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INDIVIDUAL DIFFERENCE FACTORS FOR SECOND LANGUAGE WRITING

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Background

Writing is one of the most complex skills that human beings can learn throughout their lifetimes. Similar to the acquisition of other aspects of language, the pace and route of mastering writing varies from one person to another. Even in the first language (L1), the acquisition of writing skills proceeds at a varied pace and exhibits a wide range of inter-individual and intra-individual variations (Bereiter & Scardamalia, 1987). Whereas empirical studies in second language acquisition (SLA) have consistently pointed to meaningful relationships between individual difference (ID) variables and instructional conditions, learning outcomes, and task factors, their important role has often been downplayed in theories and experimental designs. The role of IDs in L2 writing performance has attracted even less attention (Kormos, 2012). Yet, it is now widely acknowledged that any theory of second language (L2) acquisition and processing must account for individual variations. This chapter, therefore, is entirely devoted to elucidating the ways in which working memory, language aptitude, learner beliefs, motivational factors, and emotions can impact L2 writing development and performance.

Working memory is a limited capacity mechanism comprised of "multiple specialized components of cognition that allow humans to comprehend and mentally represent their immediate environment … to support the acquisition of new knowledge, to solve problems, and to formulate, relate and act on current goals" (Baddeley & Logie, 1999, p. 765). In effect, working memory is responsible for the temporary storage and manipulation of information. The most widely used model of working memory in SLA research is the one proposed by Baddeley and Hitch (1974) and then further developed by Baddeley (2017). The model comprises four components including the central executive, the visuo-spatial sketchpad, the phonological loop, and the episodic buffer. The visuo-spatial sketchpad deals with visual information, while the phonological loop is a system for temporary storage and the rehearsal of auditory and verbal information. The central executive is thought to be responsible for controlling attentional resources, and it coordinates the visual-spatial sketchpad and the phonological loop as its slave systems. That is, when there are competing demands on limited attentional resources, central executives will be called upon to prioritize activities and allocate cognitive resources to the most urgent/consequential task. The episodic buffer, which was added to the original model later on (see Baddeley, 2000), integrates information from the slave systems (i.e., visuo-spatial sketchpad and phonological loop) and long-term memory into unitary episodic representations.

Working memory is now considered a cornerstone of cognitive psychology owing to its substantial relationship with fluid intelligence, that is, the ability to solve reasoning problems (Harrison et al., 2015). Individual differences in working memory have also been shown to be implicated in various aspects of L2 acquisition and processing such as vocabulary learning, the acquisition of formulaic language, and L2 pragmatics acquisition and interaction (e.g., Révész, 2012; also see Wen et al., 2019 and Li, 2017 for reviews). The importance of working memory in L2 acquisition and processing is further underscored by the fact that some researchers consider it as one of the subcomponents of the broader construct of foreign language aptitude (Kormos, 2013; Linck et al., 2014; Robinson, 2005; Skehan, 2012).

Kellogg's (1996) model of working memory in writing integrates Flower and Hayes' (1981) cognitive process model of writing and Baddeley's multicomponent model of working memory, thereby accounting for the ways in which various writing processes are supported by working memory. In Kellogg's model, the basic writing processes are *planning* (i.e., goal setting), *translation* (i.e., linguistic encoding of ideas into actual words and sentences), *programming* the output of translation for *execution* (i.e. typing or handwriting), *reading*, and *editing*. In the model, the link between each of these processes and working memory components has been clearly elucidated. Whereas the visuo-spatial sketchpad is only drawn upon for planning purposes, the phonological loop is engaged only in translation and reading processes. The central executive is recruited for virtually all processes except for motor execution. Kellogg's model was originally put forward for L1 writing, so one could predict that the cognitive demands on (especially low-proficiency) L2 writers would build up as a result of their relatively limited and less sophisticated lexicon, less efficient lexical access, and less automatic processes involved in syntactic packaging for the translation of thoughts and ideas into sentences. Based on Kellogg's model, L2 writing can be viewed from two perspectives. First, we can investigate the ways in which L2 writing processes relate to individual differences in the functioning of slave systems. Secondly, we can look at the role of working memory in L2 writing "by studying the attentional and management functions of the central executive" (Olive, 2004, p. 30). None of these perspectives have been investigated in the SLA literature.

Language aptitude (LA) has been conceptualized in many different ways but, broadly put, it refers to a flair or "specific talent for learning a foreign or second language" (Wen et al., 2017, p. 1) and is assumed to be the most reliable learner factor predicting success/failure in L2 acquisition (Ehrman & Oxford, 1995). Language aptitude is also thought to be a stable trait impervious to training (cf. Snow, 1992) and entirely distinct from other ID variables such as motivation and anxiety (Li, 2017). Adopting a componential perspective on language aptitude, Skehan (2002) was the first scholar to attempt linking putative SLA processing stages (e.g., input processing, noticing, pattern identification, extending, complexifying language, and becoming accurate) to aptitudinal components (e.g., working memory, grammatical sensitivity, inductive learning ability, restructuring capacity, and retrieval processes). Although, as Skehan (2002) acknowledges, this framework is by and large conjectural, it "provides a basis for a more comprehensive understanding of aptitude, as well as a research program" (p. 93). Robinson's (2012) aptitude complexes hypothesis, which is essentially based on Richard Snow's (1992) aptitude-treatment interactions, extends Skehan's proposal and offers a more nuanced analysis of the acquisition processes involved in the early stages of L2 acquisition. Robinson proposes ten *primary cognitive abilities* (i.e., perceptual speed, pattern recognition, phonological working memory [PWM] capacity, PWM speed, analogies, inference ability, memory and speed of memory for text, grammatical sensitivity, and rote memory capacity) and discusses ways in which they contribute to broader and higher order aptitude factors (e.g., noticing the gap and memory for contingent text). Clearly, then, these two proposals show that language aptitude is not a monolithic construct and that it is best construed as a constellation of different abilities that mediate and moderate virtually all aspects of L2 acquisition and processing, including L2 writing performance and written corrective feedback use and processing.

Whereas research on cognitive factors such as working memory and aptitude has contributed to our understanding of L2 writing, a purely cognitive perspective can portray learners as L2 processing machines and passive recipients of L2 written data rather than proactive agents in the L2 writing process. Unless the other non-cognitive factors such as learners' motivations and emotions are considered, we cannot paint a comprehensive picture of L2 writing. Research on the role of such non-cognitive factors in L2 writing, however, has been insufficient. More importantly, there have rarely been any motivational or affective interventions designed and implemented to enhance the processes and outcomes of L2 writing. Papi and his colleagues (2020) have attributed this gap to the lack of attention to the agentic role of learners and ignoring the qualitative differences in the affective, motivational, and behavioral patterns that learners display throughout the process of L2 writing and its development. In this section, various research studies highlighting the role of such learner factors as learner beliefs, motivation, emotions, and feedback-seeking behavior in L2 writing are discussed along with potential implications for theoretically motivated instruction and research.

Research on learner beliefs marked the beginning of scholarly attention to the role of motivational and affective factors in SLA. Through engagement in L2 writing experiences, students form opinions about L2 writing and written corrective feedback (WCF) (e.g., Manchón, 2009), which, if reinforced repeatedly, can turn into more stable thought forms that are commonly known as beliefs. Such beliefs can in turn shape learners' cognitive, emotional, and behavioral engagement in the L2 writing process (e.g., Storch & Wigglesworth, 2010). Learners' experiences and beliefs, therefore, form an interactive and reciprocal relationship that leads to mutual adaptations in their beliefs and experiences.

Regardless of one's working memory capacity or aptitude level, no intentional learning will happen if the learner lacks the motivation to do so. Motivation is, however, a complex, multifaceted, and dynamic phenomenon that directs learners' preferences, choices, and behaviors (Hiver & Papi, 2019; Papi & Hiver, 2020). The complexity of the issue is best manifested in the multiplicity of the theoretical constructs, models, frameworks, and theories employed in the field of L2 writing, some of which, including self-efficacy, mindsets, and future selves, are discussed below. Learners' sense of L2 writing self-efficacy represents how much they believe in their own L2 writing skills and abilities. Mindsets concern individuals' beliefs about the malleability of their intelligence and talents (Dweck, 1999). Those who believe that they can grow their intelligence are said to have a *growth mindset*, whereas those who believe that intelligence is a fixed entity are considered to have a *fixed mindset*. Future L2 selves (Dörnyei, 2009; Papi et al., 2019a) have been at the center of L2 motivation research and thinking. Based on this perspective, the discrepancy between one's perceived L2 competence and the level of L2 competence that the learner desires to achieve creates an emotional discomfort that leads to the learner's motivation to approach the desired end state. This desired end state could either represent an ideal L2 self, representing hopes and aspirations, or an ought-to L2 self, representing expectations and obligations. Other motivational factors concern the experience of learning how to write in a second language. Teachers' best way of motivating students to write in a second language and develop their writing skills is through providing them with positive learning experiences, which would be another motivational topic that we have addressed in this chapter.

Finally, emotions constitute the experiential dimension of the learning process. Emotions are closely associated with learners' thoughts and cognitions about their past, present, and future L2 experiences. Emotions, whether negative or positive, permeate every step of the L2 learning process. They can support or harm the learning process and outcomes. Despite the emergence of various emotional constructs in SLA research (MacIntyre et al., 2016; Teimouri, 2017), only the emotional factors of anxiety and enjoyment, which have attracted L2 writing researchers' attention in recent years, will be discussed in this chapter. L2 writing anxiety refers to the feeling of tenseness and nervousness associated with L2 writing situations. L2 enjoyment represents learners' experience of joy and pleasure while writing in a second language.

Research

Evidence

Working Memory

Previous research in L1 writing has convincingly demonstrated an important role for working memory (WM; the central executive, in the first place) in higher-order writing processes (Kellog et al., 2013). Writers with more efficient WM resources have been found to compose higher quality texts than writers with lower levels of WM (Vasylets & Marín, 2021; Zalbidea, 2017). Interestingly, the results from L1 writing resonate with the findings in Linck et al.'s (2014) meta-analysis, which reported a robust, positive correlation between WM and L2 writing outcomes, with an estimated population effect size (*p*) of 0.255. Although the extant research has provided promising initial support for the view that WM capacity is positively related to L2 writing and WCF processing, the findings are, however, conflicting and defy a straightforward interpretation.

For instance, mixed results were obtained in a study by Kormos and Sáfár (2008). In this study, 121 Hungarian secondary school learners of L2 English (aged 15–16; pre-intermediate and beginners) performed a non-word span test for measuring their phonological short-term memory (PSTM) and a backward digit span for complex WM, and completed English writing tasks, which were assessed for content and accuracy. The results showed a moderate correlation between PTSM and writing performance ($r = 0.48$, $p \leq 0.05$) only for the beginner learners. No statistically significant results were found for complex WM.

Other studies have found confusing results on the relationships between complex WM and L2 written performance. Thus, in a study by Zalbidea (2017), 32 intermediate learners of L2 Spanish (mean age 19.6) took an operation span test and performed simple and complex versions of an argumentative task orally and in writing. The analysis revealed that complex WM negatively correlated with the number of errors in the nominal domain (gender and number agreement) in the complex written task, but there were no connections between WM and lexical and syntactic complexity.

A study by Zabihi (2018), on the other hand, did not replicate the connection between complex WM and accuracy as the findings revealed that WM correlated positively with syntactic complexity (subordination) and fluency (number of words per T-unit), but negatively with accuracy scores (ratio of error-free T-units). Conversely, Mavrou (2020) reported a positive link between the updating function of WM and accuracy and subordination of L2 written video-retellings performed by the adult learners of L2 Spanish.

Some recent studies found no relationship between WM and L2 writing performance. For example, a study by Michel et al. (2019) with 94 young English as a foreign language (EFL) learners in Hungary (aged 11–14) found that WM functions (assessed by a number of tests) were not significantly related to the participants' performance on different task types from the test of English as a foreign language (TOEFL) junior comprehensive test battery, except for a positive correlation with performance on an editing task. Similarly, Lu (2015) found no relationship between WM and L2 writing among Chinese learners with different levels of L2 proficiency. A recent study by Vasylets and Marín (2021), which also took into account variations in L2 proficiency, obtained different results. In this study, 56 EFL learners in Spain (mean age 19) completed a standardized L2 proficiency test, a complex verbal WM test (reading span in L1), and a video-retelling narrative writing task, which were assessed holistically and in terms of complexity, accuracy, and fluency (CAF) measures. Moderation analysis revealed that for low-proficiency learners, there was a positive connection between WM and grammatical accuracy. However, for high-proficiency writers, there was a positive relationship between WM and lexical sophistication.

Although the results are mixed, a sizable number of investigations have provided support for a positive effect of WM on L2 writing. There is also a clear indication that other factors, such as the level of L2 proficiency or task complexity, may moderate the potential effects of WM in L2 writing.

Concerning WM and written corrective feedback, to our knowledge only Li and Roshan (2019) have explored this issue to date. The results from this study showed that complex WM was a positive predictor of the effects of corrective feedback with metalinguistic explanation and the effects of direct corrective feedback plus revision. On the other hand, PSTM was a negative predictor of the effects of direct corrective feedback plus revision. On the basis of these findings, the authors concluded that the role of WM may vary as a function of feedback type, and that complex WM and PSTM may have opposite associations with the effectiveness of WCF. Clearly, more research on the effects of WM on WCF appropriation is warranted.

Language Aptitude

The available research studies and findings are too scarce to make firm conclusions, but certain patterns concerning the effects of language aptitude in the L2 writing domain can already be traced. For example, Kormos and Trebits (2012) found that aptitude components were differently related to the CAF measures of learners' oral and written performance. In the written mode, learners with higher grammatical sensitivity produced longer clauses, but only in the task which was considered simple (the task with a pre-defined plot). The results suggest that the effects of aptitude may vary depending on the complexity of the task or the mode in which the task is performed.

In a more recent study, Yang et al. (2019) investigated how aptitude (assessed by LLAMA tests; Meara, 2005) and productive and receptive vocabulary sizes may affect L2 writing performance among 59 Chinese EFL learners. Results showed that the learners' L2 writing performance, measured with a narrative picture description task, was significantly predicted by their LLAMA_B and LLAMA_F scores, which tap into aptitude for explicit language learning (Grañena, 2013).

The picture is even less clear with WCF. Sheen (2007) explored to what extent the learners' language analytic ability may mediate the effectiveness of two types of WCF (direct correction vs. direct metalinguistic correction) on the acquisition of English articles among 91 intermediate EFL learners from various L2 backgrounds. The results revealed that learners with high language analytic ability benefited more from both types of WCF. This advantage was more salient in the condition in which metalinguistic comments were provided in addition to indicating and correcting an error. Different results were obtained by Stefanou and Révész (2015), who found that higher grammatical sensitivity positively contributed to the effectiveness of direct WCF on the use of English articles by L1 Greek intermediate learners of EFL. Similarly, Benson and DeKeyser (2019) found that higher aptitude was an advantage in learning English verbal tenses from direct WCF but not from metalinguistic WCF. Also, Shintani and Ellis (2015) found that Japanese university students of English with higher abilities benefited more from both types of WCF than learners with lower abilities.

Learner Beliefs

Many qualitative and quantitative studies have explored learner beliefs about L2 writing and WCF. Whereas research has uncovered a wide range of beliefs about L2 writing, studies on learners' beliefs about WCF have led to more specific results. The studies have shown that the majority of language learners desire to receive more positive and encouraging WCF (Ferris, 1995), which can potentially contribute to learners' engagement with WCF (Han, 2017) and L2 writing performance (e.g., Cohen, 1987).

A few studies have provided evidence in support of the malleability of learner beliefs. Manchón (2009), for instance, found that employing instructional activities, such as teaching students how to use writing strategies and providing constructive feedback, led students to adjust their original beliefs about their own abilities (e.g., "I will learn how to write academic texts this year"), their L2 writing teachers (e.g., "My teacher pays more attention to how I write than what I write"), and the nature of L2 writing (e.g., "Being able to express oneself successfully in writing in English is

hard and it takes a long time"). These were examined using a questionnaire and a final interview. Similarly, Wan (2014) used a student-generated metaphor-sharing intervention, which successfully led to improvements in learners' beliefs, and writing skills and practices. Han (2017) also found that learners' engagement with L2 writing and WCF resulted in changes in learners' original beliefs.

Self-Efficacy

Learner's sense of self-efficacy has been found to enhance L2 writers' self-regulatory control (Csizér & Tankó, 2015), engagement (Ferris et al., 2013), and writing quality (McCarthy et al., 1985). It has also been found to reduce their writing anxiety (Kirmizi & Kirmizi, 2015). Feedback has been shown to influence L2 writers' self-efficacy beliefs positively or negatively depending on the source of feedback. Teacher feedback has been found to give a sense of progress to motivated students and enhance their self-efficacy, whereas peer feedback did not (Busse, 2013). Feedback is not always helpful though. In a study by Ruegg (2018), the students who received peer feedback in a writing course in fact had a slight drop in their level of self-efficacy by the end of the course. Even teacher feedback can be demotivating if it is vague, overwhelming, and unfocused (Busse, 2013; Duijnhouwer et al., 2012). Students with low self-efficacy may perceive teacher feedback as a sign of the teacher's lack of confidence in their abilities (Duijnhouwer et al., 2012).

Mindsets and Achievement Goals

The notion of mindsets has originated in the field of educational psychology and has been the topic of scholarly and public attention over the last two decades. Mindsets have also been employed in a couple of studies in the field of L2 writing. In the first study among 142 students enrolled in ESL writing classes at a US university, Waller and Papi (2017) found that learners with a growth L2 writing mindset showed strong levels of L2 writing motivation and a strong willingness to receive WCF, whereas those with a fixed L2 writing mindset did not. In another study, Papi et al. (2020) examined L2 writers' language mindsets in relation to their feedback-seeking behaviors, which represent learners' implicit or explicit efforts to gather feedback information from different sources. Questionnaire data collected from 128 students enrolled in L2 writing classes showed that learners with a growth language mindset perceived WCF to be valuable and sought WCF using different strategies. Those with a fixed mindset, on the other hand, did not see value in or seek WCF. Mindsets are also related to achievement goals, which are traditionally classified as performance and learning goals (e.g., Elliott & Dweck, 1988). Generally speaking, learners with a growth mindset have been found to pursue learning goals, which concern the goal of developing one's competence, whereas those with a fixed mindset pursue performance goals, which concern the desire to display competence in a certain area (Papi et al., 2019b). In the field of L2 writing, learners with mastery goals have been found to use more writing strategies (He, 2005), and write with higher levels of complexity (Rahimi & Zhang, 2019) and quality (He, 2005) than those with performance goals.

Future L2 Selves

Even though there have been numerous research studies in the area of L2 selves, we are aware of only three studies in the context of L2 writing. In the EFL context of Hungary, Csizér and Tankó (2015) examined the role of future L2 selves among English-major students enrolled in advanced academic English writing classes and found the ones who had stronger ideal L2 selves to report using more self-regulatory control strategies than others. Jang and Lee (2019) examined the future selves among ESL writers in the context of South Korea and found that the ideal L2 self positively predicted learners' use of strategies such as planning, their overall amount of writing strategy use, and their writing quality, whereas those who had stronger ought-to L2 selves used more revising

strategies. In another study, Tahmouresi and Papi (2021) developed a questionnaire to specifically measure L2 writing future selves. They administered the questionnaire to 83 Iranian learners of English and measured their quality of writing. The study found that whereas the ideal L2 writing self predicted L2 writing enjoyment, motivation, achievement, and fluency, the ought L2 writing self emerged as a positive predictor of L2 writing anxiety and a negative predictor of achievement. These results confirmed that different goals might lead to qualitatively different behaviors and outcomes (Papi et al., 2019a; Papi & Khajavy, 2021).

L2 Writing Experience

The role of learning experiences, which has been emphasized in L2 motivation research (e.g., Dörnyei, 2009), has been examined in several L2 writing studies. Lo and Hyland (2007) implemented an instructional program that started from students' writing self-reflections and ended with opportunities to write for publication on different topics. The study found that the instructional program enhanced students' motivation, interest, and engagement in L2 writing activities as well as the quality of their written products. In another intervention study, Liao and Wong (2010) had teachers use empathy in responding to students' dialogue journals, engage in mutual and sharing interactions with students, and encourage reflection on their writing. The researchers found that such instructional practices contributed positively to students' intrinsic motivation and writing quality. Sasaki (2011) found similar results from a study-abroad program.

A number of studies have provided motivational and learning support for the use of technology. Allen et al. (2014) found that using a game-based writing strategy tutoring system enhanced students' L2 writing enjoyment, motivation, engagement, and performance. Fathi (2019) found that computer-mediated L2 writing instruction improved students' motivation and self-regulation. Zhang et al. (2014) found similar effects for blog-mediated peer feedback. Overall, these studies confirm that learners' experiences with technology have direct and measurable effects on their writing engagement and quality.

Other Motivational Theories and Constructs

Other major theories and constructs in other fields of study have been applied in a handful of L2 writing studies. Two studies have employed self-determination theory (Deci & Ryan, 1985), which is based on the principle that the more self-determined types of motives result in higher levels of motivation. The results of the studies confirmed that intrinsic and other internalized motives contribute to writing achievement (Yeşilyurt, 2008) and learners' evaluation of WCF (Tsao et al., 2017). Regulatory focus theory has also been used in a quasi-experimental study (Papi, 2016, 2018), which showed that learners' promotion focus, concerned with advancement, accomplishment, and growth, predicted higher levels of engagement and vocabulary learning in an essay writing task than learners' prevention focus, which is concerned with safety, security, and calmness. Lin et al. (2015) employed the expectancy-value theory of motivation (e.g., Eccles et al., 1998) and found that the values and costs associated with L2 writing were significant predictors of students' self-regulation strategies and abstract-writing abilities. Also, Papi et al. (2020) found that the value of feedback and the self-presentation cost of feedback seeking were positive and negative predictors of feedback-seeking behavior, respectively.

Emotions

L2 writing anxiety has typically been found to have a negative impact on learners' engagement in the L2 writing process and their writing achievement (e.g., Teimouri et al., 2019). Most studies on this topic have been conducted using the second language writing anxiety inventory (Cheng, 2004), which has become the most-commonly used measure of L2 writing anxiety. The inventory

includes the thoughts and worries underlying the feeling of anxiety, the physiological symptoms of feeling anxious, such as tenseness and nervousness, and its behavioral consequences, such as avoiding challenging situations. Studies have commonly found L2 writing anxiety to negatively affect the L2 writer and the writing process and outcomes (for a meta-analysis, see Teimouri et al., 2019). This emotion has been shown to be negatively associated with students' self-efficacy, motivation, and willingness to take L2 writing courses; L2 writing performance (Cheng, 2004; Kirmizi & Kirmizi, 2015); use of L2 writing self-regulatory strategies (Tsao et al., 2017); perceived value of WCF (Tsao et al., 2017); writing achievement (e.g., McCarthy et al., 1985; Teimouri et al., 2019); and the complexity, accuracy, and fluency of written production (e.g., Rahimi & Zhang, 2019; Zabihi et al., 2018). In one study, however, Han and Hiver (2018) found that L2 writers could succeed despite high levels of anxiety if these co-occurred with positive self-efficacy beliefs. In terms of the sources of L2 writing anxiety, a couple of studies have found that situational factors including time pressure, fear of writing tests and negative evaluation, lack of self-confidence, lack of sufficient practice, having inadequate linguistic knowledge, and high expectations can contribute to L2 writing anxiety (Kirmizi & Kirmizi, 2015).

In terms of enjoyment, a few studies have provided evidence for what might contribute to this positive feeling among L2 writers. Kurt and Atay (2007) found that peer feedback contributed to the experience of enjoyment among students. Liao and Wong (2010) found that when teachers showed empathy in their interactions, shared personal experiences, and paid sufficient attention to their students, the students experienced more joy in their L2 writing activities. Tahmouresi and Papi (2021) found ideal L2 writing self to contribute to L2 writing enjoyment. Finally, using technology and L2 writing classes can also lead to students' enjoyment, engagement, and motivation (Allen et al., 2014; Lo & Hyland, 2007).

Data Elicitation

Two methodological approaches have been traditionally employed to investigate the relationship between writing and working memory: dual-task methodology and the regression approach (Kellogg et al., 2013). In the dual-task paradigm, a writing task (a primary task) is performed both in a single-task condition (only writing) and in a dual-task condition (writing performed concurrently with the secondary task, such as memorizing list items). The main rationale behind this technique is that the comparison of the performance in single- and dual-task conditions may discern how resources are shared between primary and secondary tasks. In L1 writing research, the dual-task paradigm has been employed to provide empirical evidence to the theoretical postulates about the links between each writing process and the central executive, phonological loop, and visuo-spatial sketchpad (Kellogg et al., 2007). However, the predominant approach in L2 writing has been the quantitative regression approach, which examines how differences in the measurement of various capacities of WM correlate with the quality of L2 writing performance, as rated holistically (Kormos & Sáfár, 2008) or as assessed by means of quantitative CAF measures (Vasylets & Marín, 2021). The regression approach has been also dominant in aptitude studies, which typically correlate the scores on the aptitude component(s) with the measures of L2 writing performance (Kormos & Trebits, 2012).

To elicit WM scores, the majority of L2 studies have employed complex WM tests that measure a person's ability to both retain and manage information in short-term memory (Vasylets & Marín, 2021). Only a few investigations measured both phonological short-term memory and complex WM (Kormos & Sáfár, 2008) or visuo-spatial WM (Michel et al., 2019). Language aptitude has been measured in different ways. While Kormos and Trebits (2012) employed the Hungarian version of the test battery for the Carrollian concept of language aptitude (Caroll, 1981), the study by Yang et al. (2019) employed the LLAMA tests (Meara, 2005), and Shintani and Ellis (2015) used the language aptitude battery for Japanese (Sasaki, 1996).

According to Barcelos (2003), research on learner beliefs can be categorized into three approaches. The *normative approach* which mainly includes questionnaire surveys, the *metacognitive approach* which mainly includes interviews and content analysis, and the *contextual* approach which mainly includes observations, life stories, and metaphors. Whereas qualitative methods can constitute an in-depth exploration of learner beliefs, using questionnaire surveys that focus on specific topics such as WCF can give a sense of students' beliefs and their possible antecedents or outcomes.

Motivational and affective factors are also examined using both qualitative and quantitative methods which could be cross-sectional (Papi et al., 2020) or longitudinal (e.g., Manchón, 2009) in scope. Qualitative studies can lead to an in-depth understanding of the topic and hypotheses (e.g., Duijnhouwer et al., 2012; Papi & Hiver, 2020) that could be further tested using quantitative methods. For instance, Tahmouresi and Papi (2021) used qualitative data to develop items for measuring specific L2 writing self-guides, which they later used in the form of a questionnaire to predict emotions, writing motivation, and the quality of L2 writing. More specific motivational factors and emotions are typically measured using questionnaire scales that have been developed and used on different samples. These can include scales for measuring L2 writing self-efficacy beliefs (Csizér & Tankó, 2015), intrinsic and extrinsic motivations (Tsao et al., 2017), mindsets and achievement goals (e.g., Waller & Papi, 2017; Papi et al., 2020), feedback-seeking behaviors (Papi et al., 2020), and L2 writing anxiety (Cheng, 2004). In addition, experimental studies can be used to examine the effects of different interventions on learners' L2 writing performance and development (Lo & Hyland, 2007; Papi, 2016, 2018).

Practical Applications

Language classrooms are essentially heterogeneous in terms of learners' individual characteristics and the onus is on course designers, materials developers, and teachers to ensure that learners can equally benefit from classroom affordances regardless of their differential cognitive, motivational, or affective profiles. Below, we offer some practical recommendations based on the research that we reviewed above.

According to cognitive load theory (Chandler & Sweller, 1991), instructional activities impose three kinds of demands on task performers: 1) *intrinsic* cognitive load, which refers to the inherent complexity of a task (e.g., number of elements and reasoning demand) and is usually affected by one's familiarity with the topic/task; 2) *extraneous* cognitive load, which derives from poorly designed/presented materials and does not contribute to learning; and 3) *germane* cognitive load, which could be manipulated by task designers and is salutary in that it promotes further learning (Price et al., 2007; see Vatz et al., 2013 for an alternative account). In order for instructional activities (and in this case, L2 writing tasks) to be maximally beneficial for learners with differential cognitive abilities, the extraneous load must be reduced as much as possible. This could be achieved through designing/choosing tasks that have clear instructions, are highly structured, and involve several small steps (Kormos, 2016). Showing learners "worked examples" (i.e., examples of completed L2 writing tasks where they can see both the task and the ways in which it has been completed and then move on to new tasks) is another critical step towards reducing unfavorable cognitive load on WM capacity (Price et al., 2007).

Construing language aptitude as a situated construct (Robinson, 2005, 2012; Snow, 1992) would render it crucial to see how L2 writers with various aptitude profiles could benefit from different instructional conditions and task factors (e.g., task complexity). As Robinson (2012) cogently argues, "options in instructional, interventionist techniques must be matched to the cognitive resources and abilities learners bring to the classroom to be optimally effective" (p. 60). If employed, such aptitude-treatment interactions could prove beneficial to optimizing L2 writing instruction.

Even though the number of studies on the role of motivational and affective learner factors has been limited, useful pedagogical recommendations can still be made based on their find-

ings. These can include the use of new technology and teaching activities, providing a relaxing environment for writing practice, and designing and implementing new instructional programs and experiences, such as study-abroad programs (Lo & Hyland, 2007; Manchón, 2009; Sasaki et al., 2018). Self-efficacy beliefs could be enhanced through other learning experiences such as getting writing help, free journal writing, valuing students' work, as well as providing verbal encouragement and positive feedback (Han & Hiver, 2018; Manchón, 2009; Sasaki et al., 2018). Promoting a growth mindset among students who endorse a relatively more fixed mindset through the use of special mindset interventions, such as reviewing research findings on how the brain can grow as a result of experience (e.g., Lou & Noels, 2016), can lead to improving learners' L2 writing motivation, engagement, and feedback-seeking behavior (see Lou & Noels, 2016; Papi et al., 2019b; Papi et al., 2020). Likewise, promoting a mastery-oriented teaching approach through simple techniques such as focusing on students' processes of learning and individual progress rather than final outcomes, and having students reflect on the feedback they receive can enhance learners' adaptive learning patterns (Duijnhouwer et al., 2012). Peer feedback, whether it be face-to-face (Kurt & Atay, 2007) or computer-mediated (e.g., Zhang et al., 2014), can be used to decrease students' L2 writing anxiety and increase their self-efficacy. Dialogue journal writing can also lower students' L2 writing anxiety and enhance their L2 writing (Liao & Wong, 2010). Encouraging risk-taking and creativity in writing tasks (Papi, 2016, 2018), enhancing learners' ideal L2 writing selves (Tahmouresi & Papi, 2021), viewing errors in a positive light, using familiar topics for writing, and adopting a process-oriented approach towards L2 writing instruction are among other strategies that could be used to minimize learners' L2 writing anxiety (Qashoa, 2014). Finally, providing feedback that is clear, focused, sufficient, and encouraging can enhance students' L2 writing self-efficacy and motivation (Busse, 2013; Duijnhouwer et al., 2012).

Future Directions

Given the complexity of the constructs of WM and language aptitude, there is an urgent need for more empirical research on the nature of the relationships between L2 writing processes and WM/language aptitude components. As discussed earlier, any theoretical model of the role of L2 writing in second language acquisition needs to take into account the role of individual differences in working memory and language aptitude. This is clearly a daunting task. Future studies need to examine the effects of written corrective feedback on L2 acquisition taking into account the important role of cognitive individual differences. Therefore, using new conceptualizations of language aptitude (Kormos, 2013) and drawing on improvements in measuring working memory capacity (Waters & Caplan, 2003) are necessary for developing this line of research.

Construing language aptitude as a situated construct (Robinson, 2005, 2012) would definitely warrant more aptitude-treatment-interaction studies aiming to match task factors, L2 writing instructional approaches, and WCF types to differential language abilities. As far as language pedagogy is concerned, the ultimate goal would be to discern what types of WCF or writing tasks would be most beneficial for the development of L2 writing ability in L2 learners with differential cognitive ability profiles. Future research on cognitive abilities would benefit from more process-oriented studies, tapping into the potential impact of cognitive abilities on the writing and learning processes involved in L2 writing and on the processing of WCF. Future studies should also broaden the scope of the dependent variables, focusing, *inter alia*, on the development of L2 writing quality in terms of CAF, coherence, organization, and communicative adequacy.

Whereas several theories of motivation have been employed or proposed in the field of second language acquisition, the study of motivational and affective factors in L2 writing has been very limited both in scope and quantity. It is imperative that SLA researchers pay systematic attention to the role of learner's beliefs, emotions, and motivation, among other factors, in order to present an

understanding of L2 writing as a process in which learners are the proactive agents of their learning rather than passive recipients of instructional techniques and materials (Papi et al., 2020).

Descriptive studies on learner beliefs and preferences have been very helpful in our understanding of L2 learners, and the next step can be examining the psychological sources of these beliefs, which can lead to theoretical and pedagogical developments in the field (e.g., Papi et al., 2021). The notions of mindsets (Waller & Papi, 2017) and achievement goals (e.g., Korn & Elliot, 2016) seem to be good options for exploring not only learner beliefs but also their different emotional, behavioral, and learning patterns in the context of learning how to write in a second language (Papi et al., 2020). Exploring learners' desire for autonomy and competence through the lens of self-determination theory could also further our understanding of the motivational processes involved in learning how to write in a second language and of methods for increasing learners' autonomy and enjoyment. Studying the role of future L2 writing selves (e.g., Tahmouresi & Papi, 2021) can further our understanding of L2 writers' motivation and persistence, writing strategies, and the quality of learners' engagement in the L2 writing process. Using a regulatory focus to develop interventions to situationally induce different motivational environments can be an effective method for increasing student engagement, creativity, and risk-taking behavior in L2 writing tasks (e.g., Papi, 2016, 2018).

There have been recent calls for exploring a wide range of positive (MacIntyre et al., 2016) and negative emotions (Teimouri, 2017). Emotions, however, do not exist in isolation and are closely connected with the learners' motivational profiles (e.g., Papi & Khajavy, 2021; Tahmouresi & Papi, 2021; Teimouri, 2017). Examining various emotions in relation to students' motivational profiles could therefore help us develop a valuable understanding of the mechanisms underlying the emotions, and methods for enhancing the positive ones and minimizing the negative ones. Exploring the psychological, contextual, and instructional factors that underlie learners' feedback-seeking behaviors can also be next on the agenda for enhancing the effectiveness of WCF (see Papi et al., 2020).

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