more abstract than plural s). Because different L2 features in different languages entail different levels of difficulty for learners with different L1s, the kinds of practice and feedback need to be matched to relevant psycholinguistic difficulties. Granena and Yilmaz (2021), for instance, attempted to categorize grammatical difficulty based on the complexity in (a) form and (b) form-meaning mapping. Their meta-analysis revealed that corrective feedback was most effective for simple grammatical structures (e.g., possessive determiners), followed by more complex structures (e.g., past tense, third person s, articles), and least effective for the most complex structures (e.g., comparative, passives, questions). As the effect of corrective feedback on most complex structures was small ($d < 0.30$), these complex structures may be less likely to benefit much from corrective feedback; a more explicit intervention may be necessary, such as deliberate practice with metalinguistic explanations (McManus & Marsden, 2019).

Finally, learner-related difficulty concerns learners' propensities such as cognitive aptitudes (e.g., inductive or analytic ability, working memory, explicit and implicit learning abilities), conative–affective factors (e.g., motivation, personality, anxiety), and prior knowledge, including first language (L1) knowledge. In a research area originally espoused in education, aptitude–treatment interaction was examined in order to match L2 practice conditions to learners' characteristics such as age, proficiency, cognitive aptitude, motivation, and personality (DeKeyser, 2019). Findings yielded by extant desirable difficulty and aptitude–treatment interaction research can inform pedagogical decisions in three ways (Suzuki, 2022): (a) capitalization on strengths (i.e., tailoring instruction to the strengths of individual learners), (b) compensation for weaknesses (i.e., tailoring instruction to provide support for what the learner cannot do), and (c) remediation (i.e., implementing training regimens to fill the specific gaps in learners' initial abilities). In the aforementioned study by Kachinske and DeKeyser (2019), their preliminary evidence suggests that certain timings of explicit instruction may alleviate the burden on working memory and language analytic ability (compensation for weakness).

In recent L2 research, the idea of desirable difficulty has been used to provide more nuanced interpretations of complex interactions among practice conditions, linguistic difficulty, and learner-related factors (e.g., Serfaty & Serrano, 2022; Terai et al., 2021). Although exploring the synergies among these sets of key variables is a major undertaking, it could provide the more fine-grained information required for individualizing practice, particularly in technologymediated contexts (see Ruiz et al., this volume, on intelligent CALL).

Contributions to This Volume: Theory, Praxis and Methods

This book aims to update and extend the concept of practice for SLA and is divided into three main parts. Part I consists of two theoretical chapters, each of which highlight receptive (input) and productive (output) practice. Suzuki, Nakata, and Rogers (Chapter 2) elucidate the roles of receptive and semi-productive practice for optimizing input and intake processing, whereas Sato (Chapter 3) shows how L2 output skills develop through communicative output practice and feedback by different types of learners in different contexts.

In Part II, the roles of practice are evaluated in diverse contexts and teaching approaches. The four chapters are ordered from the narrow (i.e., a set of practice activities targeting different linguistic components in foreign language classrooms) to the broadest sense of practice (i.e., communicative skill development in study abroad). Marsden and

Hawkes (Chapter 4) report a five-year project of foreign language curriculum development involving many high-stakes decisions. Their successful collaborative project also highlights the challenges of bridging between instructed SLA research findings and solving “real-world problems” under many practical constraints. Ruiz, Rebuschat, and Meurers (Chapter 5) showcase several prototypes of intelligent CALL systems to select practice activities based on learners’ interest and proficiency and to provide adaptive feedback. They demonstrate the effectiveness of individualized practice through large-scale ICALL research that allows for collecting longitudinal learning data in ecologically valid contexts. Lambert (Chapter 6) draws on a series of classroom research studies on task-based speaking practice and proposes that a set of communicative tasks can be systematically sequenced, along with pre-task planning, to develop L2 oral skills. McManus (Chapter 7) provides an in-depth review of the role of practice in study abroad contexts. From a skill acquisition theory perspective, he shows how high-quality practice shapes complexity–accuracy–fluency development during study abroad. These four chapters illuminate how different components of L2 practice are emphasized and evaluated for a given group of teachers and learners in a given institutionalized context. Due to the space limitation, this volume could not cover all L2 learning contexts and learner types. Other discussions relevant to skill acquisition theory are L2 learning in content-based instruction (e.g., Ranta & Lyster, 2018), teaching young L2 learners (e.g., Muñoz, 2007), and individual differences in declarative and procedural memory (e.g., Morgan- Short et al., 2022).

In Parts I and II, the authors answer two fundamental questions regarding L2 practice. The first question is how (some of) the five principles of effective practice, which were introduced in this chapter, are relevant to different types of practice activities and different contexts/teaching approaches (under the section: “Principles of Effective Practice”). The second question concerns strategies for enhancing automatization through L2 practice in specific contexts and teaching approaches (under the section: “Insights Into Automatization”). Although many L2 researchers recognize that both explicit–implicit and intentional–incidental learning processes are necessary for developing L2 knowledge and skills that are automatized and used for spontaneous communication, the extent to which explicit and implicit instruction, learning, and knowledge contribute to automatization remains to be established. The debate on this issue is addressed in the contributions to the current edited volume, where all authors discuss how L2 practice in various forms can be integrated with specific L2 learning contexts for facilitating L2 automatization from multiple angles.

The last three chapters comprising Part III are devoted to methodological

synthesis of research for studying practice and automatization and to offer practical and up-to-date guides for researchers who would like to carry out L2 research on practice and automatization. Maie and Godfroid (Chapter 8) synthesize research designs and methods commonly adopted in L2 research on practice. Suzuki and Elgort (Chapter 9) and Suzuki and Révész (Chapter 10) present a synthesis of experimental tasks and measurements to investigate automaticity and automatization in comprehension (focusing on lexical and grammatical processing and knowledge) and production (focusing on speaking and writing fluency) skills, respectively. In the epilogue (Chapter 11), I summarize the issues in the current volume and highlight the outstanding issues and challenges to provide future directions. All in all, this volume is an ambitious endeavor to bring together a team of researchers and stimulate further debate and dialogue to advance our theoretical understanding of practice in applied linguistics and SLA research.

References

- Ashby, F. G., & Crossley, M. J. (2012). Automaticity and multiple memory systems. *WIREs Cognitive Science*, 3, 363-376.
- Bjork, R. A. (1994). Memory and metamemory considerations in the training of human beings. In J. Metcalfe & A. P. Shimamura (Eds.), *Metacognition: Knowing about knowing* (pp. 185-205). Cambridge, MA: The MIT Press.
- Boers, F. (2021). *Evaluating second language vocabulary and grammar instruction: A synthesis of the research on teaching words, phrases, and patterns*. New York: Routledge.
- Bransford, J., & Brown, A. (1999). *How people learn: Brain, mind, experience, and school*: National Academies Press.
- Brown, D. (2021). Meta-analysis and research synthesis. In E. Kartchava & H. Nassaji (Eds.), *The Cambridge handbook of corrective feedback in second language learning and teaching* (pp. 164-184). Cambridge: Cambridge University Press.
- Brunmair, M., & Richter, T. (2019). Similarity matters: A meta-analysis of interleaved learning and its moderators. *Psychological Bulletin*, 145, 1029-1052.
- Bui, G., Ahmadian, M. J., & Hunter, A. M. (2019). Spacing effects on repeated L2 task performance. *System*, 81, 1-13.
- Butler, Y. G. (2017). ISLA in East Asian contexts. In S. Loewen & M. Sato (Eds.), *The Routledge handbook of instructed second language acquisition* (pp. 321-338). New York: Routledge.
- Bygate, M. (Ed.) (2018). *Learning language through task repetition*. Amsterdam, the Netherlands: John Benjamins Publishing Company.
- Castagnaro, P. J. (2006). Audiolingual method and behaviorism: From misunderstanding to myth. *Applied Linguistics*, 27, 519-526.
- Cepeda, N. J., Coburn, N., Rohrer, D., Wixted, J. T., Mozer, M. C., & Pashler, H. (2009). Optimizing distributed practice: Theoretical analysis and practical implications. *Experimental Psychology*, 56, 236-246.
- Collins, L., & Muñoz, C. (2016). The foreign language classroom: Current perspectives and future considerations. *The Modern Language Journal*, 100, 133-147.
- Cutler, S. F. (2020). *Developing formulaicity: Memorisation and production of formulaic expressions in L2 speakers of English*. (Doctoral Dissertation), Cardiff University.
- Dai, Z., & Ding, Y. (2010). Effectiveness of text memorization in EFL learning of Chinese students. *Perspectives on formulaic language: Acquisition and communication*, 71-87.
- de Jong, N., & Perfetti, C. A. (2011). Fluency training in the ESL classroom: An

- experimental study of fluency development and proceduralization. *Language Learning*, 61, 533-568.
- DeKeyser, R. M. (1998). Beyond focus on form: Cognitive perspectives on learning and practicing second language grammar. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 42-63). New York: Cambridge University Press.
- DeKeyser, R. M. (2001). Automaticity and automatization. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 125-151). Cambridge: Cambridge University Press.
- DeKeyser, R. M. (2017). Knowledge and skill in ISLA. In S. Loewen & M. Sato (Eds.), *The Routledge handbook of instructed second language acquisition* (pp. 15-32). New York, NY: Routledge.
- DeKeyser, R. M. (2018). Task repetition for language learning: A perspective from skill acquisition theory. In M. Bygate (Ed.), *Learning language through task repetition* (pp. 27-42). Amsterdam, the Netherlands: John Benjamins Publishing Company.
- DeKeyser, R. M. (2019). Introduction to the special issue of aptitude-treatment interaction in second language learning. *Journal of Second Language Studies*, 2, 165-168.
- DeKeyser, R. M. (2020). Skill acquisition theory. In B. VanPatten, G. D. Keating, & S. Wulff (Eds.), *Theories in second language acquisition: An introduction* (3rd ed., pp. 83-104). New York, NY: Routledge.
- DeKeyser, R. M. (Ed.) (2007). *Practice in a second language: Perspectives from applied linguistics and cognitive psychology*. New York, NY: Cambridge University Press.
- Dewaele, J.-M. (2018). Why the dichotomy ‘L1 versus Lx user’ is better than ‘native versus non-native speaker’. *Applied Linguistics*, 39, 236-240.
- Duckworth, A. L., Kirby, T. A., Tsukayama, E., Berstein, H., & Ericsson, K. A. (2011). Deliberate practice spells success: Why grittier competitors triumph at the national spelling bee. *Social Psychological and Personality Science*, 2, 174-181.
- Elgort, I., & Warren, P. (2014). L2 vocabulary learning from reading: Explicit and tacit lexical knowledge and the role of learner and item variables. *Language Learning*, 64, 365-414.
- Ellis, N. C. (2015). Implicit and explicit language learning: Their dynamic interface and complexity. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 3-24). Amsterdam, the Netherlands: John Benjamins.
- Ellis, N. C., & Wulff, S. (2020). Usage-based approaches to SLA. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition: An introduction* (3rd

- ed., pp. 63-82). New York, NY: Routledge.
- Ericsson, A., & Pool, R. (2016). *Peak: How all of us can achieve extraordinary things*. New York: Houghton Mifflin Harcourt.
- File, K. A., & Adams, R. (2010). Should vocabulary instruction be integrated or isolated? *TESOL Quarterly*, *44*, 222-249.
- Fitzpatrick, T., & Wray, A. (2006). Breaking up is not so hard to do: Individual differences in L2 memorization. *The Canadian Modern Language Review*, *63*, 35-57.
- Fries, C. (1945). *Teaching and learning English as a foreign language*. Ann Arbor, MI: University of Michigan Press.
- Fu, M., & Li, S. (2022). The effects of immediate and delayed corrective feedback on L2 development. *Studies in Second Language Acquisition*, *44*, 2-34.
- Golonka, E. M. (2006). Predictors revised: Linguistic knowledge and metalinguistic awareness in second language gain in Russian. *The Modern Language Journal*, *90*, 496-505.
- Goo, J., Granena, G., Yilmaz, Y., & Novella, M. (2015). Implicit and explicit instruction in L2 learning: Norris & Ortega (2000) revisited and updated. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 443-482). Amsterdam, Philadelphia: John Benjamins Publishing Company.
- Granena, G., & Yilmaz, Y. (2021). Corrective feedback and grammatical complexity: A research synthesis. In E. Kartchava & H. Nassaji (Eds.), *The Cambridge handbook of corrective feedback in second language learning and teaching* (pp. 754-776). Cambridge: Cambridge University Press.
- Hamada, Y., & Suzuki, Y. (2022). Situating shadowing in the framework of deliberate practice: A guide to using 16 techniques. *RELC Journal, Early View*.
- Hanzawa, K., & Suzuki, Y. (submitted). Does automaticity in lexical and grammatical processing predict utterance fluency development? A six-month longitudinal study in Japanese EFL context.
- Harwell, K., & Southwick, D. (2021). Beyond 10,000 hours: Addressing misconceptions of the expert performance approach. *Journal of Expertise/June*, *4*.
- Haskell, R. E. (2001). *Transfer of learning: Cognition, instruction, and reasoning*. San Diego, CA, US: Academic Press.
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*, 81-112.
- Henry, N., Culman, H., & VanPatten, B. (2009). More on the effects of explicit information in instructed SLA. *Studies in Second Language Acquisition*, *31*, 559-

575.

- Hoang, H., & Boers, F. (2016). Re-telling a story in a second language: How well do adult learners mine an input text for multiword expressions? *Studies in Second Language Learning and Teaching*, 6, 513-535.
- Horvath, J. C., Lodge, J. M., & Hattie, J. (2016). *From the laboratory to the classroom: Translating science of learning for teachers*. New York, NY: Routledge.
- Housen, A., & Kuiken, F. (2009). Complexity, accuracy, and fluency in second language acquisition. *Applied Linguistics*, 30, 461-473.
- Housen, A., & Simoens, H. (2016). Introduction: Cognitive perspectives on difficulty and complexity in L2 acquisition. *Studies in Second Language Acquisition*, 38, 163-175.
- Howatt, A. P. R. (2004). *A history of English language teaching* (2nd ed.). Oxford: Oxford University Press.
- Hui, B. (2020). Processing variability in intentional and incidental word learning: An extension of solovyeva and DeKeyser (2018). *Studies in Second Language Acquisition*, 42, 237-357.
- Hui, B., & Godfroid, A. (2021). Testing the role of processing speed and automaticity in second language listening. *Applied Psycholinguistics*, 1-27.
- Hulstijn, J. H., Van Gelderen, A., & Schoonen, R. (2009). Automatization in second language acquisition: What does the coefficient of variation tell us? *Applied Psycholinguistics*, 30, 555-582.
- James, M. A. (2018). Teaching for transfer of second language learning. *Language Teaching*, 51, 330-348.
- Jones, C. (2018). *Practice in second language learning*. Cambridge: Cambridge University Press.
- Kachinske, I., & DeKeyser, R. (2019). The interaction between timing of explicit grammar explanation and individual differences in second language acquisition. *Journal of Second Language Studies*, 2, 197-232.
- Kasprowicz, R., Marsden, E., & Sephton, N. (2019). Investigating distribution of practice effects for the learning of foreign language verb morphology in the young learner classroom. *The Modern Language Journal*, 103, 580-606.
- Kerr, R., & Booth, B. (1978). Specific and varied practice of motor skill. *Perceptual and Motor Skills*, 46, 395-401.
- Khezrlou, S. (2021). Focus on form in task repetition through oral and written task modeling. *International Review of Applied Linguistics in Language Teaching*, 61, 479-518.

- Kim, S. K., & Webb, S. (2022). The effects of spaced practice on second language learning: A meta-analysis. *Language Learning*, 72, 269-319.
- Kobayashi, M. (2022). The distributed practice effects of speaking task repetition. *International Journal of Applied Linguistics*, 32, 142-157.
- Kormos, J. (2006). *Speech production and second language acquisition*. New York: Routledge.
- Kovacs, P., & Ashby, F. G. (2022). On what it means to automatize a rule. *Cognition*, 226, 105168.
- Koval, N. G. (2022). Testing the reminding account of the lag effect in L2 vocabulary learning. *Applied Psycholinguistics*, 43, 1-40.
- Lado, R. (1964). *Language teaching: A scientific approach*. New York: McGraw Hill.
- Lambert, C. (this volume). Integrating systematic practice into task-based language teaching. In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 144-159). New York, NY: Routledge.
- Larsen-Freeman, D. (2013). Transfer of learning transformed. *Language Learning*, 63, 107-129.
- Leeman, J. (2007). Feedback in L2 learning: Responding to errors during practice. In R. M. DeKeyser (Ed.), *Practice in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 111-138). New York, NY: Cambridge University Press.
- Leow, R. P. (2007). Input in the L2 classroom: An attentional perspective on receptive practice. In R. M. DeKeyser (Ed.), *Practice in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 21-50). New York, NY: Cambridge University Press.
- Leow, R. P. (2015). *Explicit learning in the L2 classroom*. New York, NY: Routledge.
- Levelt, W. J. M. (1978). Skill theory and language teaching. *Studies in Second Language Acquisition*, 1, 53-70.
- Li, M., & DeKeyser, R. M. (2019). Distribution of practice effects in the acquisition and retention of L2 Mandarin tonal word production. *The Modern Language Journal*, 103, 607-628.
- Li, S., Zhu, Y., & Ellis, R. (2016). The effects of the timing of corrective feedback on the acquisition of a new linguistic structure. *The Modern Language Journal*, 100, 276-295.
- Lightbown, P. (1985). Great expectations: Second-language acquisition research and classroom teaching. *Applied linguistics*, 6, 173-189.

- Lightbown, P. (2008). Transfer appropriate processing as a model for classroom second language acquisition. In Z. Han (Ed.), *Understanding second language process* (pp. 27-44). Clevedon, UK: Multilingual Matters.
- Lightbown, P. (2014). Making the minutes count in L2 teaching. *Language Awareness*, 23, 3-23.
- Lightbown, P. (2019). Perfecting practice. *The Modern Language Journal*, 103, 703-712.
- Lim, H., & Godfroid, A. (2015). Automatization in second language sentence processing: A partial, conceptual replication of Hulstijn, van Gelderen, and schoonen's 2009 study. *Applied Psycholinguistics*, 36, 1247-1282.
- Loewen, S., & Sato, M. (2017). *The Routledge handbook of instructed second language acquisition*. New York, NY: Routledge.
- Lynch, T. (2018). Perform, reflect, recycle: Enhancing task repetition in second language speaking classes. In M. Bygate (Ed.), *Learning language through task repetition* (pp. 193-222). Amsterdam, the Netherlands: John Benjamins Publishing Company.
- Lyster, R., & Sato, M. (2013). Skill acquisition theory and the role of practice in L2 development. In M. García Mayo, Gutierrez-Mangado, J., & Martínez Adrián, M. (Ed.), *Contemporary approaches to second language acquisition* (pp. 71-92). Amsterdam, the Netherlands: John Benjamins Publishing Company.
- Marsden, E., & Hakwkes, R. (this volume). Situating practice in a limited-exposure, foreign languages school curriculum. In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 89-118). New York, NY: Routledge.
- McLaughlin, B., Rossman, T., & McLeod, B. (1983). Second language learning: An information-processing perspective. *Language Learning*, 33, 135-158.
- McManus, K. (2019). Awareness of L1 form-meaning mappings can reduce crosslinguistic effects in L2 grammatical learning. *Language Awareness*, 28, 114-138.
- McManus, K. (2021). *Crosslinguistic influence and second language learning*. New York: Routledge.
- McManus, K. (this volume). Practice in study abroad contexts. In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 160-178). New York, NY: Routledge.
- McManus, K., & Marsden, E. (2019). Signatures of automaticity during practice: Explicit instruction about L1 processing routines can improve L2 grammatical processing.

- Applied Psycholinguistics*, 40, 205-234.
- Michaud, G., & Ammar, A. (2019). *Timing of focus on form in TBLT*. Paper presented at the 2019 International Conference on Task-Based Language Teaching, Ottawa, Canada.
- Michaud, G., & Ammar, A. (2023). Explicit instruction within a task: Before, during, or after? *Studies in Second Language Acquisition*, 1-19.
- Moors, A. (2016). Automaticity: Componential, causal, and mechanistic explanations. *Annual Review of Psychology*, 67, 263-287.
- Moors, A., & De Houwer, J. (2006). Automaticity: A theoretical and conceptual analysis. *Psychological bulletin*, 132, 297-326.
- Morgan-Short, K., Hamrick, P., & Ullman, M. T. (2022). Declarative and procedural memory as predictors of second language development. In S. Li, P. Hiver, & M. Papi (Eds.), *The Routledge handbook of second language acquisition and individual differences* (pp. 67-81). New York: Routledge.
- Morris, C. D., Bransford, J. D., & Franks, J. J. (1977). Levels of processing versus transfer appropriate processing. *Journal of Verbal Learning and Verbal Behavior*, 16, 519-533.
- Muñoz, C. (2012). *Intensive exposure experiences in second language learning*. Bristol, UK: Multilingual Matters.
- Muranoi, H. (2007). Output practice in the L2 classroom. In R. M. DeKeyser (Ed.), *Practice in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 51-84). New York, NY: Cambridge University Press.
- Nakata, T., & Elgort, I. (2020). Effects of spacing on contextual vocabulary learning: Spacing facilitates the acquisition of explicit, but not tacit, vocabulary knowledge. *Second Language Research*, 37, 233-260.
- Nakata, T., & Suzuki, Y. (2019). Mixing grammar exercises facilitates long-term retention: Effects of blocking, interleaving, and increasing practice. *The Modern Language Journal*, 103, 629-647.
- Nassaji, H., & Kartchava, E. (2021). *The Cambridge handbook of corrective feedback in second language learning and teaching*. Cambridge: Cambridge University Press.
- Nation, P. (2007). The four strands. *Innovation in Language Learning and Teaching*, 1, 2-13.
- Newell, A., & Rosenbloom, P. S. (1981). Mechanisms of skill acquisition and the law of practice. In J. C. Anderson (Ed.), *Cognitive skills and their acquisition* (Vol. 1, pp. 1-55). Hillsdale, NJ: Erlbaum.
- Nikouee, M. (2021). *Grammar practice and communicative language teaching*:

- Groundwork for an investigation into the concept of transfer-appropriateness.* (Doctoral Dissertation), University of Alberta.
- Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 instruction: A research synthesis and quantitative meta-analysis. *Language Learning*, 50, 417-528.
- Ortega, L. (2007). Meaningful L2 practice in foreign language classrooms: A cognitive-interactionist SLA perspective. In R. M. DeKeyser (Ed.), *Practice in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 180-207). New York, NY: Cambridge University Press.
- Paulston, C. B. (1970). Structural pattern drills: A classification. *Foreign Language Annals*, 4, 187-193.
- Pérez-Vidal, C. (2014). *Language Acquisition in Study Abroad and Formal Instruction Contexts* (Vol. 13). Amsterdam: John Benjamins.
- Pérez-Vidal, C. (2014). *Language acquisition in study abroad and formal instruction contexts* (Vol. 13): John Benjamins Publishing Company.
- Ranta, L., & Lyster, R. (2007). A cognitive approach to improving immersion students' oral language abilities: The awareness-practice-feedback sequence. In R. M. DeKeyser (Ed.), *Practice in a second language: Perspectives from applied linguistics and cognitive psychology* (pp. 141-160). New York, NY: Cambridge University Press.
- Ranta, L., & Lyster, R. (2018). Form-focused instruction. In P. Garrett & J. M. Cots (Eds.), *The Routledge handbook of language awareness* (pp. 40-56). New York: Routledge.
- Roehr-Brackin, K. (2018). *Metalinguistic awareness and second language acquisition*. New York: Routledge.
- Roehr-Brackin, K. (2022). Explicit and implicit knowledge and learning of an additional language: A research agenda. *Language Teaching*, 1-19.
- Rohrer, D., Dedrick, R. F., Hartwig, M. K., & Cheung, C.-N. (2020). A randomized controlled trial of interleaved mathematics practice. *Journal of Educational Psychology*, 112, 40-52.
- Ruiz, S., Rebuschat, P., & Meurers, D. (this volume). Individualization of practice through intelligent call. In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 119-143). New York, NY: Routledge.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Publications.
- Saito, K. (2013). Reexamining effects of form-focused instruction on L2 pronunciation

- development: The role of explicit phonetic information. *Studies in Second Language Acquisition*, 35, 1-29.
- Saito, K., & Plonsky, L. (2019). Effects of second language pronunciation teaching revisited: A proposed measurement framework and meta-analysis. *Language Learning*, 69, 652-708.
- Sato, M. (this volume). Skill learning theories and language teaching: Different strokes for different folks. In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 63-86). New York, NY: Routledge.
- Sato, M., & Lyster, R. (2012). Peer interaction and corrective feedback for accuracy and fluency development: Monitoring, practice, and proceduralization. *Studies in Second Language Acquisition*, 34, 591-626.
- Sato, M., & McDonough, K. (2019). Practice is important but how about its quality? Contextualized practice in the classroom. *Studies in Second Language Acquisition*, 41, 999-1026.
- Schmid, H.-J. (2017). A framework for understanding linguistic entrenchment and its psychological foundations. In H.-J. Schmid (Ed.), *Entrenchment and the psychology of language learning* (pp. 9-36). Washington, DC: De Gruyter Mouton.
- Schmidt, R. A., & Bjork, R. A. (1992). New conceptualizations of practice: Common principles in three paradigms suggest new concepts for training. *Psychological Science*, 3, 207-217.
- Segalowitz, N. S. (2003). Automaticity and second languages. In C. J. Doughty & H. M. Long (Eds.), *The handbook of second language acquisition* (pp. 382-408). Oxford: Blackwell Publishers.
- Segalowitz, N. S. (2010). *Cognitive bases of second language fluency*. NY: Taylor & Francis.
- Segalowitz, N. S., & Freed, B. F. (2004). Context, contact, and cognition in oral fluency acquisition: Learning Spanish in at home and study abroad contexts. *Studies in Second Language Acquisition*, 26, 173-199.
- Segalowitz, N. S., & Hulstijn, J. (2005). Automaticity in bilingualism and second language learning. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 371-388). New York, NY: Oxford University Press.
- Serfaty, J., & Serrano, R. (2022). Lag effects in grammar learning: A desirable difficulties perspective. *Applied Psycholinguistics*, 43, 513-550.

- Serrano, R. (2011). The time factor in EFL classroom practice. *Language Learning*, 61, 117-145.
- Shintani, N., & Aubrey, S. (2016). The effectiveness of synchronous and asynchronous written corrective feedback on grammatical accuracy in a computer-mediated environment. *The Modern Language Journal*, 100, 296-319.
- Spada, N. (2015). SLA research and L2 pedagogy: Misapplications and questions of relevance. *Language Teaching*, 48, 69-81.
- Spada, N., Jessop, L., Tomita, Y., Suzuki, W., & Valeo, A. (2014). Isolated and integrated form-focused instruction: Effects on different types of L2 knowledge. *Language Teaching Research*, 18, 453-473.
- Stevick, E. W. (1986). *Images and Options in the Language Classroom*. Cambridge: Cambridge University Press.
- Sudina, E., Brown, J., Datzman, B., Oki, Y., Song, K., Cavanaugh, R., . . . Plonsky, L. (2021). Language-specific grit: Exploring psychometric properties, predictive validity, and differences across contexts. *Innovation in Language Learning and Teaching*, 15, 334-351.
- Suzuki, Y. (2017). The optimal distribution of practice for the acquisition of L2 morphology: A conceptual replication and extension. *Language Learning*, 67, 512-545.
- Suzuki, Y. (2021). Optimizing fluency training for speaking skills transfer: Comparing the effects of blocked and interleaved task repetition. *Language Learning*, 71, 285-325.
- Suzuki, Y. (2022). Individual difference factors for second language grammar. In S. Li, P. Hiver, & P. Mostafa (Eds.), *The Routledge handbook of second language acquisition and individual differences* (pp. 294-309). New York: Routledge.
- Suzuki, Y., & DeKeyser, R. M. (2015). Comparing elicited imitation and word monitoring as measures of implicit knowledge. *Language Learning*, 65, 860-895.
- Suzuki, Y., & DeKeyser, R. M. (2017). The interface of explicit and implicit knowledge in a second language: Insights from individual differences in cognitive aptitudes. *Language Learning*, 67, 747-790.
- Suzuki, Y., & Elgort, I. (this volume). Measuring automaticity in a second language: A methodological synthesis of experimental tasks over three decades (1990-2021). In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 206-234). New York, NY: Routledge.
- Suzuki, Y., & Hanzawa, K. (2021). Massed task repetition is a double-edged sword for

- fluency development: An EFL classroom study. *Studies in Second Language Acquisition*, 44, 536-561.
- Suzuki, Y., & Sunada, M. (2018). Automatization in second language sentence processing: Relationship between elicited imitation and maze tasks. *Bilingualism: Language and Cognition*, 21, 32–46.
- Suzuki, Y., & Sunada, M. (2019). Dynamic interplay between practice type and practice schedule in a second language: The potential and limits of skill transfer and practice schedule. *Studies in Second Language Acquisition*, 42, 169–197.
- Suzuki, Y., Eguchi, M., & de Jong, N. (2022). Does the reuse of constructions promote fluency development in task repetition? A usage-based perspective. *TESOL Quarterly*, 56, 1290–1319.
- Suzuki, Y., Jeong, H., Cui, H., Okamoto, K., Kawashima, R., & Sugiura, M. (2022). An fMRI validation study of the word-monitoring task as a measure of implicit knowledge: Exploring the role of explicit and implicit aptitudes in behavioral and neural processing. *Studies in Second Language Acquisition, Early View*.
- Suzuki, Y., Nakata, T., & DeKeyser, R. M. (2019a). The desirable difficulty framework as a theoretical foundation for optimizing and researching second language practice. *The Modern Language Journal*, 103, 713-720.
- Suzuki, Y., Nakata, T., & DeKeyser, R. M. (2019b). Optimizing second language practice in the classroom: Perspectives from cognitive psychology. *The Modern Language Journal*, 103, 551-561.
- Suzuki, Y., Nakata, T., & Rogers, J. (this volume). Explicit learning at the initial stages of SLA: Optimizing input and intake processing. In Y. Suzuki (Ed.), *Practice and automatization in second language research: Perspectives from skill acquisition theory and cognitive psychology* (pp. 39-62). New York, NY: Routledge.
- Terai, M., Yamashita, J., & Pasich, K. E. (2021). Effects of learning direction in retrieval practice on EFL vocabulary learning. *Studies in Second Language Acquisition*, 43, 1116-1137.
- Thai, C., & Boers, F. (2016). Repeating a monologue under increasing time pressure: Effects on fluency, complexity, and accuracy. *TESOL Quarterly*, 50, 369-393.
- Ullman, M. T. (2020). The declarative/procedural model: A neurobiologically motivated theory of first and second language. In B. VanPatten, G. D. Keating, & S. Wulff (Eds.), *Theories in second language acquisition: An introduction* (3rd ed., pp. 128-161). New York, NY: Routledge.
- Ur, P. (2016). Grammar practice. In E. Hinkel (Ed.), *Teaching English grammar to speakers of other languages* (pp. 109-127). New York: Routledge.

- Webb, S., Yanagisawa, A., & Uchihara, T. (2020). How effective are intentional vocabulary-learning activities? A meta-analysis. *The Modern Language Journal*, *104*, 715-738.
- Wisniewski, B., Zierer, K., & Hattie, J. (2020). The power of feedback revisited: A meta-analysis of educational feedback research. *Frontiers in Psychology*, *10*.
- Zhu, J., Zhang, X., & Li, J. (2022). Using AR filters in L2 pronunciation training: Practice, perfection, and willingness to share. *Computer Assisted Language Learning*, Early View, 1–30.