TASK DESIGN FEATURES AND LEARNER VARIABLES IN TASK PERFORMANCE AND TASK EXPERIENCE

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ABSTRACT

This dissertation study takes a holistic approach to the act of task performance, investigating how task and learner variables independently and interactively influence task performance and task experience. Drawing on Robinson’s (2001b) triadic componential framework for task design, the study explores the task demands that are inherent to tasks (task complexity) or that emerge in task–learner interaction (task difficulty). Task complexity and modality were adopted as task feature variables, while goal orientation (Dweck, 1986), the L2 motivational self system (Dörnyei, 2009b), and L2 anxiety were adopted as learner variables. Task performance was examined in terms of complexity, accuracy, and fluency (CAF), and task experience was represented by flow, conditioned by optimal challenge (Csikszentmihalyi, 1987). With the mediation of task difficulty, this study examines the relative contributions of task and learner variables to task performance and task experience. In a repeated-measures design, 141 L2 learners performed four argumentative tasks that differed in task complexity and modality. They completed two questionnaires, one a pre-task survey examining dispositional motivation and the other a post-task survey probing their subjective experience with the task. Production data were analyzed to measure complexity (i.e., the clause per T-unit ratio), accuracy (i.e., the error-free clause per T-unit ratio), and fluency (i.e., pause frequency per T-unit). MANOVAs, correlation analysis, and structural equation modeling (SEM) were conducted. The results indicate that although task complexity affected the perception of task difficulty, it did not affect task performance in terms of CAF nor task experience of flow. Task modality significantly predicted task performance and task experience of flow. Significant relationships among motivational constructs were observed, but learner variables did not have a direct impact on immediate task performance or experience. These findings suggest that task variables have a stronger impact
than learner variables on both language learning outcomes and affective outcomes of tasks. The study’s multifaceted investigation provides insight into how various motivational and affective constructs work together and interact with various task features to produce unique task performance experiences and performance outcomes.
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CHAPTER 1: INTRODUCTION

The act of task performance is a holistic activity in which a number of contextual, task, and learner variables are dynamically involved, resulting in various learning outcomes. Adopting this holistic and dynamic view of the nature of task performance, the current dissertation study investigates the effects of task design features and learner variables as they respectively and interactively influence task performance and task experience. Using Robinson’s (2001a, 2001b, 2011a) triadic componential framework for task design, this study is theoretically grounded on the distinction between task complexity and task difficulty. Task complexity is used to refer to task-inherent and objective cognitive demands of tasks, whereas task difficulty, in contrast, denotes subjective perceptions of task demands as a function of the interactions between tasks and learner variables. Robinson (2001a, 2001b, 2011a) has claimed that this distinction is useful in providing pedagogical guidelines for designing and sequencing task-based lessons, as the framework allows a systematic examination of learner performance by identifying the sources of performance variations.

In Robinson’s (2001a, 2001b, 2011a) framework, he noted that the same task can be perceived to be more or less difficult depending on learners’ own ability or affective characteristics. Task complexity serves as a task sequencing criterion that can be manipulated by a teacher a priori, while task difficulty is relatively unpredictable due to the challenges in diagnosing affective variables in advance of task engagement and the situational dynamics of task performance (e.g., Dörnyei & Kormos, 2000). In other words, the manipulation of task complexity does not assure the same level of task difficulty or affective responses for task performers, and such variations in turn are likely to produce different performances and task experiences for individual learners.
Following this line of argument, the current study distinguishes between objectively manipulated task design features and learner-contributed perceptions of task difficulty. Based on this distinction, task complexity and task modality were adopted as task design variables, and goal orientation, L2 motivational self system, and anxiety were chosen as learner variables expected to affect the ways in which learners interpret and approach the given tasks. A particular concern of this study is to observe the extent to which task variables and learner differences influence both the quality of task performance and subjective experience with the task, with the latter represented by flow (Csikszentmihalyi, 1975, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988). By incorporating both objective and subjective performance-related variables within the framework of task-based language teaching (TBLT), this study aims to explain their respective and interactive influence on linguistic and motivational outcomes.

1.1. Pedagogic Tasks in Task-Based Language Teaching (TBLT)

The field of second language acquisition (SLA) has witnessed ebbs and flows of various teaching methodologies over the past few decades. From the late 1980s, a growing number of reports on language learners’ limited communicative competence compared to their grammatical knowledge have triggered researchers’ skepticism about form-focused instruction. Such dissatisfaction has led to approaches to language teaching that highlight the communicative functions of language with a focus on meaning, as represented by communicative language teaching (CLT). Along with this increasing interest in meaning-oriented and communicative instruction, activities or tasks that provide language use opportunities to complete a certain function or accomplish a communicative purpose have been widely adopted in the language classroom.
Task-based language teaching (TBLT), one offshoot of CLT, is a contemporary approach to L2 teaching, which positions tasks at the center of syllabus design, implementation, and evaluation. In contrast to the marginalized use of tasks in a traditional syllabus, where they are only a means to provide opportunities to practice grammar rules, tasks in TBLT serve as the basic unit of analysis, as the whole curriculum is designed around tasks in a way to meet the needs of learners.

Long and Crookes (1992) distinguished between target tasks and pedagogic tasks. Target tasks refer to real-world activities language learners will encounter and do in their target language. Pedagogic tasks, on the other hand, refer to “the activities and the materials that teachers and/or students work on in the classroom or other instructional environment” (Long, 2014, p. 6). Conceptual distinctions between pedagogic tasks and target tasks as well as their compatibility function as an evaluative point from which task-based syllabi can be designed. Pedagogic tasks that resemble target tasks not only enable teachers to cater to learners’ needs by providing meaningful and relevant target language input, but also facilitate cognitive processes that are useful for language development. Related to cognitive processes, it has been suggested that instructional methods and pedagogic tasks be designed in such a way to gradually resemble real-world task complexities. Given the distinction, the term “tasks” in TBLT literature has generally been used to refer to pedagogic tasks that are designed and used for instruction, and this is the usage followed in this dissertation.

Among various definitions that highlight different aspects of tasks, Ellis’ (2003) definition features critical properties that are relevant to the study. He defined a task as “a workplan that requires the learners to process language pragmatically in order to achieve an outcome that can be evaluated in terms of whether the correct or appropriate propositional
content has been conveyed” (p. 4). The definition underscores the pedagogic goals and processes of TBLT, which are intended to equip learners with necessary real-world cognitive and language skills through meaning-oriented activities where language development processes are facilitated during task completion (Ellis, 2003; Samuda & Bygate, 2008; Skehan, 1996).

While research on TBLT has expanded with the pedagogic intent to provide meaningful syllabus design guidelines to realize communicative language teaching (Long & Crookes, 1992), the underlying tenets of TBLT are also in line with some theories and findings of SLA research, including cognitive-interactionist approaches and sociocultural approaches. First, from the interactional perspective, Long’s (1996) interaction hypothesis postulated that L2 learning occurs through engagement in interaction in which meaning is negotiated as exemplified in comprehensible input and modified output. Meaning negotiation entails the incorporation of various cognitive processes of learning that connect “input, internal learner capacities, particularly selective attention, and output in productive ways” (Long, 1996, p. 452). In parallel with the view of cognitive-interactionists, tasks are expected to promote dynamic interactional processes that facilitate L2 learning such as noticing, negotiation, and feedback.

Second, from a sociocultural perspective, language learners, as social members of a community, co-construct knowledge in collaboration with other members. Tasks create opportunities for participants to engage in a process of knowledge construction in which language learning is implicated. In addition, assistance from others, so-called “scaffolding,” which becomes available through interactive task performance, plays a significant role in helping social members to internalize knowledge such that learners can later perform the same kind of work unassisted. In this view, the ways tasks are approached and performed by participants are more important than the inherent properties of individual tasks. According to Shehadeh (2005),
“tasks here are considered to be internally rather than externally defined because learners to a large extent construct for themselves the activity they are engaged in” (p. 25).

1.2. Learner Roles in Task-Based Language Teaching (TBLT)

While language learning opportunities that tasks provide correspond to SLA theories, general educational philosophies and thoughts have also influenced the educational underpinnings of TBLT, which is characterized by the “learning by doing” principle, learner-centeredness, and participatory education. In TBLT, learners are respected in the process of discovering and acquiring target language knowledge, and this process is perceived to be facilitated by “doing” a task that incorporates real-world needs, rather than studying or memorizing target language grammar structures that are externally provided (Samuda & Bygate, 2008). Task engagement entails language learning opportunities provided at learners’ own pace such as noticing their language gap and seeking to expand their linguistic resources by formulating, testing, and modifying linguistic hypotheses. In this regard, the process of task performance in itself and task performance as a reflection of the process are featured. As Samuda and Bygate (2008) pointed out, TBLT aims at “promoting language learning, through process or product or both” (p. 69).

Learners are active contributors of language learning who construct learning opportunities along with the support of teachers and materials (Breen, 1987; Candlin, 1987). Various levels of language choices are made by learners for a particular task based on their existing linguistic resources. This characteristic of TBLT conforms to “learner-centered learning,” which respects learners’ internal syllabus (or so-called “learnability”), as opposed to adhering to a syllabus built on a pre-ordered set of grammar structures determined by a teacher. More
specifically, traditional form-based instruction attempts to create interlanguage development through teachers’ direct involvement in the language learning process, for example, by directly addressing certain grammar forms in instruction. In contrast, in TBLT, alterations to interlanguage systems are assumed to occur according to language learners’ internal syllabus through their engagement in tasks (Samuda & Bygate, 2008). Furthermore, the principle of learner-centeredness is realized through needs analysis of language learners, a crucial component of task-based lesson design. Tasks are tailored to meet students’ real world communicative needs, and relevant target tasks serve as a basis for syllabus design (e.g., Long & Crookes, 1992; Long & Norris, 2000).

In addition to the underlying principles of TBLT that emphasize learner roles, the notion that learners are implicated in learning suggests that learning cannot be fully understood or studied without taking the learner into consideration. Learners bring various individual characteristics such as personality, motivation, goals, and knowledge to their learning process. These features, in concert with given task conditions, influence the ways language learners perceive, respond, and act on tasks (Breen, 1987), which are indicated by, for example, their strategies and the effort they exert on the task performance. A wide range of discussions on the individual differences of learners has highlighted the importance of individuality and the fact that individual learners differ in various manners including learnability, needs, cognitive processes, and skills, and that these factors affect learner behaviors and outcomes (e.g., Dörnyei, 2009b).

1.3. Statement of the Problem

The above description provides an overview of TBLT in terms of its main principles and its underlying assumptions about language learning and teaching. TBLT underscores the role of
tasks as a means to create language learning opportunities, for example, extending learners’ interlanguage system as a function of task features. In addition, it accentuates the contributions and responsibilities of learners, as agents of task performance and language learning, in the co-construction of learning opportunities.

First, to revisit the characteristics of task features in learning, a variety of task design features and manipulation methods have been proposed and examined for their effectiveness in promoting learning processes (Ellis, 2003; Fotos & Ellis, 1991; Long & Norris, 2000; Robinson, 2001b, 2005a; Skehan, 2002, 2009a). One task sequencing criterion that has attracted much attention is task complexity or cognitive demands of tasks, with mixed findings on its effects on task performance (for a review, see Jackson & Suethanapornkul, 2013). In addition, although task modality is another task feature variable that can function as a determinant of task performance and task complexity (Kormos, 2014), this area of TBLT has been relatively neglected. A few studies, however, have identified task modality as a variable that influences task performance (e.g., Kormos, 2014; Kuiken & Vedder, 2011) as well as learner perceptions of task difficulty and learner anxiety, which dynamically influence learning outcomes (e.g., Cheng, Horwitz, & Schallert, 1999; Pae, 2013). Focusing on speaking and writing, it is possible that the inherent psychological processing differences between these two modes could be a variable that influences learners’ perceptions of task difficulty, which in turn would affect task performance and task experience.

Second, in terms of learner variables in task performance, it is worth reiterating the underlying principles of TBLT and its origin. TBLT emerged out of dissatisfaction with previous teaching methodologies (as described in Section 1.1), and it met a desire for learner-centered education, which has been extolled in many language teaching domains (e.g., Long, 2014).
Nevertheless, TBLT research on the cognitive and affective resources driven by learners has been relatively scarce, although this area has recently started to gain more attention (e.g., Ben Maad, 2012a, 2012b; Dörnyei, 2002; Macintyre & Serroul, 2015; Poupore, 2014).

The ways in which learners’ dispositions respond to a particular task have not been actively accounted for in previous TBLT research. This lack may be partly due to the challenges of predicting contributions of learner variables a priori, as learners’ affect fluctuates moment-by-moment, and the dynamics of task-learner interaction tend to be unforeseeable until they unfold within the actual task performance situation. Breen's (1987) distinction between “task-as-workplan” and “task-as-process” delineates how actual task performance can deviate from the original plans defined in the task design stage. “Task-as-workplan” stresses teacher roles in designing and planning task-based lessons. On the other hand, “task-as-process” emphasizes the dynamics of the actual implementation of tasks in an instructional setting, which may or may not conform to teachers’ expectations or plans, because task features, performance conditions, and learner factors interact simultaneously to produce unique task outcomes. Only a few studies have attempted to examine the dynamics of “task-as-process” by incorporating learner characteristics or disposition as a variable predicting task performance and task experience (e.g., Ben Maad, 2012a; Ma, 2009).

Understanding of both task design features and learner variables seems important. However, the research to date has placed an emphasis on the external manipulation of task features, while learner contributions or learner agency in task performance has been relatively underresearched. This study addresses this gap by investigating both task features and learner variables and further examining their interactions in their effects of task performance and task experience.
1.4. Overview of the Study

This dissertation examines functions of task design features and learners’ cognitive, motivational, and affective variables in producing linguistic and affective performance outcomes. Drawing on both task-internal and learner-internal sources of task performance variables, the dissertation study investigates the respective and interactive roles of task features and learner variables in learners’ task performance and task experience. Following Robinson’s (2001a, 2001b) conceptual distinction between task complexity and task difficulty in his triadic componential framework, this study conceptualizes task design features as elements of task complexity by incorporating task complexity and modality, and task difficulty as subjective perceptions of task demands affected by learner characteristics. Specifically, the present study first investigates the effects of objective task features on learner performance, focusing on the two features of task complexity and task modality. By doing so, it intends to provide implications for task design not only by testing Robinson’s cognition hypothesis both in speaking and writing but also by showing the ways task complexity and modality function as sources of differences in task performance and task experience.

In addition, the study examines the contributions of learner characteristics to task performance and task experience. Three individual differences variables were adopted in this study: goal orientation, L2 motivational self system, and anxiety, which were selected as cognitive, motivational, and affective variables, respectively. Regarding the cognitive variable of goal orientation, it has been documented that different types of goals orient learners to exert different strategies for and approaches to task accomplishment (Ames, 1984; Dweck, 1986). The motivational learner variable concerns the L2 motivational self system, a concept proposed by
Dörnyei (2009b) that is composed of *ideal L2 self* and the *ought-to L2 self*, and L2 *learning experience*. In general, the notion of the motivational self system provides a framework for understanding general motivation and accounting for long-term motivational behaviors and goals. Studies have suggested that the model not only provides a framework for shaping learners’ goal pursuit behaviors (e.g., Papi & Teimouri, 2014), but also is associated with individuals’ task motivation and task performance (e.g., Macintyre & Serroul, 2015; Nitta & Baba, 2015). The last individual differences factor under investigation is L2 anxiety as an affective variable. Studies have proposed that anxiety, by affecting a learner’s self-regulatory system, influences the task performance as well as the cognitive and motivational states of the learner (e.g., Papi, 2010; Piniel & Csizér, 2015).

In addition to investigating the role of task complexity and in task performance and task experience, the study examines interactions between the task features and the learner variables. These include (a) learners’ perception of task complexity, in other words, “perceived task difficulty,” as it can be influenced by goal orientations (Dweck, 1986); and (b) subjective motivational experience of tasks as represented by the concept of flow (Csikszentmihalyi, 1975, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988), wherein task-specific and situation-based motivational experiences of a particular task are gauged. The dynamics of motivation are influenced by a variety of cognitive, metacognitive, and affective experiences, which are triggered by contexts, familiarity, and situational demands of a task (e.g., Poupore, 2014). In this sense, this study is also interested in examining how and to what extent language learners’ task performance and task experience are affected by various task and learner features.
1.5. Organization of the Dissertation

This dissertation is organized as follows. This introductory chapter introduced TBLT and Robinson’s (2001a, 2001b, 2011a) triadic componential framework as the framework of the current study and provided an overview of how the main variables under investigation are situated within the framework. It also explained the direction of this study by introducing gaps in the existing research and sketching the pedagogic implications of the current research.

Chapter 2 reviews existing literature on task features and learner variables. The first part will discuss the two task features of task complexity and modality and their effects on task performance and task experience. The respective effects of task complexity and modality are examined within the context of Robinson’s (2001) cognition hypothesis, as they influence language performance in terms of complexity, accuracy, and fluency (CAF). Next, the effects of task features on learners’ affective experience with tasks are examined. Here, the concept of flow (Csikszentmihalyi, 1990), as a representative construct of task experience, is introduced in terms of its source and outcomes.

The second part of Chapter 2 reviews various learner variables and their effects on task performance and task experience. TBLT research that addresses the roles of such learner features as goals for a task and anxiety in task performance is examined. Following this comes a review on the three learner variables that are the focus of the current study, that is, goal orientation, L2 motivational self system, and anxiety. Constructs and research findings for each learner variable as well as relationships among the variables are introduced. This chapter concludes with a discussion of the interactions between task features and learner variables in both task performance and task experience, accompanied by a summary of the research findings discussed in the chapter.
Chapter 3 begins by identifying a research gap in the existing literature, and it then presents the direction of the current study, along with research questions and hypotheses. The research questions inquire into the effects of task design features on task performance and task experience, the effects of learner variables on both task performance and task motivation, and the collective contributions of both task variables and learner variables. The rest of Chapter 3 describes the study’s methodologies, detailing the participants, experimental procedures, measurement, scoring, and statistical analysis.

Chapter 4 presents the research findings, beginning with the findings of a preliminary analysis that included the processes of data screening, assumption testing, and item cleaning. Next, the research findings are presented; the results for the effects of task features on task performance and task experience are provided first, followed by the effects of learner variables on outcome measures including linguistic performance and task experience. Lastly, the interactions between the main variables are examined through structural equation modeling to observe all the variables’ relative contributions to the outcome measures.

Chapter 5 summarizes and discusses the research findings by revisiting the research questions and hypotheses. The findings are discussed with reference to previous research in TBLT and Robinson’s (2001a, 2001b, 2011a) triadic componential framework. The chapter then discusses the educational implications of the research, highlighting the importance of various interactions of task and learner features in producing learning-related linguistic and affective task outcomes, along with their potential relevance to language learning. Next, the chapter addresses the limitations of the current study. The dissertation concludes with suggestions for the direction of future research.
CHAPTER 2. LITERATURE REVIEW

In this chapter, I begin by introducing Robinson’s triadic componential framework for task classification, which identifies three components of task design that are hypothesized to impose different kinds of demands on task participants: task “complexity”—aspects of task structure such as the need for causal reasoning or the availability of planning time that affect cognitive demands; task “condition”—interactive factors such as the number of participants and the degree of shared content knowledge that make different interactional demands on participants; and task “difficulty”—learner factors such as ability, anxiety, and motivation that interact with the other dimensions to influence participants’ perceptions and experiences with particular tasks.

Task “condition” is not a focus of this dissertation or its methodology and will not be discussed further. In the remainder of the chapter, I will first discuss the theorized impact of task complexity on participants’ performance (typically categorized in terms of output complexity, accuracy, and fluency), paying special attention to two competing hypotheses: Robinson’s (2001a, 2001b, 2011a) cognition hypothesis and Skehan’s (1998) limited attentional capacity hypothesis. I will next provide a summary of the extant empirical findings on the effects of task complexity on task performance, and a comparison of results from spoken and written tasks. Based on this summary and comparison, the following subsections will discuss modality as another task variable affecting task performance and the affective variables that are influenced by task features, which include subjectively perceived task difficulty and flow.

The second part of this chapter will discuss the roles of learner variables in task performance and affective task experience. Starting with empirical observations suggesting learner roles in task performance, this section discusses theoretical models and claims concerning the role of three learner variables (goal orientation, the L2 motivational self system,
and anxiety) that are hypothesized to interact with task-inherent factors to affect both task performance and subjective experience. The chapter concludes with a summary that provides a concise picture of our current state of knowledge about task variables and learner variables and their effects on task performance and affective task experience.

### 2.1. Robinson’s Triadic Componential Framework for Task Design

Aiming to provide empirically sustainable and pedagogically feasible decision-making criteria, Robinson (2001a, 2001b, 2005, 2011a; Robinson & Gilabert, 2007) proposed the triadic componential framework for task classification and design, which classifies various task-internal and task-external variables that affect task performance and learning. One motivation for the classification derived from a disagreement over task sequencing criteria in a TBLT program. Although an increase in task complexity or difficulty has been widely accepted as a task sequencing principle (e.g., Long, 1985; Skehan, 1996), the conceptualization and operationalization of complexity has not reached consensus (Robinson, 2001b, p. 28). For example, the specific criteria determining complexity or difficulty, whether they should be based on complexities in linguistic structure or content, and if so, how, has not been agreed upon (e.g., Bachman, 2002; Skehan, 1998). Robinson’s triadic componential framework includes the three dimensions of task complexity, task difficulty, and task condition, as can be seen in Figure 1.
Robinson maintained that distinguishing the sources of the processing demands is important in order to provide systematic guidelines for manipulation and design of task-based syllabi and their implementation. In particular, Robinson differentiated task complexity from task difficulty, concepts that had been used interchangeably in earlier discussions on cognitive demands. The following sections describe his conceptualization of the three components of task classification and design.

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**Figure 1.** The triadic componential framework for task classification: Categories, criteria, analytic procedures, and design characteristics (from Robinson 2007).

Robinson maintained that distinguishing the sources of the processing demands is important in order to provide systematic guidelines for manipulation and design of task-based syllabi and their implementation. In particular, Robinson differentiated task complexity from task difficulty, concepts that had been used interchangeably in earlier discussions on cognitive demands. The following sections describe his conceptualization of the three components of task classification and design.

---

<table>
<thead>
<tr>
<th><strong>Task Complexity</strong> (Cognitive factors)</th>
<th><strong>Task Condition</strong> (Interactive factors)</th>
<th><strong>Task Difficulty</strong> (Learner factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Classification criteria: cognitive demands)</td>
<td>(Classification criteria: interactional demands)</td>
<td>(Classification criteria: ability requirements)</td>
</tr>
<tr>
<td>(Classification procedure: information-theoretic analyses)</td>
<td>(Classification procedure: behavior-descriptive analyses)</td>
<td>(Classification procedure: ability assessment analyses)</td>
</tr>
<tr>
<td><strong>(a) Resource-directing variables making cognitive/conceptual demands</strong></td>
<td><strong>(a) Participation variables making interactional demands</strong></td>
<td><strong>(a) Ability variables and task-relevant resource differentials</strong></td>
</tr>
<tr>
<td>+/- here and now</td>
<td>+/- open solution</td>
<td>h/l working memory</td>
</tr>
<tr>
<td>+/- few elements</td>
<td>+/- one-way flow</td>
<td>h/l reasoning</td>
</tr>
<tr>
<td>+/- spatial reasoning</td>
<td>+/- convergent solution</td>
<td>h/l task-switching</td>
</tr>
<tr>
<td>+/- causal reasoning</td>
<td>+/- few participants</td>
<td>h/l aptitude</td>
</tr>
<tr>
<td>+/- intentional reasoning</td>
<td>+/- few contributions needed</td>
<td>h/l field independence</td>
</tr>
<tr>
<td>+/- perspective-taking</td>
<td>+/- negotiation not needed</td>
<td>h/l mind/intention-reading</td>
</tr>
<tr>
<td><strong>(b) Resource-dispersing variables making performative/procedural demands</strong></td>
<td><strong>(b) Participant variables making interactant demands</strong></td>
<td><strong>(b) Affective variables and task-relevant state-trait differentials</strong></td>
</tr>
<tr>
<td>+/- planning time</td>
<td>+/- same proficiency</td>
<td>h/l openness to experience</td>
</tr>
<tr>
<td>+/- single task</td>
<td>+/- same gender</td>
<td>h/l control of emotion</td>
</tr>
<tr>
<td>+/- task structure</td>
<td>+/- familiar</td>
<td>h/l task motivation</td>
</tr>
<tr>
<td>+/- few steps</td>
<td>+/- shared content knowledge</td>
<td>h/l processing anxiety</td>
</tr>
<tr>
<td>+/- independency of steps</td>
<td>+/- equal status and role</td>
<td>h/l willingness to communicate</td>
</tr>
<tr>
<td>+/- prior knowledge</td>
<td>+/- shared cultural knowledge</td>
<td>h/l self-efficacy</td>
</tr>
</tbody>
</table>
2.1.1. Task complexity

The first component, *task complexity*, refers to the cognitive demands of a task, which are imposed by task features and structures that make attentional, memory, reasoning, and other information processing demands on task performance. Robinson (2001a, 2001b, 2005, 2011a; Robinson & Gilabert, 2007) argued that task complexity can be manipulated in two dimensions, which are resource-directing and resource-dispersing aspects. Resource-directing task complexity pertains to the *conceptual* demands of tasks, which are influenced, for example, by the number of elements in a task (+/- elements) or by the visibility or actual presence of materials or the task (+/- here-and-now). In situations of greater resource-directing task complexity, along with the increased need to express conceptual complexities, learners are pushed to use specific features of language code in order to meet the greater needs. On the other hand, resource-dispersing task complexity is related to *performative/procedural* demands, where cognitive demands are imposed by the requirements of performance; the level of such complexity can be increased, for instance, by the elimination of planning time (+/- planning) or the removal of background knowledge (+/- background knowledge). This type of task complexity disperses learner attention to other aspects of task performance, so it does not necessarily lead to enhancing learner attention to language form. These two dimensions are considered to differentially affect learners’ allocation of cognitive resources during L2 performance (Robinson, 2001b; for a discussion, see section 2.2.1.1.1.).

2.1.2. Task difficulty

Another component of Robinson’s (2001a, 2001b, 2005, 2011a; Robinson & Gilabert, 2007) triadic componential framework is task difficulty. *Task difficulty*, in Robinson’s sense, refers to individual differences factors that contribute to the degree of cognitive demands of a
task. That is, even the same level of task complexity or task demands can become or be perceived to be more or less difficult depending on the abilities and motivation of learners. Robinson categorized two types of task difficulty features (individual differences variables): ability and affective variables. Ability variables include intelligence and aptitude characteristics, and affective variables encompass motivation and anxiety. Both types are considered to influence an individual’s perception of task complexity and allocation of cognitive resources. For example, greater motivation is likely to lead individuals to maximally utilize their attentional resources, as higher motivation is associated with greater attention (Robinson, 2001a, pp. 31–32).

In terms of pedagogic implications, information on ability-based learner differences can be easily diagnosed prior to syllabus design and used in task design and implementation as these variables are relatively permanent. In contrast, information on affective individual differences variables tends to be hard to predict a priori, as these variables readily change and fluctuate.

2.1.3. Task condition

The third component of Robinson’s triadic componential framework is referred to as task condition, which pertains to interactive demands of tasks, yet is distinct from task features and learner variables. Task conditions can be further divided into participation variables and participant variables. Participation variables include information on the type of participation and the type of goal orientation in task performance, illustrated by factors such as the openness of tasks (e.g., open vs. closed), the direction of information flow (e.g., one-way vs. two-way), and communicative goals (e.g., convergent vs. divergent). Participant variables involve information on the relationship with the interlocutor or participant such as gender, familiarity, power, and

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1 The term “task difficulty” seems to mislead readers. According to Robinson’s account, task difficulty is a result of the interaction between task-inherent cognitive demands and learner variables. However, his conceptualization represents individual differences variables that may potentially affect perceived task difficulty. In this sense, the second component of this triad could be perhaps better represented by the term “learner variables” (Richard Schmidt, 2014, pers. comm.).
solidarity. Task context such as the degree of knowledge or information shared with the co-participant is another interactive task performance feature.

In terms of the conceptual similarities between task complexity and task difficulty, Robinson and Gilabert (2007) pointed out that task complexity explains within-learner variables, while task difficulty accounts for between-learner variables. The interchangeable use of the terms task complexity and task difficulty may obscure underlying differences in the source of cognitive demands for certain task outcomes. Through the classifications, Robinson attempted to systemize variously defined and conceptualized notions of task complexity into a framework so that dynamic classroom situations and learning opportunities could be analyzed and planned in a manageable way (Robinson, Cadierno, & Shirai, 2009).

Robinson (2001a) further discussed possible interactions between the three components. For example, increased task complexity due to absence of planning time or dual task demands may have a stronger impact on task difficulty (e.g., measured via anxiety) than increased task complexity that is due to tasks having more elements or being less familiar. Similarly, perceived task difficulty may vary depending on the roles of the participant in an interactive tasks (i.e., task condition) (p. 33).

Of the three components, task complexity has been considered the most relevant and useful for designing and sequencing pedagogic tasks a priori (Robinson, 2001b). Task complexity allows teachers to make prospective decisions about task units and implementations. In contrast, task conditions and task difficulty variables are largely contingent on task performance situations, and hence they are considered to influence on-line decisions of task implementation such as teaching methodologies and classroom management (Robinson, 2001a, p. 30). Likewise, Robinson’s (2001a, 2001b, 2011a) cognition hypothesis is devoted to discussing
potential performance outcomes with respect to varying task complexity. The following section focuses on his model and hypothesis as well as research findings on task complexity effects on performance.

2.2. The Role of Task Features

2.2.1. The effects of task features on task performance (CAF)

2.2.1.1. Task complexity

In task-based language teaching (TBLT), a progressive increase in complexity is generally accepted to assist language learning by equipping learners with competence to meet the needs of real-world task demands (e.g., Long, 1985; Skehan, 1996; Robinson 2001a, 2001b). Task complexity has been considered an important task sequencing criterion. Two competing models have been proposed: Skehan's (1996, 1998, 2009b) limited attentional capacity model and Robinson’s (2001a, 2001b, 2011a; Robinson & Gilabert, 2007) cognition hypothesis. Both models predict learner performance regarding complexity, accuracy, and fluency (CAF) in response to different types and levels of task complexity, but the predictions differ. The following sections review the two models and their predictions in terms of the effects of increasing task complexity.

2.2.1.1.1. Robinson’s cognition hypothesis

Robinson’s (2001a, 2001b, 2011a) cognition hypothesis predicts task performance processes and outcomes in regard to task complexity. His predictions differ depending on how cognitive complexity is manipulated: resource-directing (conceptual demands of the tasks) and resource-dispersing (performative/procedural demands) dimensions. Based on the assumption that conceptual or functional complexity requires complex linguistic expressions, Robinson
argued that task complexity manipulated via resource-directing dimensions directs learner attention to particular aspects of language form. Learners must analyze linguistic form-meaning mapping relations to fulfill the conceptual and functional demands of such tasks. This enhanced attention to form increases both complexity and accuracy, because tasks manipulated in this way do not require learner attention to be divided, so that their full attention can be paid to language form (complexity and accuracy), although fluency decreases. On other hand, when task complexity is heightened via resource-dispersing dimensions, learner attention is not directed to linguistic codes but is dispersed to nonlinguistic aspects of task performance that have to be managed simultaneously (e.g., planning contents). Therefore, overall performance in CAF is expected to be degraded. A gradual increase in resource-dispersing complexity is hypothesized to support fast and efficient access to the existing interlanguage system, and this tactic can be used to improve fluency.

Robinson (2001a) and Robinson and Gilabert (2007) claimed that resource-directing complexity facilitates analysis of language form, whereas resource-dispersing complexity develops “automatic access to, and control of, an already established interlanguage system” (Robinson & Gilabert, 2007, p. 166; italics original). Robinson (2001a, 2001b, 2011a; Robinson & Gilabert, 2007) proposed that both dimensions of task complexity should be interactively used in task sequencing in such a way as to maximize learners’ interlanguage development (complexity and accuracy) while facilitating learners’ greater control over their existing interlanguage system (fluency).

2.2.1.1.2. Skehan’s limited attentional capacity model

Skehan’s (1996, 1998, 2009; Skehan & Foster, 2001) limited attentional capacity hypothesis, also known as the trade-off hypothesis, assumes that human attentional capacity is
limited (VanPatten, 1990) and that humans can regulate their attentional resources (Schmidt, 1990). In particular, L2 learners whose language processing is not yet automatic and thus consumes attentional resources face situations where they need to direct their attention to a certain aspect at the expense of another. Skehan (1998) and Skehan and Foster (2001) theorized that learners’ language production processes often result in meaning-oriented (fluency) versus form-oriented (complexity and accuracy) competition, in which meaning is generally prioritized over form for L2 learners. However, it is also possible to draw learner attention to language form via task design features, which, due to the learners’ limited capacity, further engenders competition between complexity and accuracy. It is assumed that using a more complex and advanced language form increases the likelihood of being inaccurate. In contrast, being accurate tends to be associated with keeping language use within the boundaries of a well-established interlanguage system, rather than stretching the interlanguage. Skehan and Foster (2012, p. 200) termed this tension “form-as-ambition” (complexity) and “form-as-conservatism” (accuracy).

The trade-off effect among CAF is the essence of Skehan’s model, which also proposes that what is traded off can be influenced by task design features and/or learners’ own dispositions towards CAF or discretion in task performance (Skehan, 1996, 1998; Skehan & Foster, 2012). Skehan and Foster (2012) emphasized the need “to identify tasks which promote the different performance areas (complexity, accuracy, fluency) in a way that fits pedagogic goals” (p. 201).

To summarize, Skehan’s (1996, 1998, 2009; Skehan & Foster, 2001) limited attentional capacity hypothesis does not make a conclusive claim regarding task complexity effects on CAF, but argues that increase in one domain occurs at the expense of the others. Compared to simple tasks, complex tasks may degrade a learner’s overall performance in CAF, or enhance a certain domain of CAF by neglecting others. One concrete prediction Skehan made, in response to
Robinson’s prediction, is that complexity and accuracy in production cannot be raised together with the function of task complexity.

The cognition hypothesis and the limited capacity hypothesis provide two different perspectives on task complexity effects on task performance, especially on different aspects of language development. The two seemingly contradicting models are in fact similar, however, and mainly differ in terms of the specificity of their arguments. Robinson (2001a, 2001b, 2011a) makes explicit claims about the manipulation and effects of task complexity, while Skehan (1996, 1998, 2009; Skehan & Foster, 2001) highlights the functions of task design in general. Skehan’s argument only differs from that of Robinson in that Skehan does not predict a joint raise in complexity and accuracy in performance as a function of high task complexity. This study will be situated within Robinson’s framework, because it makes specific predictions regarding task complexity effects. Furthermore, Robinson’s triadic componential framework provides more comprehensive contexts for the discussion of interactions between task features and learner variables.

2.2.1.1.3. Empirical research on task complexity

A number of studies have set out to examine the effects of task complexity on L2 performance under different task conditions. Many studies on task complexity have incorporated interactional tasks as task mode (e.g., Kim & Tracy-Ventura, 2011; Michel, Kuiken, & Vedder, 2007; Révész, 2011), and a number of studies operationalized cognitive complexity along with resource-dispersing domains including the absence of planning opportunities (for reviews of planning research, see Ellis, 2009; Skehan & Foster, 2012). However, the scope of this review is limited to task complexity manipulated via conceptual demands (so-called resource-directing) under monologic speaking task conditions.
Table 1 summarizes seven extant L2 studies on task complexity in monologic oral performance (Albert, 2011; Gilabert, 2007; Ishikawa, 2011; Iwashita, McNamara, & Elder, 2001; Kormos & Trebits, 2011; Michel et al., 2007; Robinson, 1995). In general, various L2 groups were tested with different types of task complexity such as the availability of storyline (Albert, 2011; Kormos & Trebits, 2011) or the availability of visual stimuli at the time of task performance (+here-and-now) (Gilabert, 2007; Iwashita et al., 2001; Robinson, 1995). Most studies measured CAF and lexis; lexis was examined either as a separate domain in addition to CAF or as a part of general complexity measures distinguished from syntactic complexity. In terms of the effects of task complexity on CAF, as can be seen in Table 1, all studies showed improvement in accuracy along with increased task complexity, and half of them (Albert, 2011; Michel et al., 2007; Robinson, 1995) revealed degraded fluency. Regarding lexis, three studies (Kormos & Trebits, 2012; Michel et al., 2007; Robinson, 1995) observed enhanced lexical complexity in complex tasks, while Albert (2011) found decreased lexical variety. Syntactic complexity was not influenced by task complexity in any study except that of Robinson (1995).

The summary in general seems to corroborate meta-analytic findings on task complexity effects (for a meta-analytic review, see Jackson & Suethanapornkul, 2013). Jackson and Suethanapornkul’s (2013) meta-analysis revealed small positive effects for accuracy and small negative effects for fluency with increasing task complexity via resource-directing domains. However, no significant task complexity effects on linguistic complexity were observed. They claimed that the data partially support Robinson’s claim in that accuracy increased, but fluency decreased. While their study did not address Skehan’s model, it should be noted that their findings partially corroborate Skehan’s claims in that they found no joint raise between complexity and accuracy.
### Table 1. Summary of Research on Task Complexity in Oral Task Performance

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Operationalization of complexity</th>
<th>Task type</th>
<th>Dependent variables/Task design</th>
<th>Results of increasing task complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert (2011)</td>
<td>41 Hungarian college EFL students</td>
<td>+/- storyline (cartoon description vs. picture sequence)</td>
<td>Monologic narrative</td>
<td>CAF, Lexis</td>
<td>+ accuracy - fluency - lexical variety No effects on syntactic complexity</td>
</tr>
<tr>
<td>Gilabert (2007)</td>
<td>42 Spanish college EFL students</td>
<td>+/- here-and-now elements +/ reasoning</td>
<td>Monologic, narrative vs. instruction-giving vs. decision-making</td>
<td>CAF</td>
<td>+ accuracy - self-repair (+ fluency) No effects on complexity</td>
</tr>
<tr>
<td>Ishikawa (2011)</td>
<td>24 Japanese college EFL students</td>
<td>Reasoning: no reasoning, simple reasoning, complex reasoning</td>
<td>Monologic narrative</td>
<td>CAF, Lexis</td>
<td>Only descriptive data presented and observed task complexity effects on other motivational variables</td>
</tr>
<tr>
<td>Iwashita, Mcnamara, &amp; Elder (2001)</td>
<td>198 pre-university ESL students (only data from 39 were analyzed for CAF)</td>
<td>+/- immediacy +/- adequacy +/- perspective +/- planning time</td>
<td>Monologic narration tests</td>
<td>CAF, Lexis</td>
<td>No condition effects on complexity, fluency, or lexis + accuracy (+ immediacy condition)</td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Operationalization of complexity</td>
<td>Task type</td>
<td>Dependent variables/Task design</td>
<td>Results of increasing task complexity</td>
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<td>---------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Michel, Kuiken, &amp; Vedder (2007)</td>
<td>44 L2 learners of Dutch</td>
<td>+/- elements</td>
<td>Monologic narrative (+/dialogic); recommending</td>
<td>CAF, Lexis A repeated-measures design</td>
<td>+ accuracy - fluency + lexical complexity No effects on complexity</td>
</tr>
<tr>
<td>Kormos &amp; Trebits (2011)</td>
<td>44 Hungarian secondary school EFL students</td>
<td>+/- storyline (cartoon description vs. picture sequence)</td>
<td>Monologic narrative</td>
<td>CAF, Lexis A repeated-measures design</td>
<td>+ accuracy + lexical diversity No effects on fluency or syntactic complexity</td>
</tr>
<tr>
<td>Robinson (1995)</td>
<td>12 college ESL students</td>
<td>+/- here-and-now</td>
<td>Monologic narrative</td>
<td>CAF, Lexis A repeated-measures design</td>
<td>+ accuracy + complexity (lexical complexity) - fluency</td>
</tr>
</tbody>
</table>
2.2.1.2. Modality

In examining task features, modality can be one variable that affects learners’ task processes and performance. Although TBLT theories have not been intended to be restrictively applied to speaking tasks, a large body of research findings on task features is based on spoken data (Manchón, 2014, p. 29). Although interest in L2 writing in SLA has been growing recently (e.g., Byrnes & Manchón, 2014; Ortega, 2012), writing research in TBLT has been scarce. Nor is there much research on writing task complexity, partly due to the assumption that L2 online processing constraints are not directly reflected in writing (Jackson & Suethanapornkul, 2013). Nevertheless, Kormos (2014) noted that studies of task complexity in writing not only advance our understanding of task complexity, but open up discussions of L2 learning opportunities unique to and driven by written communication such as coherence and cohesion as part of the development of L2 writing (p. 194).

In terms of task modality within the context of task complexity or task demands, as Robinson (2011b) conceded, little attempt has been made to address the link between task demands and psycholinguistic mechanisms of the writing process (pp. 15–16), in contrast to the various attempts to define task demands in speaking with reference to Levelt’s (1989) speech production model (Robinson, 1995, 2001b, 2011b; Skehan, 2009a, 2009b). In other words, there seems to be no established basis for juxtaposing speaking and writing in reference to task complexity, suggesting that psycholinguistic production differences between speaking and writing should be identified by examining language production models of both modalities.

First, in terms of a speaking model, according to Levelt (1989), speech production is composed of four stages: conceptualization, formulation, articulation, and monitoring. In the first stage of speech production, conceptualization, concepts, and messages are semantically planned.
In the next stage, formulation, the planned messages are transformed into subvocal speech, combining lexical, syntactic, and phonological information. In the articulation stage, the preverbal speech is realized as speech through articulatory systems. Monitoring reviews and checks the correctness and appropriateness of the preverbal speech (covert monitoring) and/or the produced speech (overt monitoring).

As for writing production, Kellogg's (1996, 1999) writing model, composed of planning, formulation, and monitoring, has been influential amongst other writing models (Hayes, 1996; Zimmermann, 2000). In the formulation stage, planning and translating occur. In planning, writers set goals and plan ideas and organization while drawing on knowledge stored in long-term memory. The planned concepts are transformed into linguistic codes (so-called translating), where lexical, syntactic, and phonological information is accessed and combined. Although this formulation stage is assumed to be automatic in L1 speech, this stage even in L1 writing requires some level of consciousness. In the next stage of execution, kinetic motor systems convert subvocal messages into written text through either handwriting or typing, and this stage is generally considered to be automatic for adult writers, but not for children. Finally, in the monitoring stage, writers review, evaluate, and edit the produced texts.

The psycholinguistically based language production models of speaking and writing suggest that the basic psycholinguistic mechanisms are similar (Kellogg, 1996; Kormos, 2012; Levetl, 1989; Zimmermann, 2000). All components should be simultaneously active to produce language in either speaking or writing, but they differ in their operationalization. The processing is incremental in speaking (Levetl, 1989), while writing processing can be described as recursive (Kellogg, 1996). In other words, processing differences in modality can be related to time pressure and on-line planning opportunities (e.g., Kormos, 2014). In this sense, it is generally
believed that writers have more control over their language output and production processes, compared to speakers (e.g., Ochs, 1979; Ravid & Tolchinsky, 2002).

Although speaking and writing vary in a number of socio/pragmatic aspects, the current discussion focuses on the differences in their on-line processing constraints. Granfeldt (2008) summarized the modality issue in L2 as “control,” “planning,” or “monitoring” possibilities (p. 87). Speaking and writing differ along three dimensions: (a) “the presence or absence of an audience during production”; (b) “the stability of the language signal”; and (c) “the degree of control of the language user over linguistic output” (Ravid & Tolchinsky, 2002, p. 426). The three differences in speaking and writing correspond to three parameters for “the smaller cognitive load of writing compared to speaking” (Grabowski, 2007, p. 169), as described below.

According to Grabowski (2007), the presence of an audience in speaking and the ensuing communicative needs call for continuous on-line progress to be made by the speaker, while one’s writing pace is generally self-determined. Writers can allocate their attention according to their intentions and needs, making it possible to place attention solely on one stage of the writing process such as the retrieval or planning process. Also, in terms of the stability of the language signal, whereas speaking protocol is volatile and ephemeral so all spoken information must be stored in the speaker’s memory, writers’ memory is freed from maintaining produced linguistic information as they can rely on the external storage of the written text. Further, since motor execution or verbalization through written text takes longer than articulatory realization in speaking, writers can utilize more time for information retrieval and the planning of their writing.

The aforementioned processing features of writing compared to speaking, represented by “control,” “planning,” and “monitoring,” are assumed to reduce the cognitive demands of a writing task, and the freed cognitive resources enable L2 learners to better access the knowledge
stored in their long-term memory. This assumed benefit of writing for recalling knowledge has been termed “writing superiority effects,” which are mediated by the eased cognitive demands and the beneficial effects of writing, and have been supported in empirical research (e.g., Grabowski, 2007).

Regarding modality in task complexity research, insomuch as task complexity research primarily concerns cognitive demands imposed on working memory, attention, and other psycholinguistic processes, processing differences between the two modalities lead to different performance outcomes. At the same time, it seems important to examine Robinson’s (2001a, 2001b, 2011a) cognition hypothesis in terms of L2 writing in order to examine whether the theoretical claim is bound to a specific task modality, or is applicable across modalities.

Robinson (2001a, 2001b, 2011a) suggested that due to the extended control, planning, and monitoring opportunities in writing, L2 learners can employ and thus demonstrate a more complete inventory of their L2 knowledge in writing than in speaking. In addition, hypothesizing that written text reveals more features of conscious declarative knowledge such as more complex and accurate performance (for a review of L2 knowledge types in CAF, see Towell, 2012), Granfeldt (2008) explored how L2 performance in CAF differs in speaking and writing. In a small-scale study (N = 6) comparing L2 speaking and writing in the expository genre, he showed that writing, compared to speaking, revealed increased lexical complexity, although counter to expectations, accuracy decreased, and no difference in syntactic complexity was found.

Positing the mediating role of modality in task performance, a few researchers have suggested that modality should be included in Robinson’s (2001a) triadic componential framework as a possible task variable (Jackson & Suethanapornkul, 2013; Kormos, 2014). Kormos (2014) pointed out that Robinson’s (2001a) taxonomy did not address task modality as a
task variable in learners’ task performance, although the mode of task performance may direct learner attention to language form (e.g., Niu, 2009). Contextualizing modality within Robinson’s framework, Jackson and Suethanapornkul (2013) conceived of modality as a resource-dispersing task complexity element (i.e., +/- planning), as writing processes can provide inherent on-line planning opportunities. They therefore asserted that research on writing performance could be better understood in the light of research on task planning. On the other hand, Kormos (2014) argued that task modality can function as a resource-directing task complexity variable. She acknowledged that modality can serve as a resource-dispersing factor, aligning with Jackson and Suethanapornkul’s (2013) perspective; however, she focused more on the nature of the functions of resource-dispersing dimensions in improving fluency and of resource-directing dimensions in directing learner attention to form (Robinson, 2007). Based on previous findings that writing reflects more form-directed behaviors than speaking, she argued that a greater focus on form in writing is not necessarily a function of its relative freedom from on-line time pressure, but might be a function of the less ephemeral nature of writing, which inherently draws learner attention to form. In this sense, she maintained that task modality can be best understood in terms of a resource-directing task complexity taxonomy.

Several studies (Farahani & Meraji, 2011; Ishikawa, 2007; Kuiken & Vedder, 2007, 2008; Kormos, 2011, 2014; Ong & Zhang, 2010, Ruiz-Funes, 2014; Tavakoli, 2014) have examined the effects of task complexity on written task performance; this research is summarized in Table 2. Some studies simultaneously observed other effects such as planning (Farahani & Meraji, 2011; Ong & Zhang, 2010) and assistant types in writing (e.g., Ong & Zhang, 2010), but only findings on conceptual task complexity are reported in Table 2.
<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Operationalization of complexity</th>
<th>Task type</th>
<th>Task design &amp; measurement</th>
<th>Dependent variables</th>
<th>Results of increasing task complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farahani &amp; Meraji</td>
<td>123 Iranian college EFL students (intermediate)</td>
<td>(+/- planning)</td>
<td>Picture narration</td>
<td>Group comparison (4 groups)</td>
<td>Complexity</td>
<td>- fluency No effects on syntactic or lexical complexity, or accuracy</td>
</tr>
<tr>
<td>(2011)</td>
<td></td>
<td>(+/- here-and-now)</td>
<td></td>
<td></td>
<td>Accuracy</td>
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<td>Fluency</td>
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<td></td>
<td></td>
<td></td>
<td>Lexis</td>
<td></td>
</tr>
<tr>
<td>Ishikawa (2007)</td>
<td>54 Japanese high school students</td>
<td>(+/- here-and-now)</td>
<td>Picture narration</td>
<td>Group comparison</td>
<td>Complexity</td>
<td>+ accuracy + syntactic complexity + fluency + accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accuracy</td>
<td>No consistent effects on lexis</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Fluency</td>
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<td></td>
<td></td>
<td></td>
<td>Lexis</td>
<td></td>
</tr>
<tr>
<td>Kuiken &amp; Vedder</td>
<td>91 L1-Dutch college students</td>
<td>6 (complex) vs. 3 (simple)</td>
<td>Argumentative: Choosing travel destination</td>
<td>A repeated measures design (2 tasks)</td>
<td>Complexity</td>
<td>+ accuracy No effects on syntactic complexity or lexical variation</td>
</tr>
<tr>
<td>(2007, 2008)²</td>
<td>(91 L2-Italian, 76 L2-French)</td>
<td>consideration requirements</td>
<td></td>
<td></td>
<td>Accuracy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lexis</td>
<td></td>
</tr>
<tr>
<td>Kormos (2011, 2014)</td>
<td>44 Hungarian EFL secondary school students</td>
<td>+/- storyline (cartoon description vs. picture narration)</td>
<td>Picture narration</td>
<td>L1 and L2 performance; A repeated-measures design</td>
<td>Complexity</td>
<td>+ lexical complexity No effects on syntactic complexity, accuracy, or cohesion devices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accuracy</td>
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<td>Lexis</td>
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<td></td>
<td>Cohesion</td>
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</tbody>
</table>

² The two publications are based on the same research, and have the same findings.
Table 2. Summary of Research on Task Complexity in Written Task Performance (Cont.)

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Operationalization of complexity</th>
<th>Task type</th>
<th>Task design &amp; measurement</th>
<th>Dependent variables</th>
<th>Results of increasing task complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ong &amp; Zhang (2010)</td>
<td>108 Chinese EFL</td>
<td>(+/- planning time)</td>
<td>Argumentative essay</td>
<td>Group comparison</td>
<td>Fluency Lexis</td>
<td>+ lexical complexity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+/- content assistance)</td>
<td></td>
<td></td>
<td></td>
<td>No effects on fluency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+/- availability of first draft during revision)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruiz-Funes (2014)</td>
<td>Six undergraduate L2-Spanish learners</td>
<td>(+/- elements)</td>
<td>Analytical essay</td>
<td>A repeated-measures design</td>
<td>Complexity Accuracy Fluency</td>
<td>+ syntactic complexity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+/- reasoning demands)</td>
<td>Argumentative essay</td>
<td></td>
<td></td>
<td>- accuracy - fluency</td>
</tr>
</tbody>
</table>
In this body of research, complexity has been manipulated via the presence and absence of picture stimuli (+/- here-and-now) (Farahani & Meraji, 2011; Ishikawa, 2007), storyline (Kormos, 2011), content assistance (Ong & Zhang, 2010), and the number of considerations in decision-making (+/- elements) (Kuiken & Vedder, 2007, 2008). One notable difference between writing and speaking research is that fluency was not investigated in some of the writing studies (Kormos, 2011; Kuiken & Vedder, 2007, 2008), presumably due to the challenge of operationalizing fluency in writing due to its recursive nature. Compared to speaking research (Table 1), writing research has adopted more varied methodologies in terms of task type (e.g., narrative, argumentative), task design (group comparison, repeated measures design), and types of dependent variable (e.g., omission of fluency from the CAF triad). Regarding task complexity effects in writing, although Ishikawa (2007) showed beneficial complexity effects on all three elements of CAF, in general, task complexity effects seem to be limited, affecting one domain of CAF or lexis. Specifically, task complexity enhanced one element of CAF, for example, fluency (Farahani & Meraji, 2011), accuracy (Kuiken & Vedder, 2007, 2008), or lexical complexity (Kormos, 2011; Ong & Zhang, 2010), but not the others. Nevertheless, any conclusions regarding task complexity effects in writing are tentative due to the limited amount of research on the topic and its varied methodologies.

A few publications to date have incorporated modality in the study of task complexity (Kormos & Trebits, 2012; Kuiken & Vedder, 2011, 2012). In a series of publications on task complexity in speaking and writing, Kuiken and Vedder (2011) examined how the role of task complexity in complexity, accuracy, and lexis (but not fluency) differs depending on modality. They provided a descriptive analysis showing that writing generated syntactically complex and lexically varied performance, but they did not make statistical comparisons of CAF in the two
modalities. Descriptively, only syntactic complexity was differentially involved in the two modalities, but there seemed to be no modality effects on accuracy or lexis. Increased task complexity enhanced syntactic complexity in writing, but negatively influenced syntactic complexity in speaking production.

Another modality study by Kormos and Trebits (2012), however, directly compared performance between speaking and writing in terms of complexity, accuracy, and lexis (but not fluency) and further examined the interactions between modality and task complexity. The findings revealed (a) more enhanced lexis in writing than speaking in both of two complexity conditions, (b) more enhanced accuracy in writing than in speaking only in a simple task condition, and (c) no modality differences in either complexity condition in syntactic complexity.

A recent study by Kormos (2014) examined task modality as a variable in task performance under different task conditions with different cognitive demands and imposed at different stages of language production. In addition to testing modality as a variable in syntactic complexity, lexical variety, and accuracy, she examined cohesion and connectives in language production. Overall, her findings regarding modality effects are in line with her earlier findings in other studies in that she showed increased accuracy, more varied lexical choices, and more complexity in noun phrases in the writing tasks than in the speaking tasks. She concluded that the availability of monitoring during the production of writing may have allowed writers to pay more attention to accuracy and that the availability of on-line planning in writing may have enabled writers to employ a greater variety of words than speakers. Regarding syntactic complexity, however, her findings showed no difference between modalities in terms of the use of dependent clauses, although the writing contained significantly more noun phrases than the speaking. She speculated that the subordination index (i.e., the use of dependent clauses) may not
be sensitive enough to reveal modality effects, but she also acknowledged that the frequency of subordination might be more strongly affected by task characteristics than task modality. However, regarding the higher frequency of noun phrases in writing, she concluded that the findings could be related to her participants’ awareness of the fact that written genres tend to use more adjectives and complex prepositional phrases than spoken genres (e.g., Biber & Conrad, 2009).

Overall, learner language performance seems to be better in writing than speaking, which might be partly attributable to the enhanced opportunities that writing provides for conscious attention to encoding and monitoring of linguistic forms (Grabowski, 2007; Granfeldt, 2007; Kormos & Trebits, 2012). However, the research results are still inconsistent, which is due to some extent to the methodological differences in task types and proficiency levels of participants (Kormos, 2014). A tentative conclusion to be drawn from the extant studies is that modality differentially and independently influences CAF in interaction with task complexity, but more research is needed to explain the role that modality plays in task performance along with its interaction with task complexity.

2.2.2. The effects of task features on task experience

The influence of task features on task outcomes is not limited to linguistic performance, but includes learners’ affective states such as motivation and emotion that may arise during the process of task performance. Studies have shown that emotional arousal induced by certain task performance conditions can play a crucial role in learner behaviors and performance outcomes (Ma, 2009; MacIntyre, 2002; Poupore, 2014; Puca & Schmalt, 1999; Révész & Brunfaut, 2013; Tapola, Jaakkola, & Niemivirta, 2013). For example, in the general educational field, Tapola et
al. (2013) showed that task characteristics such as concreteness influence the ways that learners’ situational interest in the task is aroused and sustained. In SLA, Poupore (2014) showed that task contents contribute to L2 learners’ intrinsic interest, which in turn affects L2 task performance. He found that themes that are immediately related to their lives are more intrinsically interesting than other, more remote themes such as current affairs and global issues. In addition to task features that influence motivation, factors in the perception of task difficulty have been examined by some researchers. Révész and Brunfaut (2013) identified text characteristics that become sources of task difficulty in listening comprehension tasks, finding that lexical range, diversity, and density as well as causal content could predict learner perceptions of task difficulty.

Such findings can be understood from the perspective of task motivation, as one type of motivation is influenced by task situations and characteristics. The importance of situational and momentary motivation and experience in learning lies in the fact that accrued experiences of similar types of tasks may lead to stable types of task motivation that can consistently affect language learning. The following subsections will review two affective outcomes that can be generated by task complexity, or perceived task difficulty.

2.2.2.1. Perceived task difficulty

According to Tavakoli (2009), in order to better understand learners’ task performance and development, it is necessary to define and determine task difficulty. Understanding task difficulty and its sources not only expands our knowledge on how to develop and sequence tasks but also provides grounds for designing and interpreting task-based assessment (p. 2). Along with the increasing interest in task complexity, some empirical studies have investigated learner perception of task difficulty or reactions in response to different task features (Appel & Gilabert, 2002; Ben Maad, 2010, 2012a, 2012b; Gilabert, 2007; Hawkey, 2006; Ishikawa, 2011; Ma, 2009;
For example, Tavakoli (2009a) conducted interviews to examine how learners’ and teachers’ perceptions of task difficulty match. Although there were slight differences, in general teachers’ and students’ perceptions of task difficulty seemed to be determined by similar criteria. Other researchers have examined how learners’ perceptions of task difficulty change in response to different levels of task complexity, finding that in general learners’ perceptions matched the manipulated task complexity (Appel & Gilabert, 2002; Robinson, 2001b; Robinson & Gilabert, 2007).

Under the umbrella term of “task difficulty,” however, researchers have operationalized the concept in various ways. Some take it to encompass the emotional responses ensuing from task difficulty, such as stress and interest, following Robinson’s conceptualization of task difficulty in the triadic componential framework for task design (Appel & Gilabert, 2002; Robinson, 2001b; Robinson & Gilabert, 2007). For example, Robinson (2001b) explored whether language learners’ perception of task difficulty corresponded to objective task complexity as manipulated by the availability of prior knowledge and the amount of information. The study revealed that learners found a complex task (i.e., one for which they had less information and no prior knowledge) more difficult and stressful, but also more interesting, compared to a simple task. He also found that learners tended to rate their competence lower in the complex task than in the simple task.

While Robinson (2001b) found generally negative affective experiences with complex tasks, Ishikawa (2011) reported different findings. He examined how cognitive demands manipulated via reasoning demands in tasks affected learners’ perception of task difficulty. In measuring task difficulty, Ishikawa included various aspects of affective and cognitive responses
such as concentration, time pressure, anxiety, stress, difficulty, interest, ability, and motivation. He showed that, in general, with an increase in reasoning demands, learners perceived the task as more difficult. In addition, similar to Robinson’s (2001b) findings, Ishikawa’s study showed that difficult tasks tended to be perceived as more interesting.

Other studies have attempted to identify sources of task difficulty in various task conditions (Nunan & Keobke, 1995; Poupore, 2014; Tavakoli & Skehan, 2005). Nunan and Keobke (1995) provided language learners with different types of tasks and examined their perception of task difficulty as well as sources of perceived difficulty. They found lack of familiarity with task types, confusion about the purpose of a task, and lack of relevant cultural knowledge to be factors that increased learners’ perception of task difficulty. Tavakoli and Skehan (2005) also showed that task structure played a role in learners’ perception of task difficulty, in that learners felt more structured tasks to be easier than less structured tasks, and they showed more accurate and fluent performance in the more structured tasks.

Although the number of studies on task difficulty is limited, their findings suggest that learners’ perception of task difficulty seems to parallel objective task design features of task complexity; tasks that are manipulated to be more complex tend to be perceived as more difficult by learners. Furthermore, although the research is limited and the findings thus are not conclusive perceived task difficulty seems to influence various affective and cognitive behaviors of learners.

2.2.2.2. Flow

The previous sections have discussed the effects of perceived task difficulty on cognitive and affective experience in task performance. Continuing to discuss this line of relationships, this section discusses a conglomerate of such complex cognitive and affective states, represented as
“flow” (Csikszentmihalyi, 1990). The previous sections described researchers’ attempts to examine task difficulty (following Robinson’s (2001b) terms), which encompasses related emotional reactions such as stress and interest. The links that have been reported between task complexity, task difficulty, and holistic cognitive experience of tasks are what motivated the adoption of the concept of flow. The following subsections first introduce the concept, and then discuss the sources and outcomes of flow.

2.2.2.2.1. Constructs of flow

Since the mid-20th century, many researchers interested in human behaviors and happiness have sought to understand why humans pursue activities that are not extrinsically rewarding. Csikszentmihalyi’s (1990) “flow theory” was born out of an attempt to answer this question. He looked for the source of human happiness in the intrinsic nature of motivation—specifically, an individual’s inner satisfaction with a given activity. In his earlier studies, he interviewed people who were intensely engaged in various fields, including athletes, rock climbers, artists, and surgeons, and he found that despite the differences in their fields of action, they experienced similar emotional and cognitive states while engaging in their chosen activities. They commonly reported the perception that one action seemed to flow into the next action; such transitions seemed to occur according to an internal logic and without the actor’s awareness of the transition. Csikszentmihalyi (1975) referred to this state as “flow,” which he described as “the holistic sensation that people feel when they act with total involvement” (p. 36), and which he suggested often emerges in activities such as climbing, or playing chess, a musical instrument, or basketball. Flow is an optimal experience that makes an activity itself an end result and its own sole purpose. Flow tends to occur with “a self-contained activity, one that is done not with
the expectation of some future benefit, but simply because the doing itself is the reward” (Csikszentmihalyi, 1990, p. 67).

According to Csikszentmihalyi (1990), flow is characterized by the following components: (a) an activity meets an individual’s perceived level of ability so that s/he feels optimally challenged and confident in regard to the action; (b) an actor is so involved in the activity that the activity becomes almost automatic—the actor is aware only of the action, and not of the awareness itself, so that a merging of action and awareness occurs; (c) the availability of clear goals and immediate feedback enables an actor’s complete involvement in a flow experience; (d) an actor engages in a task with a high degree of concentration, giving undivided attention to the relevant stimuli so that no attentional room is left for irrelevant information; (e) an actor believes in the possibility of controlling difficult situations, or possesses a sense of exercising control, rather than an actual state of being in control, in difficult situations; (f) an actor loses self awareness due to being fully engrossed in an activity; and finally, (e) an actor feels time distortion, in that time seems to pass by quickly, or sometimes slowly.

Although flow refers to “a psychological state in which the person feels simultaneously cognitively efficient, motivated, and happy” (Moneta & Csikszentmihalyi, 1996, p. 277), it differs from other positive and joyful peak experiences such as watching a movie, or listening to music. This is because flow occurs in a situation where one actively utilizes one’s skills in a certain activity, hence flow is additionally characterized by active execution of one’s skills (Csikszentmihalyi & Csikszentmihalyi, 1988). Csikszentmihalyi and Csikszentmihallyi (1988) noted that flow may occur regardless of whether involvement in an activity was one’s choice or not, and whether the original intent of the activity was enjoyment or not (p. 32). A flow
experience can occur by chance, or be enabled by competition or other cognitive and emotional processes during task performance.

2.2.2.2. Conditions of flow

Given the notion of flow as an optimal experience, an important question concerns the conditions in which people enter into a state of flow. An optimal balance between challenge and skill level has been proposed as a crucial precondition for flow, and in order to sustain a flow experience, the level of challenge must also increase along with the increased skill level. (Csikszentmihalyi, 1975, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988). For example, a beginning tennis player may find tennis interesting because both his skills and the challenge he faces are low. Later, with increasing skills, the player may want more challenge. If he continues to compete with opponents whose skills are at the level his own skills used to be, the person will start to get bored as his skills surpass the challenge level. In order to re-experience flow, the player may want stronger opponents, so that the challenge level subsequently increases. In this sense, one’s intrinsic motivation emerges, is sustained, or grows with the realization that one’s skills are gradually developing as one pursues a match between skills and challenge (Csikszentmihalyi, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988). In other words, task interest increases along with achievement at a certain level of difficulty, which enables the sharpening of one’s skills.

Figure 2 suggests how the two dimensions of task demands and an actor’s skills jointly lead to different emotional and cognitive states.
As depicted in Csikszentmihalyi’s (1975) original model on the left side of Figure 2, a balance between skills and challenge creates a flow channel; if the skill level surpasses the challenge level, this creates boredom. If the challenge is greater than the skill level, this produces anxiety. Later, Csikszentmihalyi and Csikszentmihalyi (1988) revised the model to include four dimensions of the skill–challenge balance. In this four-channel model, activities that involve low skills and low challenge levels create apathy. Flow occurs only when both skills and challenge levels are high, and this balance results in emotional happiness and intrinsic interest as well as cognitive concentration and a sense of control.

While compatibility between skill and challenge levels has been generally accepted as a crucial characteristic of flow, compatibility’s function and its relation to flow are still debated (e.g., Vollmeyer & Rheinberg, 2006). Some researchers (Csikszentmihalyi & LeFevre, 1989; Lambert, Chapman, & Lurie, 2013) have perceived compatibility itself as flow, which for them was sufficiently captured by compatibility in skill–challenge levels, leads to further positive experiences and outcomes, as predicted by the flow theory. Others (Keller & Blomann, 2008) seem to consider flow as an optimal experience characterized by distortion of time, involvement and enjoyment, and the feeling of control. Their research investigates whether compatibility...
results in flow experience (Ainley, Enger, & Kennedy, 2008). Despite the differences, both are interested in examining whether skill–challenge compatibility leads to positive emotional and performance experiences.

Other conceptual complications in regard to flow characteristics exist. Although both enjoyment and attentional involvement are characteristics of flow, attentional involvement seems to mediate the relationship between optimal challenge and enjoyment (Abuhamdeh & Csikszentmihalyi, 2012a). According to Csikszentmihalyi (1988, 1990), it is the compatibility between high challenge and high skills that drives an actor’s attention to focus solely on the task itself. For example, if challenge exceeds skills, one may become anxious, and if skills exceed challenge, one may become bored, and in either case, one cannot focus on the task at hand. That the heightened attention of a flow state enables an individual to enjoy a task through full engagement has received empirical support (Abuhamdeh & Csikszentmihalyi, 2012a).

Acknowledging the slightly different approaches and terminology used by researchers interested in flow, this study will follow the idea that flow is an optimal experience characterized by attention, involvement, and enjoyment, which is preceded and conditioned by an optimal challenge and skill balance.

2.2.2.2.3. Outcomes of flow

Regarding the function of flow in performance, flow can result in positive performance in two different ways. First, at a conceptual level, flow is a functional state (i.e., cognitively efficient and focused), which in itself facilitates performance. Second, it is likely that individuals who have experienced flow tend to work harder to experience flow again by setting higher challenges (Engeser & Rheinberg, 2008, p. 159). That is, it can lead to personal development, which Csikszentmihalyi and Csikszentmihallyi (1988) called “evolution”; according to them,
flow functions as “a dynamic force in evolution” (p. 30). Csikszentmihalyi (1990) argued that people feel a sense of growth in self through a discovery that pushes them to increase performance competency (p. 74).

Numerous studies have set out to examine the validity of Csikszentmihalyi’s (1988, 1990) claim that a human’s positive cognitive and affective response to an activity occurs given the fit between challenge and skills (Csikszentmihalyi & LeFevre, 1989; Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005; Engeser & Rheinberg, 2008; Lambert et al., 2013; Moneta & Csikszentmihalyi, 1996; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003). In accordance with the features of flow, four dimensions of subjective psychological experience have been widely investigated as indicators of flow (Bassi & Fave, 2004; Csikszentmihalyi & LeFevre, 1989): (a) cognitive efficiency as in concentration or ease of concentration; (b) positive affect such as enjoyment and happiness; (c) positive emotional activation including a sense of being aroused, active, and strong; and (d) motivation such as intention to do the activity or feeling free (Lambert et al., 2013). In some studies, each construct of affective and cognitive state has been independently examined, in which case they generally consider flow as intrinsic motivation (Keller & Bless, 2008), while in others (Engeser & Rheinberg, 2008; Keller & Blomann, 2008) a holistic measure of flow composed of the above-mentioned elements is incorporated into the study.

While overall, optimal challenge seems to render positive experiences in general, as predicted by the flow theory (Engeser & Rheinberg, 2008; Moneta & Csikszentmihalyi, 1996; Shernoff et al., 2003), studies have provided evidence of different influences of the optimal fit condition on different cognitive and affective experiences (Bassi & Fave, 2004; Csikszentmihalyi & LeFevre, 1989; Lambert et al., 2013). In some studies, the fit produced
positive outcomes in terms of cognitive efficiency and attention, but no apparent motivational benefits (Bassi & Fave, 2004; Csikszentmihalyi & LeFevre, 1989; Lambert et al., 2013; Moneta & Csikszentmihalyi, 1996). In other studies, however, the match has been shown to lead to heightened intrinsic motivation (Keller & Bless, 2008; Keller & Blomann, 2008).

Regarding the different effects reported by various studies, Eisenberger, Jones, Stinglhamber, Shanock, and Randall (2005) pointed out that variations in the type, context, and importance of tasks may have resulted in different findings. Previous studies have been conducted in diverse educational, work-related, and leisure contexts. For example, Csikszentmihalyi and LeFevre (1989) showed that while the match of high skills and challenge in the workplace aroused cognitive efficiency, it did not influence employees’ motivation and satisfaction. Bassi and Fave (2004) showed that in school-related activities, flow tended to be highly associated with concentration, but they found no positive motivational or affective influence. Moneta and Csikszentmihalyi (1996) investigated whether equilibrium effects vary depending on different dimensions of experience (in school, with relatives, with friends, and in solitude). They confirmed that across various contexts, there were positive compatibility effects on concentration and involvement, but not on happiness or the desire to do the activity. Nevertheless, the magnitude of the effects differed across contexts; they showed that the negative impact of imbalance was strongest in school contexts across the four task conditions.

Particularly focusing on the relationship between the compatibility and interest and enjoyment, Lambert et al.’s (2013) study showed that supposed linear development toward flow shifted at some point to enjoyment of a more comfortable and stable state of being. They investigated whether college students’ daily life experiences in terms of enjoyment, happiness, intrinsic motivation, and cognitive involvement were dependent on a flow state (high in both
challenge and skills) or a control state (moderate challenge and high skills). Contrary to the predictions of flow theory, they found that flow tended to be associated only with cognitive efficiency dimensions such as ease of concentration, but that affect and motivation dimensions in enjoyment, happiness, and intrinsic motivation were related to the control condition, where skills exceeded challenges. These findings suggest that optimal enjoyment, happiness, and intrinsic motivation are maximally achieved with levels of challenge that are comfortable given one’s skills.

Similar findings have been observed in L2 research (Egbert, 2003; Schmidt & Savage, 1992). Schmidt and Savage (1992) examined how foreign language learners’ motivation, affect, activation, and cognitive efficiency could be described in relation to challenge and skill levels and in comparison to other daily activities such as work and leisure. They provided participants with portable devices set to beep randomly throughout the day, along with several copies of a questionnaire; the participants were instructed to fill out a questionnaire each time their watch beeped. They showed that L2 learners reported that L2 learning was challenging, but they had more positive experiences and stronger motivation in regard to English learning than to other daily activities. These results support Csikszentmihalyi’s (1990) claims, as well as Krashen’s (1985) i + 1 principle for L2 learning. However, Schmidt and Savage (1992) noted that the results should be interpreted with caution, as the participants in their study already had high instrumentality-based motivation, which suggests that they may have been predisposed to enjoy language learning even though it is challenging.

In addition to general language learning contexts, specific task conditions that are likely to produce a higher chance of flow have been the focus of research. Egbert (2003) emphasized the construction of flow in instructional settings, arguing that “although flow is something
individuals experience, it does not occur in isolation; rather, it depends on both individual characteristics and conditions in the environment” (p. 500). From this point of view, she examined whether flow exists and whether certain types of tasks are likely to produce higher chances of flow for students. Incorporating various types of tasks that varied in the degree of challenge and control over the task, she found that foreign language class tasks are more likely to provide flow experiences when students can have some level of control.

2.2.2.3. Individual differences and flow experience

Some studies have suggested that other factors such as task types or other personality variables mediate the relationship between high task demand and skill compatibility and enjoyment or intrinsic motivation, or flow experience (Abuhamdeh & Csikszentmihalyi, 2012a, 2012b; Clarke & Haworth, 1994; Eisenberger et al., 2005; Keller, Ringelhan, & Blomann, 2011). Abuhamdeh and Csikszentmihalyi (2012b), focusing on the relationship between optimal challenge and enjoyment, showed that the occurrence of flow depended on the type of activity (i.e., goal-directedness) and existing intrinsic motivated. However, Keller, Ringelhan, and Blomann (2011) showed different results. They employed intrinsically playful games and serious and authentic knowledge performance tasks to measure intellectual performance, and showed that regardless of task type, when skills and task demands matched, participants had positive flow experiences, as indicated by the perception of accelerated passage of time, intense involvement, and enjoyment. Taking these studies together, it seems that the manipulation of task types can mediate the relationship between skill–challenge compatibility and flow experience.

It has been suggested that the inconsistent findings on the effects of skill–challenge compatibility on positive experience may be related to personality or individual differences.
variables (Eisenberger et al., 2005); that is, some people are more likely to be influenced by skill–challenge compatibility than others. Individual differences in personality or beliefs have been found to mediate the relationship between optimal fit and the experience of flow (Csikszentmihalyi & LeFevre, 1989; Keller & Bless, 2008; Keller & Blomann, 2008). Keller and Blomann (2008) showed that given the fit of skills and challenge, those with a strong internal locus of control (a belief that positive outcomes are achieved through one’s own effort) are more likely to experience flow than those with a strong external locus of control (a belief that success can be attributed to luck or external sources). Also, people with an internal locus of control were shown to be more sensitive to changes in the optimal fit of skills and challenge. Likewise, employees’ general satisfaction in a condition of high challenge and high skills has been found to be affected by the individuals’ dispositional preference toward challenging tasks (Csikszentmihalyi & LeFevre, 1989).

Along the same lines, some researchers have suggested the notion of “regulatory compatibility” (Keller & Bless, 2008; Keller & Blomann, 2008). It is broadly defined as “the compatibility of person characteristics (e.g., level of skill, habitual goal orientation, personal needs or standards) and structural settings or environmental characteristics (e.g., task demands, task framing, availability of distinct means, salience of specific outcomes or incentives)” (Keller & Bless, 2008, p. 197). Keller and Bless (2008) observed that flow, as indicated by involvement and enjoyment, is dependent not only on skill–challenge compatibility but also on the degree of the match between certain personality characteristics and task conditions.

Regarding the assumption that a balance between challenge and skill functions as an antecedent or a sufficient condition for flow, Engeser and Rheinberg (2008) maintained that the overreliance of the skill–challenge balance should be reconsidered, as factors such as perceived
importance of the activity and individual achievement motives may moderate the relationship. They argued that sometimes flow occurs even with the absence of skill–challenge balance, for example, with activities that are considered important or that have consequential impact; in other words, when an activity does possess important consequences, skills need to exceed challenge for people to experience flow. Engeser and Rheinberg showed that individuals with high achievement motives (e.g., high hope of success) tended to experience more flow when they felt the task difficulty and their skills to match. On the other hand, those with low achievement motives (e.g., high fear of failure) tended to experience flow less in the equivalent condition. Similar moderating effects of achievement needs were found by Eisenberger et al. (2005), who showed that only among high achievement-oriented employees were positive experiences in mood and task interest found to provide the optimal matching condition of skills and challenge.

In terms of the moderating effects of individual differences, Schüler (2007) examined how two types of achievement motivation, hope-of-success and fear-of-failure, functioned differently in response to individuals’ preferences for task levels and their achievement motivation. According to Atkinson’s (1957) risk-taking model, hope-of-success leads learners to choose tasks with medium difficulty because they can compare their current performance with that of others or their own past performance. Alternatively, fear-of-failure leads individuals to avoid tasks with an average level of difficulty, as they tend to prefer either very easy or very difficult tasks. In a very easy task, their fear of failure is minimized. In a very difficult task, on the other hand, individuals can attribute failure to the difficulty of the task itself, rather than their own lack of ability. Adopting this perspective, Schüler (2007) examined the role of achievement motivation as a mediator in learner experience of flow, and showed that in the condition of skill–challenge balance, only individuals with high hope-of-success experienced flow.
Engeser and Rheinberg (2008) conceptualized achievement motives as one of the features of the “autotelic personality” proposed in the flow theory (Csikszentmihalyi, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988). “Autotelic” was coined based on the Greek words for “self” (auto) and “goal” (telos); “autotelic personality” refers to a disposition or personality characteristic of being apt to be intrinsically motivated and goal-directed by intrinsically rewarding activity. Autotelic personality as an individual difference factor may contribute to further explaining the link between the skill–challenge balance and flow experience.

To sum up, flow occurs when one feels that one is stretching one’s skills by exploring challenges in a task in the condition that an equilibrium exists in challenge and skill levels (Csikszentmihalyi, 1990; Csikszentmihalyi & Csikszentmihalyi, 1988). Previous research has largely examined the causal relationship between the two conditions and explored whether the equilibrium produces positive outcomes such as intrinsic motivation, attention, and involvement. Nevertheless, various individual features have been identified as moderators of the relationship, as certain personality features seem to facilitate or hinder the occurrence of flow.

Flow is a momentary experience that one feels at the very moment of task engagement. Flow therefore can be conditioned by the given task, but as Fisher, Minbashian, Beckmann, and Wood (2013) pointed out, momentary emotions are caused by individuals’ appraisal of the situation and the task, which influences how they interpret and construe the given event (p. 364). The aforementioned studies on the moderating roles of learner variables in flow suggest that the flow theory can be better explained and understood by considering personality traits such as autotelic personality and motivational orientation.

As Puca and Schmalt (1999) pointed out, a common research interest is the relationship of task enjoyment to both flow theory (Csikszentmihalyi, 1990; Csikszentmihalyi &
Csikszentmihalyi, 1988) and goal orientation (Dweck, 1986; Elliot & Harackiewicz, 1994, 1996; Pintrich, 2000). In terms of flow theory, task enjoyment itself becomes a consequence of flow experience, and in terms of goal orientation, task enjoyment can become a mediator linking goal orientation and task performance. Furthermore, different types of goal orientations (e.g., mastery vs. performance) affect the ways individuals approach given tasks. That is, given the same task, individuals’ interpretations of its difficulty and evaluations of their own capacity to complete it may differ depending on their goal orientation. This varying perceived task difficulty, in turn, is likely to influence the experience of flow. Furthermore, in terms of performance, individuals’ goal orientations may lead them to take different strategies or task approaches, which may eventually affect task performance outcomes.

2.3. The Role of Learner Variables

According to Campbell (1988), task complexity can be conceptualized in three different ways: (a) in terms of objective task characteristics that can be manipulated through an increase or decrease in information processing characteristics; (b) as a subjective psychological experience—the individual’s subjective reaction to the task and task conditions; and (c) as a person–task interaction where both individual differences factors such as ability and motivation and objective task features interactively affect the experience of complexity. Revisiting Roinson’s conceptualization of task complexity (Section 2.1.1.) to compare that of Campbell, it seems that Campbell’s objective task complexity parallels Robinson’s (2001) definition of task complexity, and that person–task interaction aligns well with the concept of “perceived task difficulty” (“task difficulty” to use Robinson’s terms). Campbell (1988) maintained that different sources of task complexity stimulate different goal types and strategies, thus influencing
individual behaviors (p. 49), and that for this reason, the sources of task complexity should be differentiated in research.

2.3.1. The effects of learner variables on task performance (CAF)

A wide range of learner variables is involved in language learning and language development. Individual differences variables can be broadly classified into ability-related factors and affective factors (Robinson, 2001a, 2002). Extensive research exists on the effects of learner variables on various aspects of language learning processes and products; the subset of this research that is of particular interest in this dissertation concerns learners’ affective variables that have direct impact on task performance within the TBLT framework. Specifically, rather than investigating relatively fixed cognitive individual differences attributes such as intelligence and aptitude, the scope of this discussion is limited to learner variables that can be “changed and shaped through teacher intervention in language learning” such as motivation and anxiety (Robinson, 2002, p. 8).

Studies have shown that learner variables influence task performance and mediate the relationship between task features and task performance. For example, Albert (2011) examined learner creativity as a variable influencing task performance, showing that creativity benefitted learners’ fluency, quantity of talk, ratio of narrative clauses, and lexical diversity, but the effects only emerged in less structured task. Other studies have investigated how anxiety affects task performance and mediates the relationship between task complexity and task performance. Robinson (2007) examined how learners’ existing anxiety about input, processing, and output of L2 is associated with task performance outcomes with different task complexity. He also observed how anxiety determines learners’ perception of task difficulty and their task experience.
such as enjoyment, stress, and confidence. His findings revealed that high output anxiety was correlated with low syntactic complexity in language production across all task complexity conditions. Robinson concluded that anxiety can impede the degree to which learners may benefit from high task complexity (see Robinson 2001a, 2001b, 2007, 2011a). Kim and Tracy-Ventura (2011) also showed that speaking anxiety tends to have debilitating effects on learners’ development of a target form, although in this study, the effects of anxiety did not differ across different task complexity conditions.

However, other studies have found no correlations between learner variables and task performance. For example, Révész (2011) examined how individual differences factors such as linguistic self-confidence, anxiety, and self-perceived competence are related to speech performance in terms of complexity, accuracy, and fluency, employing tasks that differed in task complexity. She observed no significant correlations, and speculated that the highly proficient learners in her study might have strategies to overcome any limitations caused by individual differences.

The studies discussed in this section so far examined individual differences along with task complexity. They expected to observe the relationship between individual differences variables and task performance, and further assumed that the relationship would be stronger in a complex task, following Robinson’s (2001a, 2001b, 2011a) cognition hypothesis. Overall, although the correlations they found were not strong, the studies showed that learner variables tend to affect task performance to some extent, though the relationship seems to vary depending on the nature of the tasks, for example, task complexity.

In addition to correlational analysis, the descriptive observations in other studies also reveal the potential relationships between learner motivation or goals and task performance
outcomes, which may be better understood as learner agency or discourse motivation, to use Batstone’s (2005) terms. This line of argument is based on the view that L2 learners can voluntarily direct their attentional resources (Schmidt, 1990; Skehan, 1996, 1998) to a certain aspect of language production depending on their personal concerns, values, predispositions, and goals (Batstone, 2005; Foster & Skehan, 1996; Skehan, 1998). For example, as Skehan (1996) noted, “a greater concern, on the part of the learner, to be correct, to conform to target language norms, and to value them as important” may affect accuracy (p. 47). If a learner is not a risk-taker and adopts “a conservative strategy” in task performance (p. 47), the likely result would be the increase of accuracy at the expense of complexity. In this way, learners’ outcomes can be the result of their motivation, which can include choices, values, predispositions, and orientations (Gardner & Tremblay, 1994), within the boundaries of their interlanguage system and attentional capacity (Skehan, 1996, 1998).

Empirical evidence supports the claim that L2 learners have voluntary control over their attention to different language elements during task performance, which can be motivated by task conditions and personal dispositions toward language aspects, including complexity, accuracy, and fluency (Li, 2010; Ortega, 1999; Skehan & Foster, 2012; Skehan, Xiao Yue, Qian, & Wang, 2012). For example, Ortega’s (1999) study showed that L2 learners adopted different strategies and used pretask planning opportunities differently, depending on their orientations toward task performance, such as perceived goals for the tasks or language-specific values and dispositions. This study suggests that learners’ judgments, plans, or goals in regard to task performance can influence language learning outcomes. Similarly, Purcell and Suter (1980) showed that L2 learners’ strength of concern for pronunciation was one of the significant
predictors of pronunciation accuracy. Such findings together suggest that task performers’ personal concerns or interests can also shape task performance.

Finally, it should be noted that learners’ decisions and goals are also influenced by task performance situations and contexts (e.g., Dörnyei, 2002; Kormos & Dörnyei, 2004; Ma, 2009). In other words, task motivation, which refers to a type of motivation specific to task performance situations, affects task performance, which is created by the interactions between a person’s existing attitudinal trait motivation and the contextual motivation a particular task may provide. Ma’s (2009) study demonstrated that, despite learners’ similar levels of general trait motivation, various external task performance conditions such as choice, autonomy, and relatedness affected the learners’ task motivation, intention to persist, and task engagement as well as task performance quality. In another study, Dörnyei (2002) showed that the amount of talk or engagement in interactive tasks was influenced by an interlocutor’s motivation, suggesting that task motivation is co-constructed through the engagement in the task. These studies overall show that learners’ task performance can be affected not only by learners’ general concerns (e.g., anxiety) or general dispositions toward tasks and learning, but also by their situational motivations or goals in specific task performance conditions. Robinson (2007) claimed that “individual differences in ability and affective factors relevant to the cognitive demands of tasks will increasingly differentiate learners’ speech production” (p. 196).

2.3.2. The effects of learner variables on task experience

2.3.2.1. Goal orientation

2.3.2.1.1. Definition

Over the last century, motivation has received a great deal of attention in various fields of human studies, and attempts have been made to understand the sources and processes of humans’
pursuit of goal-oriented activities (e.g., Atkinson, 1957; Beck, 1983; Dollard & Miller, 1950). Various conceptualizations and theorizations of motivational constructs have been proposed, one of which concerns achievement motivation (e.g., Ames, 1984; Dweck, 1986). Achievement motivation explains motivation with reference to learner goals, attributions, and beliefs about intelligence, success, and ability (Dweck, 1986; Nicholls, 1984). Developed by researchers such as Dweck (1986) and Ames (1984) in the late 1970s, the achievement goal approach has been an influential achievement motivation model in educational fields.

Achievement goals represent reasons for pursuing or engaging in achievement-related tasks (Dweck, 1986), which differ from general or task specific reasons for performing an activity. Achievement goals show a unified and systematic pattern by which behavior is instigated or directed. In other words, achievement goals represent dispositions toward specific achievement tasks, so they are more specific than general life goals such as happiness and safety (Pintrich, 2000). At the same time, as achievement goals reveal some consistent patterns, they are less specific than specific target goals for a certain task (Pintrich, Conley, & Kempler, 2003, p. 321).

In the original model of achievement goals proposed by Dweck (1986), two types of goals exist: learning (mastery) goals and performance goals. With learning goals, individuals expect to develop skills and competence through an activity so that mastering the given task in itself becomes an essential purpose for the activity. Hence, learning goals are frequently associated with values such as advancement, progress, and improvement. On the other hand, performance goals have to do with demonstrating one’s competence and skills through the task, which in most cases is by comparison with others’ performance, so they are associated with such values as security, safety, and ability to outperform.
Although these dichotomous features of goal orientations have been widely accepted, different labels and terms have been attached to essentially similar constructs of goal orientations (Pintrich, 2000; Pintrich et al., 2003). General goals of pursuing learning, improvement, and advancement in skills have been labeled “mastery,” “learning,” and “task-involved” goals, whereas terms such as “performance,” “relative ability,” and “ego-involved goals” are used to denote goals of demonstrating one’s ability and competence relative to others (Pintrich, 2000, p. 95). Although subtle differences exist with respect to the use of different terms in the different theoretical frameworks of goal orientation models (e.g., Pintrich, 2000), as Ames and Archer (1987) contended, the features of goal constructs and their relations are similar enough to be integrated in unified constructs. Therefore, in this study, the most common labels, “mastery goals” and “performance goals,” will be adopted to represent the two distinctive types of achievement goals.

According to Pintrich (2000),

the term “goal orientation” is often used to represent the idea that achievement goals are not just simple target goals or more general goals, but represent a general orientation to the task that includes a number of related beliefs about purposes, competence, success, ability, effort, errors, and standards. (p. 94)

Goal orientation is an integrated system that reflects how individuals define competence and success, use effort, judge errors, and establish standards for evaluation. This, in turn, suggests that different goal orientations direct one’s behaviors in different manners according to one’s belief system.
First, different types of goal orientations denote different views on ability and competence (Dweck, 1986). Individuals with learning goals tend to adopt an incremental theory of intelligence, wherein competence is perceived as malleable and thus can be improved through effort. Competence is evaluated through reflection on one’s past performance to decide whether and how one’s ability and competence have been improved from the past. Conversely, individuals with performance goals are likely to adopt an entity theory of intelligence, in which competence is viewed as fixed and static. In this view, demonstrating one’s competence in relation to others becomes more important than improving one’s ability.

Task choice and pursuit processes are built around one’s goal setting. In terms of task choice, mastery goals tend to orient individuals to choose challenging tasks for the sake of learning skills and mastering tasks, albeit at the risk of making mistakes and being seen as ignorant. On the other hand, performance goals direct individuals to strategically choose tasks that are within their capacity in order not to reveal their incompetence, although learning opportunities that otherwise could have become available by choosing challenging tasks are sacrificed (Dweck, 1986).

In addition, goal orientations influence the ways individuals interpret and attribute the sources of outcomes, and they affect the degree of intrinsic motivation an actor experiences from the task (Dweck, 1986). When it comes to the construal of negative outcomes, performance-oriented individuals tend to attribute the outcomes to ability (e.g., Ames, 1984), while mastery-oriented individuals consider the cause to be the task itself or other learner-external factors. Therefore, in the face of difficulty, performance-oriented learners are likely to display defensive behaviors such as withdrawal of effort in order not to reveal their incompetence (Dweck, 1986). However, mastery-oriented individuals perceive challenge or difficulty as an opportunity from
which they can grow, so such people tend to use obstacles as cues for extended effort and persistence in learning. They even strategically use their skills and competence to overcome obstacles, which often results in enhanced performance (e.g., Ames, 1984; Dweck, 1986).

Lastly, the source of satisfaction and the level of intrinsic motivation vary depending on goal orientations (Dweck, 1986). Performance-oriented individuals’ satisfaction is largely dependent on the ability they display in task performance, whereas mastery-oriented individuals’ satisfaction derives from the efforts they exert in the process of mastering the task. Furthermore, mastery goals have been positively associated with intrinsic motivation, which arises from task performance in and of itself, while performance goals tend to show a negative relationship with intrinsic enjoyment or interest.

Different goal orientations are also assumed to be associated with different cognitive processes and learning behaviors. Mastery goal orientation has been related to positive sets of processes and outcomes including persistence in the face of failure, higher self-monitoring, and deeper processing levels (Greene & Miller, 1996). Mastery goal orientation is also likely to lead to more effective strategy-seeking behaviors and the devotion of more energy and effort to the task itself (Fisher & Ford, 1998). On the other hand, performance goal orientation has been perceived as leading to negative cognitive and affective outcomes such as surrender to failure, surface-level processing, and decreased intrinsic motivation (for a review, see Button, Mathieu, & Zajac, 1996).

2.3.2.1.2. Empirical research on goal orientation

According to achievement goal theory (Ames & Archer, 1987; Dweck, 1986), goal orientation adopted at the outset of a task creates a framework through which individuals interpret, evaluate, and act on achievement-related conditions. A substantial body of research has
examined the effects of goal orientation on various achievement motivations and outcome variables such as affect, motivation, persistence, self-regulated behaviors, and enjoyment (e.g., Ames, 1984; Dweck, 1986; Elliot, 1996; Midgley et al., 1998; Pintrich, 2000; Utman, 1997). Based on different features of the two types of goal orientations, a number of studies have sought to investigate whether and how mastery and performance orientations differentially function in task performance to result in different outcomes.

In terms of the effects of goal orientations, as predicted by the theory, overall mastery goal orientation is associated with positive performance outcomes showing adaptive patterns of learning, whereas performance goal orientation is related to negative performance outcomes and maladaptive behavioral patterns (Payne, Youngcourt, & Beaubien, 2007; Wolters, Yu, & Pintrich, 1996; Yeo, Loft, Xiao, & Kiewitz, 2009). Controversies exist, however, with respect whether these two orientations have such dichotomous effects on task performance (e.g., Dweck, 1986; Payne et al., 2007).

Some studies have supported a null hypothesis regarding the positive relationship between mastery goal orientation and performance (e.g., Cury, Elliot, Da Fonseca, & Moller, 2006), while others have shown mixed or even negative effects of mastery orientation, compared to performance orientation (Elliot & Harackiewicz, 1994, 1996; Mangos & Steele-Johnson, 2001). For example, Mangos and Steele-Johnson (2001) showed that performance-oriented individuals performed better than mastery-oriented individuals through the mediation of perceived difficulty, because performance orientation leads to increased rehearsal strategies.

Researchers have proposed potential sources of these inconsistent findings and further attempted to identify conditions or circumstances wherein positive goal orientation effects emerge (Cho, Weinstein, & Wicker, 2011). One approach has been to elaborate the construct of
goal orientation by referring to the recent reconceptualization of goal orientation structures. The traditional view of a dichotomous goal orientation structure (mastery orientation vs. performance orientation) has been reconceptualized as trichotomous with performance orientation divided into performance-approach and performance-avoidance (Elliot & Harackiewicz, 1996; Elliot & Murayama, 2008). A performance-approach goal orientation is motivated by an individual’s desire to outperform others and to demonstrate superiority to others. A performance-avoidance goal orientation, alternatively, indicates an individual’s wish not to reveal incompetence in front of others. Payne et al. (2007) maintained that the investigation of the effects of goal orientations on performance requires more sophisticated understanding of the constructs of goal orientations and their relevant antecedents and consequences.

Research adopting this tripartite goal orientation structure has shown that, in general, performance-avoidance goal orientation has a negative influence on various outcome variables; the effects of performance-approach orientation have not yet been consistently demonstrated. Elliot and Harackiewicz (1996) explored how intrinsic motivation, as indicated by enjoyment and the amount of time spent on the activity, is affected by the particular type of goal orientation that participants were assigned to adopt. They showed that, in general, performance-avoidance goal orientation had deleterious effects on intrinsic motivation, compared to performance-approach and mastery goal orientations, and that the relationship was mediated by the amount of involvement the participants had in the task.

Another approach taken to unravel the complex relationship between goal orientation and outcome measures was to address mediating variables for the relationship. Possible mediating variables that have been researched include achievement orientation (need for achievement; Elliot & Harackiewicz, 1994), learning context and perceived competence (e.g., Cho et al., 2011),

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and task demands (Steele-Johnson, Beauregard, Hoover, & Schmidt, 2000). First, in terms of achievement orientation, Elliot and Harackiewicz (1994) found that although mastery goal orientation enhanced intrinsic motivation more than performance goal orientation, achievement orientation mediated the effects of performance goal orientation. That is, for high achievement-oriented individuals, performance orientation had a positive effect, while for low achievement-oriented individuals, it had a negative effect.

Another mediating variable is perceived competence, with some studies reporting that the effects of perceived competence can override those of goal orientation (Bandura & Schunk, 1981; Elliot & Harackiewicz, 1994). Dweck (1986) maintained that although goal orientation determines a behavioral framework, competence level may also influence achievement behaviors. That is, even individuals with performance goal orientation can direct themselves to engage in mastery-oriented behaviors such as seeking challenges and showing high persistence, but this may occur only when their confidence in the present ability is high. On the other hand, individuals with performance goals who have low confidence in their ability become helpless so that they tend to avoid challenges and show low persistence. Vlachopoulos and Biddle (1997) showed that people with a performance orientation performed as well as those with a mastery orientation when they perceived their skills or competence to match or go beyond the demands of the task. Similarly, Cho et al. (2011) examined the role of perceived competence and autonomy as moderators of the relationship between goal orientations and learning-related outcomes such as interest, effort, and strategy use. They showed that perceived competence played a role in strengthening positive relationships between mastery orientation and strategy use, with autonomy fostering the relationship between mastery goal orientation and effort. However, they found no role of performance goal orientation in outcome variables.
Other researchers have explored goal orientation effects on performance that are dependent on the attentional resource demands of the task (Mangos & Steele-Johnson, 2001; Steele-Johnson et al., 2000; Yeo et al., 2009). Steele-Johnson, Beauregard, Hoover, and Schmidt (2000) hypothesized that performance-oriented individuals would benefit more from a simple task than mastery-oriented individuals, and they investigated goal orientation effects on motivation, affect, and task performance, treating task demands as a moderating variable. Their findings conformed to their predictions, indicating that a mastery goal orientation rendered beneficial outcomes in a demanding task condition, whereas a performance goal orientation showed beneficial effects in a less demanding task condition. Based on the results, they emphasized that the match between goal orientation and appropriate task demands maximizes performance.

Regarding task demand effects, Yeo et al. (2009) showed that while mastery orientation positively influences performance more than performance orientation in general, performance-approach orientation appeared to be more sensitive to the changes in task demands than mastery orientation. Utman’s (1997) meta-analysis on the effects of goal orientation on various outcome measures manifested that task complexity mediates the emergence of goal orientation effects. He showed that, in general, although mastery goal orientation is positively associated and performance goal orientation is negatively associated with performance outcomes, the advantageous effects of mastery goal orientation emerged in a relatively complex task.

To reiterate, compared to the relatively consistent beneficial effects of mastery goal orientation, the effects of performance goal orientation seem incongruent. Performance goal orientations can be either positive or negative depending on the operationalization of performance goal orientations (e.g., performance-approach vs. performance-avoidance; Elliot &
Harackiewicz, 1996) and depending on mediating variables such as achievement orientation (Cho et al., 2011), perceived competence (Bandura & Schunk, 1981; Elliot & Harackiewicz, 1994), and task demands (Mangos & Steele-Johnson, 2001; Steele-Johnson et al., 2000; Yeo et al., 2009). Finally, although the issue of the trait or state nature of motivational constructs has been debated (Duda & Nicholls, 1992; Pintrich, 2000), in general in personality research, goal orientation is considered as relatively stable across time, thus functioning as a trait-like individual-difference variable.

2.3.2.2. L2 Motivational self system

One of the most recent and influential motivational models in SLA is Dörnyei’s (2009b) L2 motivational self system. This model attempts to reconceptualize past L2 motivation research in terms of self-concept by integrating other motivational constructs such as integrativeness and instrumentality aspects of motivation. The model addresses problems in previous motivational models such as the applicability of integrative motivation to various foreign language learning contexts (e.g., Csizér & Kormos, 2009; Papi, 2010; Taguchi, Magid, & Papi, 2009b). In addition to its comprehensive nature of encompassing various L2 motivational constructs, by understanding motivation from the perspective of a self-concept, this model depicts an L2 as more than a mere communication tool, but rather as an important part in the formation of identity, adopting a whole-person perspective for understanding motivation. Dörnyei’s (2009b) model, which has been widely accepted as a comprehensive framework for understanding L2 motivation, is in line with mainstream approaches in psychology in its emphasis on self-concept in understanding motivation (Higgins, 1987, 1997; Markus & Nurius, 1986).

The L2 self system model is composed of three major constructs of self-concept: the ideal L2 self, the ought-to L2 self, and the language learning experience. The ideal L2 self refers to
L2-related aspects of one’s desired future self. The ideal L2 self is internally driven by oneself, which includes a desire to be integrated into the target language community (integrative motives) and internalized instrumental motives such as a desire for a successful career through the use of the L2. The second component is the ought-to L2 self, which represents L2-related properties one feels one ought to possess in order to meet others’ expectations or to avoid negative outcomes. This aspect of L2 self is largely based on extrinsic motives and less internalized types of instrumental motives.

In addition to the two aspects of future self-concept, the third component of the model concerns L2 learning experience. This facet is related to immediate and situation-based learner experience such as the influence of the teacher, the curriculum, the peer group, and the experience of success. Dörnyei perceived this component as having a type of executive function in learner motivation in that it can support the formulation and alteration of the L2 self-concept or L2 motivation. For example, in the early stage of L2 learning, when students may not yet have a concrete L2 self-concept, specific L2 learning experiences can significantly affect the development of the ideal L2 self.

Dörnyei’s (2009b) L2 motivational system is based on mainstream psychological claims on the role of possible selves (Markus & Nurius, 1986) and future self-guides (Higgins, 1987, 2012). Markus and Nurius’s (1986) possible selves theory postulates that one’s imagery of one’s future selves functions as a motivating source for individuals. The highlighted function of imagery in the possible selves theory has been equally emphasized in the formation of the ideal L2 self (Dörnyei, 2009b; Dörnyei & Chan, 2013). Although possible selves have self-guiding functions, not all possible selves possess the power of self-guiding. Dörnyei (2009b) argued that some strong conditions, including a strong sense of imagery, must be satisfied for possible selves
to serve as self-guides. In addition, although goals have self-guiding functions, Dörnyei (2009b) maintained that conceptualizations of goals and future self-guides should be distinguished. Future self-guiding functions of possible selves are related to long-term goal development in which goal setting, volition, and achievement processes are arranged and sought within a long-term possible selves plan. Thus, the concept of possible selves is larger than one’s long-term goals, as possible selves are not only integrated within one’s self-concept but also incorporate the current state of one’s self (p. 15).

Dörnyei’s (2009b) model bases its concept of motivational source on Higgins’s (1997) self-discrepancy theory. Higgins argued that people try to reduce the discrepancy of their desired self and their current self, and this becomes a motivational force. Dörnyei (2009b) maintained that learners’ motivational source is the perceived discrepancy between their desired future L2 selves and their current L2 self, and learners’ desire to reduce the discrepancy becomes a motivational force in their behaviors. He also argued that both the internally driven ideal L2 self and the externally driven ought-to L2 self can serve as a desired end state that creates a gap between one’s current and desired self.

A number of studies have been conducted to examine the validity and applicability of the model in various contexts (e.g., Al-Shehri, 2009; Csizér & Kormos, 2009; Ryan, 2009; Taguchi, Magid, & Papi, 2009). Taguchi et al. (2009), for example, compared how the L2 motivational self system could be applied in Chinese, Japanese, and Iranian contexts, showing generally consistent and similar findings and thus supporting the generalizability of the model. Other studies also showed that, overall, the ideal L2 self tends to be related to a motivational criterion measure such as intended learning effort, which is mediated by L2 learning experiences (Taguchi et al., 2009) or milieu (Csizér & Kormos, 2009). These studies also showed that the L2 self
system is related to integrativeness and instrumentality, wherein integrativeness and internalized instrumentality tend to be associated with the ideal L2 self, and extrinsically driven and yet-to-be internalized instrumentality showed correlations with the ought-to L2 self.

While the aforementioned studies examined the validity of the three main components of the L2 motivational self system, these studies also revealed how these components are associated with each other, creating learner motivation. A general consensus has been reached in terms of the positive role of the ideal L2 self (Csizér & Kormos, 2009) in motivation, while some research has also found the ought-to L2 self to be a powerful force in learner motivation (Papi, 2010; Taguchi et al., 2009). Interestingly, among the three main constructs of the L2 motivational self system, language learning experience has been shown to have the strongest and most direct effects on L2 learners’ language learning effort (Csizér & Kormos, 2009; Papi, 2010; Taguchi et al., 2009). It has been consistently found that language learning experience mediates the effects that ideal L2 self and ought-to L2 self have on learners’ intended learning effort or motivation. These findings imply that without positive immediate language learning experiences, it is hard to ignite or sustain motivation.

2.3.2.3. L2 anxiety

Through language learning processes, language learners experience a wide range of emotions such as feeling successful, confident, worried, and nervous. Language anxiety can be defined as “the feeling of tension and apprehension specifically associated with second language contexts, including speaking, listening, and learning” (MacIntyre & Gardner, 1994, p. 284), sometimes accompanied by self-derogatory cognition, feelings of apprehension, and physiological responses such as increased heart rate (Gardner & MacIntyre, 1993, p. 5). Three performance-related components of language anxiety were proposed by Horwitz, Horwitz, &
Cope (1986): communication apprehension, fear of negative social evaluation, and test anxiety. First, communicative apprehension arises when learners are unable to express their thoughts, which are generally more mature than their L2 capacity. Second, L2 learners are concerned about making a negative impression in social interaction with others due to their inability to successfully communicate in the L2. Another aspect of anxiety is related to tests, such as fear of not passing a test.

Anxiety can be classified into trait, situation-specific, and state in nature (e.g., MacIntyre, 1999). Trait anxiety refers to a general characteristic of an individual of becoming nervous in a wide range of contexts. Situation-specific anxiety is similar to trait anxiety but functions only in a certain context. These kinds of stable and dispositional learner anxiety are considered to be potential sources of particular emotions or behaviors. State anxiety refers to a momentary and transient emotional feeling of nervousness; such anxiety can arise from a particular task performance situation.

Some researchers, however, have asserted that trait anxiety and state anxiety are not qualitatively different, and can both be considered “a stable personality trait” (Gardner & MacIntyre, 1993). MacIntyre and Gardner (1989), through a factor analysis of both trait and state anxieties, showed that they loaded on the same factor, indicating that they are not distinctively and qualitatively different from each other. Rather, they viewed anxiety as a learned emotional response, which starts as transitory apprehension and only becomes a stable, trait-like fear after repeated occurrences of the apprehensive feeling. They emphasized the association of trait and state motivation in that foreign language anxiety tends to produce poor performance, which in turn affects one’s general state of anxiousness at the moment (p. 272). Similarly, MacIntyre (1999) argued that learners with high general anxiety tend to experience state anxiety more.
frequently, and consequently, that research that helps us understand trait and situation-specific anxiety is needed because it can help us predict who is likely to experience state anxiety (p. 29).

While most previous studies have been concerned with the trait-like nature of anxiety in defining and determining the constructs (Baker & MacIntyre, 2000; Cheng, Horwitz, & Schallert, 1999; Gardner & MacIntyre, 1993; Macintyre & Gardner, 1989), the changing moment-by-moment nature of anxiety has recently been more studied. Anxiety has been examined under the assumption that emotion and motivation affect an individual’s momentary decisions in the regulation of language learning processes and task performance (MacIntyre & Gregersen, 2012; Macintyre & Serroul, 2015). For instance, MacIntyre and Gregersen (2012) maintained that in order to fully understand language learning processes, researchers should pay attention to the link between affect in general, or anxiety in particular, and language performance. The study revealed how frequently and quickly anxiety rises and falls during tasks in process. They suggested that anxiety cannot be best understood in merely cause-and-effect terms.

Anxiety seems to influence various aspects of learner behaviors and learning (e.g., MacIntyre, 1999), regardless of the nature of anxiety, whether it be trait or state. A number of studies have shown that high anxiety is associated with low academic achievement or performance (Aida, 1994; Elkhafaifi, 2005; Horwitz, 2001; Marcos-Llinás & Garau, 2009), although studies occasionally note its facilitative role in learning (e.g., overstudying; Price, 1991).

In addition to outcome-based achievement measures, anxiety is considered to influence cognitive processes of language learning. Tobias (1986) proposed a model that specifies how anxiety engages in general learning processes including input, processing, and output in instructional settings. He argued that anxiety interferes with learning as anxious learners focus on self-directed and derogatory self-concepts rather than on task performance itself. Specifically,
when they are anxious, learners’ attention is divided into emotion-related and task-related thoughts so that they register smaller amounts of input. In addition, anxiety tends to result in latency in processes such as the retrieval of information from long-term memory. Debilitating effects of anxiety can appear at a post learning stage, such as during tests, in which case anxious learners tend to freeze up, which interrupts their recall of knowledge. Based on Tobias’s (1986) anxiety model of general learning, MacIntyre and Gardner (1994) examined how L2 anxiety is associated with three stages of task performance: input, processing, and production. They showed that stage-specific anxiety is negatively related to stage-specific performance, supporting the view that anxiety subtly impedes language processes.

Anxiety also affects social behaviors, as anxiety is related to the feeling of incapability as a social member (MacIntyre, 1999). Anxiety has been shown to be negatively associated with willingness to communicate in the target language (Baker & MacIntyre, 2000; MacIntyre & Charos, 1996; Macintyre & Legatto, 2011; Yashima, Zenuk-Nishide, & Shimizu, 2004). Yashima et al.’s (2004) study on the effects of various attitudes and affect on willingness to communicate showed that willingness to communicate is negatively associated with communication anxiety and positively associated with communication competence. The study proposed that communication anxiety and communication competence together form self-confidence, which significantly predicted L2 learners’ willingness to communicate. Anxiety also has been reported to negatively impact individuals’ perception of their competence (MacIntyre & Doucette, 2010). Willingness to communicate implies the existence of motivation or the intent to take action; therefore, such findings suggest that anxiety can play a negative role in output-related language learning opportunities and subsequent learning outcomes.
While in general anxiety is conceived of as having a debilitating role in L2 learning, different perspectives exist that take a cautious stance toward a causal relationship between high anxiety and low achievement or performance because of the issue of how anxiety should be measured (Chen & Chang, 2004; Sparks & Ganschow, 1991; Sparks & Patton, 2013). Differently put, the observed negative relationship may not necessarily be a function of anxiety per se, but could indicate a mediating function of anxiety in linking learning success with other learning-related variables such as cognitive difficulties in classroom learning. Chen and Chang (2004) showed that L2 anxiety was associated with past difficulties in learning, with about 37% of anxiety accounted for by language learning ability in their study. These findings suggest that the observed negative function of anxiety in achievement or grades could be due to learning difficulties, not the anxiety itself. Similarly, Sparks and Ganschow (1991) showed that undue L2 anxiety could originate from other general L1-related language problems. In other words, they argued that L2 anxiety is not the cause of poor L2 learning but the result of unsuccessful language learning experience. Furthermore, Sparks and Patton (2013) pointed out that a widely used foreign language anxiety measure (the Foreign Language Classroom Anxiety Scale; FLCAS) does not measure unique aspects of anxiety, but rather anxiety associated with learners’ language skills and their perceptions of their skills.

Furthermore, research on L2 anxiety has shown that it may differ depending on the type of skills involved in various processes (Pae, 2013; Saito, Horwitz, & Garza, 1999). Elkhafaifi (2005) showed that L2 listening anxiety and general L2 anxiety are distinctive in nature, despite their correlations. Cheng et al. (1999) showed that L2 learners have different types of anxiety for L2 speaking and L2 writing, implying that modality is a variable for determining L2 learners’ level of anxiety. Pae’s (2013) study also confirmed the distinctive nature of different skill-based
anxieties specific to listening, speaking, reading, or writing. He also showed that not only are these skills distinctive from general foreign language classroom anxiety, but the degree of association between each of the skill-based anxieties and general anxiety differed.

2.3.2.4. Relationships among learner variables

2.3.2.4.1. Goal orientation and L2 motivational self system

Goal orientation concerns individuals’ behavioral tendencies in an achievement-oriented task, which has been widely applied in various disciplines of human behavioral science. In particular, goal orientation has been extensively researched in educational psychology in the sense that achievement goals provide a framework within which both affective and cognitive properties of learner behaviors are formed (Pintrich & Schunk, 2002). Despite the popularity of goal orientation theory in other educational fields, as Dörnyei (2003) rightly pointed out, “there have hardly been any attempts in L2 studies to adopt the other well-known goal theory in educational psychology, goal-orientation theory” (p. 9). It is true that although L2 motivation models have drawn motivational concepts from psychology (e.g., Dörnyei, 2009b), goal orientation has received little attention.

Nevertheless, understanding learners’ achievement goals is particularly useful for explaining classroom-based educational practices. Such framework creates consistent achievement patterns, which allow teachers to better understand student behaviors and construct classroom environments that are facilitative of learning (Grant & Dweck, 2003). Dörnyei (1994) contended that L2 motivational research should expand its scope by addressing a learner-situational L2 motivation in order to provide practical guidelines for educational practices. In his view, an investigation of achievement goal orientation could provide a classroom-based micro perspective on learner motivation. More specifically, using goal orientation theory would allow
us to make predictions about learner behaviors in instructional settings based on understanding the ways individuals interpret, shape, and approach activities and events.

At an empirical level, goal orientations or goals in motivation have been attached to task performance in TBLT research. Some researchers (Batstone, 2005; Foster & Skehan, 1996; Skehan, 1998) have highlighted the need to consider individuals’ personal concerns, values, predispositions, and goals in explaining learner task performance. Empirical evidence suggests different functions of learner orientations toward task and task completion (Batstone, 2005; Li, 2010; Ortega, 1999). Batstone (2005), for example, argued that the relationship between planning opportunity and learner performance cannot be the sole result of learners’ freed attentional capacity, as many previous studies have claimed. Instead, the relationship can also be predicted via social factors and learner agency as to how they approach tasks by strategically planning and regulating their behaviors to achieve the goals they set.

Furthermore, Dörnyei (2009b) pointed out that the concept of possible selves is larger than long-term goal setting, goal action, and goal achievement, and even combinations of them in that possible selves incorporate experiential elements, “‘self states’ that people experience as reality” (p. 16). As such, the L2 motivational self system incorporates long-term goals within the context of self and identity, which reflects both the future and current state of the self.

The two models take different approaches to explaining human motivation. Goal orientation theory explains motivation as humans’ goal-directed behaviors, whereas the L2 motivational self system model perceives motivational behaviors as the process of constructing the future self. While goal orientations may shape task-specific behaviors of learners and the L2 motivational self system guides learners towards their possible selves, the underlying ideas of
goal orientation theory parallel the general motivational components of the L2 motivational self-system model (Dörnyei, 2009b).

Other similarities exist between the two approaches. The two types of goal orientation, mastery and performance goal orientations, and the two core elements of self-concept, the ideal L2 self and the ought-to L2 self, share similar features. Specifically, mastery goal orientation can be related to the concept of an ideal L2 self, and performance goal orientation to the concept of an ought-to L2 self, in terms of underlying sources of motivation. For example, an important motivational force for mastery orientation comes from inner satisfaction or enjoyment and intrinsic motivation in the task; the source of motivation of the ideal L2 self is from oneself, and even if the motivation is driven by an instrumental purpose, it must be internalized (e.g., Taguchi et al., 2009). On the other hand, in performance goal orientation, the source of motivation derives from external judgments or from others, in front of whom one wishes to demonstrate competence or conceal incompetence, and this is similar to the construct of the ought-to L2 self.

Indeed, the parallel relationship between goal orientations and L2 motivational selves has been empirically supported (Papi & Teimouri, 2014; Taguchi et al., 2009). Taguchi et al. (2009), drawing on Higgins’s (1997) promotion-focus versus prevention-focus self regulatory behaviors, showed a positive relationship between promotion-focus and ideal L2 self, and between prevention-focus and ought-to L2 self. A promotion-focus is related to the concepts of achievement, aspiration, hope, and growth, which is similar to mastery goal orientation. On the other hand, a prevention-focus orientation is concerned with duty, obligation, security, and safety, where people’s motivation develops from a desire to be secure from negative outcomes. This prevention-focus resembles the ought-to L2 self. Overall, Taguchi et al. showed that promotion-
focus predicts the ideal L2 self, and prevention-focus predicts the ought-to L2 self. In Papi and Teimouri’s (2014) study, they conceptualized the ought-to L2 self and instrumental prevention as representing prevention-focused orientations, and the ideal L2 self and instrumental promotion as related to promotion-focused orientations. It should be acknowledged, however, that mastery orientation cannot be equated with promotion focus, nor performance orientation with prevention focus. For example, according to the multistructured goal orientation model, performance orientation encompasses both performance-approach orientation, where one hopes to excel more than others, and performance-avoidance orientation, which regulates one’s behaviors so as to avoid a negative outcome. Nevertheless, given the observed similarities, it seems plausible to associate the ideal L2 self with mastery orientation and the ought-to L2 self with performance orientation. Investigation into the relationship between goal orientation and L2 motivational self system will advance the field by situating task-specific and context-based goal orientations within the larger picture of the motivational self concept.

2.3.2.4.2. L2 anxiety and L2 motivational self system

The role and function of anxiety in SLA has oftentimes been discussed within other related motivational and emotional frameworks (Hashimoto, 2002; MacIntyre & Doucette, 2010; Papi, 2010; Yashima et al., 2004), as anxiety is related to actual task performance and the construction of one’s motivation. In terms of the relationship between anxiety and L2 motivational self, Papi (2010) argued that the discrepancy between one’s current self and ideal self may arouse emotional states like L2 anxiety (p. 469) and examined the relationships between anxiety and other components of the L2 motivational self system including the ideal L2 self, the ought-to L2 self, language learning experience, and intended learning effort. He found that the ought-to L2 self (a future aspect of L2 self expected by others) tends to be strongly associated
with L2 anxiety, which can be explained in that the ought-to L2 self is formed based on others’ evaluation and expectations, and this awareness of external factors may lead to emotional apprehension. Papi’s findings align well with one component of anxiety proposed by Horwitz et al. (1986), “fear of negative evaluation,” with their definition of anxiety as “apprehension about others’ evaluations, avoidance of evaluative situations, and the expectation that others would evaluate oneself negatively” (p. 128).

Other interesting findings in Papi’s (2010) study are worth mentioning. He found that positive learning experiences were associated with low anxiety, which is somewhat expected in that it has been documented that anxiety tends to grow as a result of repeated negative experiences (e.g., Macintyre & Gardner, 1989). Another finding concerns the positive relationship between L2 anxiety and intended learning effort, which contradicts the general view that anxiety has debilitating effects. Papi conceded that the finding supports a facilitative role of anxiety in learner motivation, as it drives learners’ determination to work harder to compensate for their perceived lack of language skills. However, he was cautious in interpreting the results in that it was unclear whether a higher level of determination leads to actual effort. He supposed that the increased motivation might not lead to actual effort for those with high anxiety in that anxiety tends to produce less successful learning, which may in turn discourage their motivation. He left the question open and called for more research to better understand the relationship between L2 anxiety and actual learner effort and behaviors. The study, nevertheless, provides empirical insights as to how L2 anxiety is related to Dörnyei’s (2009b) L2 motivational self system.
Studies examining L2 anxiety within the context of goal orientations have primarily focused on the ways different types of goal orientations are associated with anxiety. Research has shown that high anxiety tends to be more strongly related to performance goal orientation than to mastery goal orientation (Dykman, 1998; Koul, Roy, Kaewkuekool, & Ploisawaschai, 2009; Ng, 2009; Sideridis, 2005). Dykman (1998) postulated that individuals seeking validation from others (performance goal orientation) will show greater anxiety when expecting stressful events, and he confirmed the relationship in his study. Similar arguments have been made in other studies. Wolters, Yu, and Pintrich (1996) argued that individuals with mastery goal orientation tend to adopt positive motivational beliefs such as higher levels of self-efficacy and perceived competence, which in turn help reduce their level of anxiety (p. 212). Their findings supported their predictions, showing that anxiety is negatively associated with mastery goal orientation, and positively associated with performance orientation.

Anxiety as it relates to goal orientations tends to affect learner behaviors and task performance. Ng (2009) examined learners’ emotions and achievement in mandatory essay writing conditions. Participants were divided into three groups according to their goal orientations (mastery goals, performance-approach goals, and work-avoidance goals). Participants’ responses to the writing task, such as strategy use, self-beliefs, and anxiety, were examined with reference to their goal orientations. Regarding learner anxiety, performance-focused learners showed more anxious learning patterns and adopted more surface strategies when performing the task. Similarly, learners with work-avoidance goals along with low mastery and low performance-approach goals also were more anxious, less efficacious, and less interested in essay completion, and they also adopted surface strategies. As a corollary,
unmotivated learners (work-avoidance goals) had a lower level of achievement than the other two groups. Ng showed that learners’ concern about performance was significantly associated with heightened levels of anxiety. He concluded that “their focus on high performance may have led to the development of high anxiety and the use of less adaptive strategies in attaining their goal of favorable ability judgment” (p. 293). In contrast, learners with mastery goals along with performance-approach goals felt less anxious.

In addition, Koul, Roy, Kaewkuekool and Ploisawaschai (2009) examined how different types of intrinsic and extrinsic goal orientations are related to different types of anxiety such as fear of failing English class, fear of negative evaluation, and English speech anxiety. In general, they showed that intrinsically driven goal orientations such as mastery goal orientation tended to be associated with low anxiety, while extrinsic goal orientations such as performance goal orientation were related to high anxiety. In terms of the link between goal orientation and the type of anxiety, although performance goal orientation was associated with all three types of anxiety, mastery goal orientation was only related to one type of anxiety, fear of negative evaluation. Self-rated L2 proficiency was negatively associated with anxiety overall, suggesting that high perceived competence might also be linked to low anxiety.

2.4. Chapter Summary

This chapter has reviewed both task and learner variables that can influence task performance and learners’ affective task experience. The discussion was situated within Robinson’s (2001a, 2001b, 2011a) triadic componential framework for task design and adopted Robinson’s distinction between task complexity and task difficulty. The chapter discussed objective task variables (task complexity, modality) and learner variables (goal orientations, L2
motivational self system, anxiety) that can determine task experience by their effects on task performance in terms of complexity, accuracy, and fluency, and can influence affective task experiences including perceived difficulty and flow.

While the existing research has generally observed positive effects of task complexity on task performance (for a review, see Jackson & Suethanapornkul, 2013), it is limited in terms of the mode of production it explores. Speaking is the dominant production mode considered in the study of task complexity, leaving unexamined the role of task complexity in writing performance. This situation persists in spite of proposals that modality can serve as another task variable that might direct learner attention to form during task performance (e.g., Kormos, 2014).

Task features not only influence linguistic aspects of task outcomes, but also arouse different affective states. Different task features and contents have been shown to be crucial factors in students’ interest and anxiety (e.g., Poupore, 2014), and different levels of perceived task difficulty have been associated with different types of emotions such as anxiety, stress, and confidence (e.g., Appel & Gilabert, 2002; Robinson, 2001b). A more systematic approach to the individual’s holistic experience with a given task can be realized by adopting the concept of flow (Csikszentmihalyi, 1990). An optimal cognitive and affective experience of flow is expected to arise when challenge and skill levels match and both are high; this generally accepted concept in psychology has been shown to be applicable in L2 learning (Egbert, 2003; Schmidt & Savage, 1992). However, L2 research on flow is rare, and its applicability to language learning contexts seems questionable, as arguments exist to support learners’ favoring of easy tasks.

Introducing Campbell’s (1988) notion of task complexity as a person–task interaction, the chapter next shifted its focus to learner contributions to task performance and affective outcomes. It has been shown that learners can plan and regulate their behaviors in task performance as to
how they approach and perform tasks (e.g., Ortega, 1999). Although it is still unclear whether their intentions or regulatory attempts lead to visible task outcomes, studies have suggested that learners’ interpretations and reactions to a given task tend to be framed by their goal orientations (e.g., Elliot & Harackiewicz, 1994). The ways learners pursue task accomplishment can be shaped by their on-the-spot or even momentary decisions given the task, and learners also bring their existing dispositional cognitive, motivational, and emotional characteristics to their task performance.

It has been shown that goal orientation forms a framework in which learners set their goals for and approaches to tasks (Ames & Archer, 1987; Dweck, 1986), thus engendering different processes and learning outcomes (Payne et al., 2007; Pintrich, 2000). In general, mastery orientation has been related to adaptive learning behavior compared to performance orientation. However, contrary findings on the positive roles of performance orientations have been reported, which has led researchers to ponder potential mediators of the relationships such as perceived competence (Cho et al., 2011) and task demands (Steele-Johnson, Heintz, & Miller, 2008). Furthermore, goal orientation has rarely been adopted as a framework in L2 research despite its wide application in other fields (Dörnyei, 2003); research on the role of goal orientation in L2 tasks will advance our understanding of task performance as well as of learners’ motivational behaviors.

As for learner motivation in task performance, Dörnyei’s (2009b) motivational L2 self system is a currently popular motivation model that not only embraces previously discussed motivational constructs such as integrativeness but also has been shown to be applicable in various contexts and settings. It is a demonstrably valid model to explain L2 motivation, and it
can also be linked to other types of motivational and emotional variables such as anxiety (Papi, 2010).

Finally, the chapter discussed L2 anxiety, and the general consensus on its debilitating role in L2 learning (for a review, see MacIntyre, 1999). In regard to issues such as whether anxiety can be either the cause or result of poor language performance (e.g., Sparks & Ganschow, 1991) and whether anxiety is either a trait or a state, no definite answers exist. Nonetheless, many studies adopt the view that anxiety is a cause and a trait, and they suggest that L2 anxiety plays a negative role in language learning (e.g., MacIntyre & Gardner, 1989). L2 anxiety has also been shown to be associated with various cognitive and motivational variables including motivational L2 self system, goal orientations, and cognitive processes. To this end, I would like to emphasize the complexity of the relationships among all the related task and learner variables that independently and interactively emerge during the process of learners’ task performance.
CHAPTER 3. METHOD

3.1. Introduction

The previous chapter reviewed theoretical perspectives and research findings concerning several task and learner variables that may affect task performance and experience. While some task features have been extensively studied, very little is known about how learners interpret task features in relation to their existing motivation and affect, despite the emphasis on learner roles in language learning (Breen, 1987; Campbell, 1988). With the goal of filling this gap, the current study examines the influence of both task design features and learner variables on linguistic and affective aspects of task performance. The study first examines the effects of two task features (task complexity and modality) on task performance in terms of complexity, accuracy, and fluency, as well as on cognitive and affective experiences of tasks (perceived difficulty and flow). The second part of this study focuses on learner variables (goal orientations, the L2 motivational self system, and anxiety), exploring the relationships of learner variables with both task performance (complexity, accuracy, and fluency) and subjective experience (perceived difficulty and flow). The relationships among learner variables are also examined to observe potential mediation effects among learner variables influencing task performance and experience. Finally, by placing all of the previously observed task and learner variables in a task performance model, the study investigates the relative contributions of various task and learner variables to task performance and experience.

3.2. Research Questions and Hypotheses

The following research questions are asked in this study.
RQ1. The effects of task design variables on task performance

RQ1-a. Task complexity effects: What differences in performance (in terms of complexity, accuracy, and fluency) are there between simple and complex tasks?

Hypothesis: Based on Robinson’s (2001b) cognition hypothesis, L2 users will produce more complex and accurate but less fluent language in complex tasks than in simple tasks in both speaking and writing.

RQ1-b. Modality effects: What differences in performance (in terms of complexity, accuracy, and fluency) are there between speaking and writing tasks?

Hypothesis: The language elicited by writing tasks will be more complex and more accurate than the language produced in speaking tasks. This prediction follows from differences in psycholinguistic processes between speaking and writing, in which on-line planning opportunities are more readily available in writing than speaking (Grabowski, 1996; Ochs, 1979; Ravid & Tolchinsky, 2002). The prediction is also based on general features of spoken and written language, whereby written text is generally more complex than spoken language. Regarding fluency, it is expected that L2 writers will be less fluent than L2 speakers, due to the recursive nature of writing (Kellogg, 1996).

RQ1-c. What interaction effects exist between modality and task complexity regarding learner task performance (complexity, accuracy, fluency)?

Hypothesis: It is expected that task complexity effects on complexity, accuracy, and fluency will be stronger in speaking than in writing, as writing provides opportunities for on-line planning that can reduce the effects of high complexity demands.

RQ2. The effects of task design variables on affective task experience

RQ2-a. Are there differences in learners’ perception of task difficulty depending on task
features of task complexity and modality?

Hypothesis: It is hypothesized that complex tasks are perceived to be more difficult than simple tasks by L2 learners in both speaking and writing, based on an overall match between manipulated task complexity and perception of task difficulty. For modality differences, speaking tasks are expected to be perceived as more difficult than writing tasks across both complexity levels, due to the on-line processing demands of speaking production.

RQ2-b. Are there differences in flow experience depending on task features of task complexity and modality?

Hypothesis: It is hypothesized that neither task complexity nor modality has a direct influence on learners' flow experience, as flow experience is expected to be mediated by the presence of optimal challenge, which differs according to each individual’s skills.

RQ3. The effects of learner variables on task performance: What relationships exist between learner variables (goal orientation, L2 anxiety) and task performance in terms of complexity, accuracy, and fluency?

Hypothesis: It is expected that a mastery orientation and low anxiety will be associated with syntactic complexity, whereas a performance orientation and high anxiety will be associated with accurate performance. Concern about their performance (performance orientation, anxiety) may lead L2 learners to be more attentive to not making mistakes, producing increased accuracy in performance. In contrast, the desire to advance (mastery orientation) may lead L2 learners to risk-taking behaviors, such as stretching their linguistic resources, resulting in increased syntactic complexity (Skehan, 1996, p. 47). Fluency is expected to be associated with low anxiety, as low anxiety has been shown to be associated with increased willingness to communicate (Yashima, Zenuk-Nishide, & Shimizu, 2004), which may help L2 learners develop
fluency.

RQ4. The effects of learner variables on task experience: What relationships exist between goal orientation and anxiety, on the one hand, and perceived task difficulty and flow on the other?

Hypothesis: In terms of learner variables on perceived difficulty, it is expected that a strong mastery orientation and low anxiety will be associated with low perceived task difficulty, whereas high performance orientation and high anxiety will be associated with high perceived task difficulty. As for the effects of learner variables on flow, no direct relationship between goal orientation and flow is hypothesized, as the relationship is expected to be mediated by perceived task difficulty and anxiety.

RQ5. Interactions between task design variables and task experience: Are the relationships between learner variables and task performance and affective outcomes similar across different task features of task complexity and modality?

Hypothesis: It is expected that the observed relationships will be consistent across various task performance conditions that vary in task complexity and modality, although the degree of strength is expected to vary. For example, the relationship between anxiety and perceived task difficulty is expected to be stronger in complex tasks and speaking tasks, compared to simple tasks and writing tasks.

RQ6. What are the relationships between goal orientations, Dörnyei’s (2009b) L2 motivational self system (ideal L2 self, ought-to L2 self, and L2 learning experience), and anxiety?

Hypothesis: It is expected that mastery goal orientation and performance orientation will be closely associated with Dörnyei’s (2009b) ideal L2 self and ought-to L2 self, respectively. L2
learning experience is expected to be positively related to mastery orientation and negatively related to performance orientation. Anxiety is expected to be positively related to performance orientation and ought-to L2 self, and negatively related to mastery orientation, ideal L2 self, and L2 learning experience.

RQ7. What are the effects of task variables (task complexity, task modality) and learner variables (goal orientation, L2 motivational self system, and L2 anxiety) on task performance (complexity, accuracy, fluency) and task experience (task challenge, flow). Also, what are the relationships among these variables?

Hypothesis: The expected relationships among the variables are presented in Figure 3.
Figure 3. The hypothesized model on the effects of task variables and learner variables on task performance and task experience.

To investigate task complexity effects on perceived task difficulty (regardless of perceived skills), perceived task difficulty scales were examined (RQ2-a). However, in this model, optimal challenge as a predictor of flow is conceptually different from perceived flow, as difficulty in itself cannot predict flow experience. Therefore, rather than the construct of “task difficulty,” the model includes “challenge,” which is composed of perceived skill level and “optimal task difficulty,” which is neither too easy nor too difficult (see Table 3 for definitions and operationalization of the constructs).
As can be seen in Figure 3, it is expected that task complexity and modality influence the ways L2 learners perceive optimal challenge and experience flow; in other words, complex tasks and writing tasks are expected to be positively associated with optimal challenge of the tasks, which in turn is expected to influence flow experience (Csikszentmihalyi, 1975, 1990). Regarding the L2 motivational self system (ideal L2 self, ought-to L2, and L2 experience), based on previous findings (e.g., Papi, 2010), it is expected that there will be a positive relationship between ideal L2 self and L2 learning experience and between ought-to L2 self and L2 anxiety. A negative relationship is expected between ought-to L2 self and L2 learning experience, and between L2 learning experience and L2 anxiety. However, the relationships among ideal L2 self, ought-to L2 self, and L2 learning experience are expected to be mediated by goal orientation. This is based on the conceptualization of the L2 motivational self as describing an overall future self-image of one’s desirable end-state, while goal orientation defines more task-specific behavioral patterns of an individual. Therefore, self-concept is considered to be a relatively abstract motivational construct of a factor that influences the ways L2 learners define and pursue task-specific goals (goal orientations). Regarding the relationships, ideal L2 self is expected to be related to mastery orientation, as both pertain to internally driven aspects of motivation. In addition, ought-to L2 self and performance orientation are expected to be positively associated, as the motivational sources for both constructs derive from others, or concern for others. Given this link, it is expected that a chain of relationships that links ideal L2 self, mastery orientation, and L2 learning experience will have a positive impact on optimal challenge (leading to flow), and performance outcomes. In contrast, motivational constructs that are driven by obligation or others’ expectation tend to create relatively weak motivational power and increase anxiety. Therefore, it is expected that a series of positive relationships among ought-to L2 self,
performance orientation, and anxiety will have a negative impact on optimal challenge and flow experience.

3.3. The Current Study

3.3.1. Participants

A total of 141 L1-Korean students of English as a foreign language (EFL) at a university in Seoul participated in the study. The original number of participants was 153, but 12 participants were removed from the sample because they were identified as outliers in the preliminary analysis or they failed to complete all tasks. Participants were recruited through classroom visits and a campus bulletin board recruiting announcement. Participation was voluntary and participants received either extra credit for a major course or monetary compensation. All data were treated anonymously by assigning a numerical code to each participant.

Prior to their participation in the study, participants were informed of the purpose, procedure, and time duration of the activities. Minimum requirements for participation included that they had studied English either exclusively or predominantly as a foreign language in Korea and had not studied or lived abroad in English-speaking countries for more than one year. Because all the participants were enrolled at the same institution, and English is an important part of the university entrance exam, it was expected that they would have relatively similar levels of proficiency. Learner proficiency was measured via Brown’s (1980) cloze test, on which the participants received on average 32.20 points out of 50 based on acceptable scores ($M = 32.20, SD = 7.82$). The results indicated that the overall proficiency level of the participants was intermediate (Tremblay, 2011). Participants were recruited from various majors; while relative homogeneity among the participants was required for the purposes of statistical analysis, the
sample population also needed to be representative of university EFL students in general. Out of 141 participants, 87 were English majors, and 54 had other majors. To confirm that there was no significant proficiency difference between English majors and non-English majors, an independent sample $t$-test was conducted with proficiency indicated by scores in the cloze test. Average mean scores and standard deviations between the groups were similar ($M = 31.97, SD = 7.17$ for English majors; $M = 32.59, SD = 8.83$ for non-English majors) and no significant proficiency difference was found ($t(139) = -.461; p = .645; \text{cohen's } d = 0.078$).

3.3.2. Instruments

3.3.2.1. Task design

Task complexity was operationalized through +/- elements as classified in Robinson’s (2001a, 2001b) triadic componential framework. The study assumed that the more features to be considered for task completion, the greater the cognitive demands of the task. This assumption aligns with Campbell’s (1988) conceptualization of a complex task as “having several interrelated and conflicting elements to satisfy” (p. 42). In addition, according to Campbell (1988), among different types of complex tasks such as decision tasks, judgment tasks, problem tasks, and fuzzy tasks, those that require decision-making have greater task complexity because they have a number of desired outcomes that can be achieved through various conflicting possible actions. For this reason, decision-making tasks were adopted in this study.

Although speaking and writing can be either monologic, dialogic, or multiparty, for the sake of simplicity and comparability, both speaking and writing were elicited in monologic tasks. During the tasks, participants had to make decisions among available options and argue for their choice. The four tasks were manipulated in two different ways in terms of task complexity and
modality: (a) simple speaking task, (b) complex speaking task, (c) simple writing task, and (d) complex writing task. Because of the repeated measures design, the four tasks were balanced in every way other than the two manipulations of complexity and modality. Information from students’ survey responses from a pilot study was used to control for such intervening variables as familiarity, content, and vocabulary, and these factors were carefully balanced across the four tasks.

For each task, participants were given instructions: They had to recommend to a friend either a school to attend or a company to work for. Depending on task complexity conditions, two or five criteria had to be considered in the choice. None of the available options, however, satisfied all of the two or five criteria. Participants were asked to compare all possible options and recommend one that maximally satisfied the consideration criteria. For all tasks, five options were provided from which participants could choose. Descriptions of each option included weather conditions, living costs, salary or tuition, studying or working environment, and cultural and sports activities. After reading the task instructions, participants were given three minutes to compare the available options and choose the one that they would recommend. In order to minimize variations in planning time across and within individuals (which the pilot study had shown to be a significant factor), all tasks had the same time constraint (Appendix C-F).

3.3.2.2. Questionnaires

Two questionnaires, one gauging aspects of individuals’ dispositional goal orientations, L2 motivational self system, and anxiety, and the other concerning participants’ experience with the tasks (task difficulty and flow), were administered. The questionnaire on dispositional learner motivation and affective characteristics was administered prior to task performance, and the questionnaire on task experience was administered after the completion of each task. The
questionnaires were in the participants’ L1, Korean, in a pencil-and-paper format, and they asked the participants to rate the applicability of a given statement on a six-point Likert scale with 1 indicating “not at all applicable” and 6 indicating “very applicable.”

3.3.2.1. Learner variables

The questionnaire on learner trait characteristics examined three aspects of learner motivational and affective properties: goal orientation, the L2 motivational self system, and anxiety. The survey comprised 64 items in total: 25 on goal orientation, 23 on L2 motivational self system, and 16 on L2 anxiety. Most of the survey items were adopted and modified from previous research (e.g., Ben Maad, 2012; Cheng, Horwitz, & Schallert, 1999; Taguchi, Magid, & Papi, 2009), but some were newly created. The items were presented in a random order. The pilot study had validated the survey items on L2 motivational self system but not those on goal orientation and L2 anxiety. Therefore, the survey included items concerned with various aspects of goal orientation and L2 anxiety, with the expectation that some items with low construct validity would be removed from the analysis later.

The goal orientation items examined the learners’ existing dispositional approach toward L2 task performance, and comprised 10 mastery orientation and 15 performance orientation items, the latter consisting of seven performance-approach and eight performance-avoidance items. Some items were adopted from a study by Ben Maad (2012a), who adapted an existing, widely cited, general goal orientation survey questionnaire (e.g., Midgley et al., 1998) to L2 task performance conditions. New items were also added to reflect goal orientation in L2 learning and task performance conditions. Examples of mastery goal orientation items include “Challenging tasks that arouse my curiosity are important to me” and “The most important goal when doing English tasks is to acquire new knowledge,” which are intended to reflect the learner’s values on
advancement or learning through performing challenging tasks. Examples of performance-approach items include “I prefer my task performance to be graded only when I do well” and “It is important for me to demonstrate my speaking or writing skills to others.” Finally, examples of performance-avoidance orientation items include “My constant fear of failure always motivates me to be successful” and “I do not want to take risks when I feel unable to complete the task.” These performance-avoidance items were intended to probe participants’ fear of failure and stance toward hiding incompetence from others, respectively.

The 23 L2 motivational self system items consisted of six items about an ideal L2 self, six about an ought-to L2 self, and 11 on L2 learning experience. An example of the items regarding the ideal L2 self, which represents the future L2 self that one wishes to become, is “I often imagine myself speaking English as if I were a native speaker of English.” The ought-to L2 self concerns L2-related properties that one feels one ought to possess in the future, as represented in the example, “I have to study English because if I do not study it, I'll be letting down parents/teachers/friends.” These items were adopted from previous research (Dörnyei, 2009b; Papi, 2010; Taguchi et al., 2009).

With respect to the construct of L2 learning experience, research based on the L2 motivation self system has typically included items about the participants’ current and immediate learning environment (e.g., Papi, 2010; Taguchi et al., 2009), asking, for example, about how enjoyable L2 learning is. However, this comes conceptually very close to what I have called here, task-experience or “flow”. In order to assess trait motivation (presumably influenced by experiences accrued from the past up to the present) in a questionnaire administered prior to task performance), items were rewritten to reflect past experience, for example “Reflecting back, I
Finally, 16 items explored participants’ L2 anxiety about speaking and writing, which reflects apprehension or worry related to the use of the L2, English. The eight items on L2 speaking anxiety are exemplified by “I am afraid that other people will laugh at me when I speak English.” L2 writing anxiety (8 items) was examined through items such as “When I hand in an English composition, I know I’m going to do poorly.” These items were taken directly from Cheng, Horwitz, and Schallert’s (1999) study, in which L2 speaking anxiety and L2 writing anxiety were shown to be distinct skill-based aspects of L2 anxiety.

3.3.2.2. Task experience

After completing each task, participants filled out a debriefing questionnaire, which asked about their perception of task difficulty and related skill level in reference to the given task demands. This questionnaire also examined participants’ cognitive and affective experience, which is represented as the motivational construct of flow. Participants were asked to rate the applicability of the statements on a six-point Likert scale, with one indicating “not at all applicable” and six representing “very applicable.”

Of the 22 items included in this survey, eight were related to task difficulty and optimal challenge level of the task in terms of difficulty and perceived skills, and 14 were about learner experiences of flow. Subjective task difficulty was gauged via two items, for example, “This task was difficult.” Perceived optimal challenge level, related to whether the degree of challenge is within the range of one’s competence, was assessed with four items. Optimal challenge was operationalized in two ways: (a) negativity toward a task being “too difficult” or “too easy” and (b) perceived compatibility of skill levels and task demands. Due to the negative connotation of
the word “too,” it was used only in the negative sense in the two items, “This task was too
difficult” and “This task was too easy,” which would reflect an absence of the conditions in
which optimal challenge is assumed to occur. The four items about perceived skills level in
relation to task demands are exemplified by “I felt competent enough to meet the high demands
of the task.”

Regarding task experience, four aspects of flow were examined in the 14 items, which
inquired into interest (4 items), willingness to repeat (2 items), attention (5 items), and control (3
items). Interest items addressed intrinsic enjoyment, as in “I found the experience very rewarding
and felt good after completing it.” Willingness to repeat represented one’s free choice to re-
engage in the task as exemplified with “I would do this again, even if it were not required.”
Attention items examined how much one was involved in a task or how little one was distracted
by other things, as in “It took no effort to keep my mind on the task” and “When doing this task,
I was distracted and thought about other things” (reverse coded). Finally, control items
represented the notion that one had a clear goal when doing the task and had a sense of control
over the process of the task. Examples include items such as “When doing this task, I had a
feeling of total control” and “When doing this task, I knew clearly what I wanted to do.”

Table 3 summarizes the conceptual and operational definitions of the constructs used in
the survey.
Table 3.
Summary of Variables Under Investigation and Their Conceptual and Operational Definitions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Conceptual Definition and Operationalization</th>
<th>Example Questionnaire Items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trait-like learner characteristics</strong>&lt;br&gt;Goal orientation</td>
<td>(a) Mastery orientation (10 items): goals related to advancement, progress, and improvement of skills&lt;br&gt;(b) Performance orientations (goals of outperformance, security, and safety)&lt;br&gt;(b-1) performance-approach (7 items): demonstration of one’s competence to others&lt;br&gt;(b-2) performance-avoidance (8 items): hiding one’s incompetence</td>
<td>(a) “The most important goal when doing English tasks is to acquire new knowledge.”&lt;br&gt;(b-1) “It is important for me to demonstrate my speaking or writing skills to others.”&lt;br&gt;(b-2) “I do not want to take risks when I feel unable to complete the task.”</td>
</tr>
<tr>
<td><strong>L2 motivational self system</strong>&lt;br&gt; Ideal L2 self (6 items): L2-related future self one desires to possess&lt;br&gt;Ought-to L2 self (6 items): L2-related future self one feels that one should possess to meet others’ expectations or to avoid negative outcomes&lt;br&gt;L2 learning experience (11 items): past L2 learning experiences</td>
<td>(a) “I often imagine myself speaking English as if I were a native speaker of English.”&lt;br&gt;(b) “I have to study English because if I do not study it, I’ll be letting down parents/teachers/friends.”&lt;br&gt;(c) “My past English learning experience was really fun and enjoyable.”</td>
<td></td>
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<tr>
<td><strong>L2 anxiety</strong>&lt;br&gt;The feeling of tension and apprehension&lt;br&gt;L2 speaking anxiety (8 items)&lt;br&gt;L2 writing anxiety (8 items)</td>
<td>(a) “I am afraid that other people will laugh at me when I speak English.”&lt;br&gt;(b) “When I hand in an English composition, I know I’m going to do poorly.”</td>
<td></td>
</tr>
<tr>
<td>Variables</td>
<td>Conceptual Definition and Operationalization</td>
<td>Example Questionnaire Items</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Task experience Perceived task difficulty</td>
<td>Subjective perception of task complexity (2 items)</td>
<td>“This task was difficult.” “This task was easy.” (reverse-coded)</td>
</tr>
<tr>
<td>Optimal challenge</td>
<td></td>
<td>(a) “This task was too difficult.” (reverse-coded) “This task was too easy.” (reverse-coded)</td>
</tr>
<tr>
<td></td>
<td>The level of difficulty is perceived as within one’s capacity while meeting a certain level of challenge.</td>
<td>(b) “I felt competent enough to meet the high demands of the task.”</td>
</tr>
<tr>
<td></td>
<td>(a) Negative responses of tasks being either “too difficult” or “too easy” (2 items)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Perceived competence (4 items)</td>
<td></td>
</tr>
<tr>
<td>Flow</td>
<td>Heightened cognitive and affective state of task involvement characterized by intrinsic interest, attention, and control</td>
<td>(a) “I found the experience very rewarding and felt good after completing it.”</td>
</tr>
<tr>
<td></td>
<td>(a) Interest (4 items): intrinsic enjoyment, curiosity about the task</td>
<td>(b) “I would do this again, even if it were not required.”</td>
</tr>
<tr>
<td></td>
<td>(b) Willingness to repeat by one’s free choice (2 items)</td>
<td>(c) “When doing this task, I was distracted and thought about other things.” (reverse coded)</td>
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<td></td>
<td>(c) Attention (5 items): the extent to which one is focused and concentrated on the task</td>
<td>(d) “When doing this task, I knew clearly what I wanted to do.”</td>
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<td></td>
<td>(d) Control (3 items): the extent of control one has over the task indicated by clear goals</td>
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</table>
3.3.3. Scoring

3.3.3.1. Task performance in complexity, accuracy, and fluency (CAF)

Speaking and writing task performance was analyzed for complexity, accuracy, and fluency. First, the speech data were pruned by removing semantically nonmeaningful discourse markers and hedging expressions such as *well, um, and you know*. False starts or repetitions were also pruned. The pruned speech data and the final product of writing were analyzed using the T-unit (minimal terminable unit) as the unit of analysis. A T-unit is composed of a main clause plus any subordinate clauses, with clause defined as a phrase dominated by VP or S.

For both speaking and writing, complexity was measured by counting (a) the number of clauses per T-unit (C/T) and (b) the number of words per T-unit (W/T). Accuracy was measured by counting (a) the total number of errors per T-unit (E/T) and (b) the number of error-free clauses per T-unit (EFC/T), with high E/T indicating low accuracy and high EFC/T indicating high accuracy. Fluency measures considered both speed fluency and breakdown fluency. Speed fluency was measured via (a) the number of words produced per minute (W/M), and breakdown fluency was measured by counting (b) the total number of pauses lasting over two seconds per T-unit (P/T). Higher W/M means higher fluency, while higher P/T indicates lower fluency. The measurements of complexity, accuracy, and speed fluency are based on the production data, and that of breakdown fluency on the process-based data. For both speaking and writing, a threshold level of two seconds was set to indicate pausing. For speaking, pauses that lasted over two seconds or pauses filled with nonmeaningful discourse markers were considered to indicate the presence of a pause. For writing, the keystroke logging program InputLog provided information on pauses during writing production. For coder reliability, two raters coded the data in terms of complexity, accuracy, and fluency. Comparison of 15% of the total data found high rater
reliability in the coding with agreement rates of approximately 97% for complexity, 92% for accuracy, and 100% for fluency.

3.3.3.2. Questionnaires

When coding participants’ responses to the questionnaires, reverse-worded items were reverse-coded. Although the survey items were based on theory-driven underlying constructs, a factor analysis was conducted as a preliminary step to validate the subscales for each construct. Some studies have created a composite score by averaging all subscales, which allowed them to observe only internal consistency (Wolters, Yu, & Pintrich, 1996); this study, through factor analysis, examines internal consistency among subscales of the same factor as well as relationships among the factors. Construct validity of the measurement can be established by detecting and eliminating problematic items. Items that loaded on multiple factors and those that seemed to randomly load on factors (low in face validity) were removed to maximize orthogonality. In addition, Cronbach’s alpha was used to assess internal consistency among the subscales for each construct. The selected items were averaged to create a composite score to represent each construct.

3.3.4. Procedures

A repeated-measures design wherein all participants completed the same set of tasks was adopted for the study. One advantage of this design in the study of task complexity, compared to a between-subjects design, is that subtle within-individual performance variations can be captured, as task complexity in particular pertains to within-individual performance variations (Robinson, 2001b; Wang & Skehan, 2014). With such an experimental design, potential intervening effects of individual differences variables such as proficiency can be controlled for.
However, disadvantages of the repeated measures design include practice effects or order effects that may result from the participants’ performing similar tasks several times. In this study, to minimize possible intervening effects, the order of tasks was counterbalanced and randomly assigned to participants.

The participants completed (a) two questionnaires, one a pre-task survey examining dispositional motivation and the other a post-task survey probing their state-like motivation (subjective experience reported after completing the task), and (b) two speaking and two writing tasks, which differed in complexity within the respective modality, and (c) a cloze test. These activities were divided into two experimental sessions on two different days, each taking approximately 40–50 minutes.

On the first day, participants were informed of the purpose and the procedure of the study and they completed a written consent form. Next, the participants completed a survey inquiring about various aspects of their pre-existing motivation and dispositions including goal orientations, the L2 motivational self system, and anxiety. The survey was followed by two tasks and post-task surveys. Each participant completed one speaking and one writing task, presented in a random order. Each task was immediately followed by a survey asking about the participant’s experience with the task in terms of perceived task difficulty, perceived skills, and flow experience, as represented by enjoyment, attention, and control.

On the second day, the participants completed the remaining tasks, which again consisted of one speaking task and one writing task, presented in the reverse order from the order in each individual’s first session. Each task was followed by the same survey probing their experience with the completed task. The performance order of the four tasks was counterbalanced within and across participants.
The speaking tasks were completed individually in a silent room and voice-recorded. Writing performance was recorded through a keystroke recording program, Inputlog Ver. 6.0, developed by a research team led by Mariëlle Leijten and Luuk Van Waes. Inputlog is freely available research software, which was designed to provide information on cognitive processes and strategies underlying the writing process. The processes are assumed to be reflected in observable writing behaviors including pausing and revision behaviors (Leijten & Van Waes, 2013, p. 362). Although multifaceted analyses on both process- and product-based writing processes are available through the program, for the purpose of the current study, only information on the speed of writing production and pausing behaviors was analyzed to investigate fluency, and the final product of the writing was analyzed for complexity and accuracy.

3.3.5. Analysis

3.3.5.1. The effects of task features on task performance (RQ1)

Research questions RQ1-a, RQ1-b, and RQ1-c investigate the effects of task features on task performance in terms of complexity, accuracy, and fluency (CAF). A two-way repeated measures MANOVA was conducted to examine overall effects of task complexity and task modality (RQ1-a, RQ1-b) as well as their interaction effects (RQ1-c). The two independent variables (IVs) were the two levels of task complexity (simple, complex) and the two levels of task modality (speaking, writing), and the dependent variables (DVs) were the six measures of CAF. Given the overall picture of the effects of task features on task performance, task complexity effects and task modality effects were examined separately. For task complexity effects (RQ1-a), two separate repeated-measures MANOVAs were conducted for speaking and
writing, because task complexity effects for the two modalities were not assumed to be similar in the study. For each case, the independent variable (IV) was task complexity with two levels, and the dependent variables were the six measures of CAF. Similarly, for modality effects (RQ1-b), two sets of MANOVAs were employed for simple and complex tasks. For comparing modalities in simple tasks, the independent variable (IV) was the two levels of modality and the dependent variables (DV) were the six measures of CAF. A critical $p$-value of .002 was set for statistical significance throughout the study, which was based on a Bonferroni adjustment, representing the comparison-wise $p$-value; that is, experimental-wise $p$-value of .05 was divided by 27, the total number of comparisons made throughout the whole dissertation.

### 3.3.5.2. The effects of task features on task experience (RQ2)

The second set of research questions concerns how task features (task complexity, task modality) influence task experience including perceived task difficulty and flow. Regarding task difficulty (RQ2-a), a repeated measures ANOVA was conducted to answer whether there were differences in learners’ perception of task difficulty across the four tasks that differed in task complexity and task modality. The two independent variables (IVs) were the two levels of task complexity and two levels of task modality, and the dependent variable (DV) was perceived task difficulty. For flow experience (RQ2-b), which encompasses interest, attention, and control, flow was first examined by being decomposed into its subcomponents in order to understand the influence that task features have on specific aspects of flow experience. For this, a repeated measures MANOVA was conducted, in which the two independent variables (IVs) were task complexity and task modality, with two levels for each, and the three dependent variables (DV$s$) were interest, attention, and control. Along with this, the effects of task features on flow as a
holistic representation of interest, attention, and control were also examined through a repeated-measures ANOVA. In this case, the two independent variables (IVs) were the two levels of task complexity (simple, complex) and the two levels of task modality (speaking, writing), and the one dependent variable (DV) was flow experience.

3.3.5.3. The effects of learner variables on task performance and task experience (RQ3–RQ6)

The third set of research questions (RQ3) addressed the relationships between learner variables and task performance in complexity, accuracy, and fluency (CAF). Various aspects of learner characteristics such as goal orientation, the L2 motivational self system, and L2 anxiety were correlated with the three aspects of task performance (CAF). In addition, the relationships between learner variables and their experience of task difficulty and flow were examined through bivariate correlation analysis (RQ4). In examining flow experiences, the relationship between learner variables and flow was examined first by dividing flow into interest, attention, and control. However, the overall correlations observed with specific aspects of flow were not different from the correlations observed with flow as an integrated construct. Therefore, flow was examined as a unified construct for further analysis.

In order to examine whether the observed relationships between learner variables and task performance and task experience were consistent across the four task performance conditions (RQ5), descriptive comparisons of the correlations were made. For RQ6, bivariate correlation analysis was employed to examine the relationships among learner variables (goal orientation, the L2 motivational self system, and L2 anxiety).

3.3.5.4. Testing the hypothesized model: Structural Equation Modeling (SEM) (RQ7)

The last research question (RQ7) examines the holistic relationships among various trait-like learner variables and task-specific motivational and affective experience and task
performance. In order to examine whether the hypothesized relationships among variables in the proposed model can be supported by the observed data, structural equation modeling (SEM) was employed. SEM is generally composed of two parts: the structural model, which indicates the relationships between latent variables, and the measurement model, which defines the relationships between measured variables (i.e., survey items) and the underlying latent variables that the measured variables are intended to measure. In the model, as illustrated in Figure 3, latent variables are represented by ovals and measurement variables by rectangles. Arrows from one latent variable to another latent variable indicate causal relationship in the direction the arrows point; and two arrows between latent variables represent correlations between the latent variables.

For testing the model fit in SEM, indicator variables, representatives of the latent variables, were selected based on the preliminary factor analysis. The two highest subscales were chosen as indicator variables. For components of flow, composite scores of interest, attention, and control were used for indicator variables. Optimal challenge was indicated by two composite scores of difficulty and perceived skills, respectively. Task performance is represented by complexity, accuracy, and fluency measures.

In addition to chi-square statistics, several goodness-of-fit indices were employed to test the proposed model in relation to observed data; these included chi-square ratio, the comparative fit index (CFI), the parsimonious fit index (PCFI), and the root mean square error of approximation (RMSEA). As chi-square statistics are too strict and sensitive to sample sizes, a related method using the chi-square ratio was adopted. Several complementary model fit indices including comparative fit indices (CFI) and parsimonious fit index of PCFI were also employed. Finally, the most widely used model fit index of comparative model fit of RMSEA was adopted.
These indices were selected because each measures model fit from a slightly different perspective and furthermore are commonly reported in SEM research (Tabachnick & Fidell, 2007, p. 725). Model improvements were made through chi-square statistics differences test. Once the model was accepted, the path coefficients were examined to find the directions and magnitudes of the relationships among variables. The path coefficients also showed relative contributions of task features (task complexity, modality) and learner variables (goal orientation, the L2 motivational self system, L2 anxiety) to task performance outcomes of complexity, accuracy, and fluency as well as task experience of flow mediated by perceived task difficulty.
CHAPTER 4. RESULTS

4.1. Preliminary Analysis

4.1.1. Data cleaning and assumption testing

4.1.1.1. Data cleaning for MANOVA

Several statistical assumptions need to be confirmed regarding the data prior to conducting analysis. These include checking for the presence of outliers, multivariate normality, the linearity of dependent variables (DVs), the presence of multicollinearity and singularity, and homogeneity of variance. Prior to assumption checking, missing values were identified in the data. All missing data points were replaced with the mean score of the respective variable. Prior to mean replacement, missing data patterns were examined to ensure that the missing data is distributed randomly.

Outliers in MANOVA tend to cause Type I and Type II errors in statistical analysis, where a true null hypothesis can be incorrectly rejected or a false null hypothesis is not rejected, respectively. The presence of both univariate and multivariate outliers was examined in the data. For univariate outliers, Z-score transformations were conducted for performance outcomes for complexity, accuracy, and fluency, and absolute standardized score values over 3.29 were considered as outliers. One univariate outlier was detected, and this case was removed from the sample as this participant was both outside the normal distribution. Multivariate outliers were identified by calculating Mahalanobis distance values. As there were numerous combinations for all pairs of DVs, randomly selected sets of pairs and groups of DVs were analyzed for multivariate outliers. A total of 10 multivariate outliers were detected and those outliers were removed for all further analyses.
Next, the normality of the distributions was examined. Shapiro-Wilk's normality tests were statistically significant ($p < .05$), suggesting that the data were not all normally distributed. Skewness and kurtosis were calculated to determine the extent of non-normality within the data. Skewness represents the degree of asymmetrical distribution around the mean while kurtosis indicates the relative steepness or flatness of the distribution. In general, if the absolute skewness values, measured via skewness statistics divided by the standard error of skewness statistics, are below 3.00, it is considered that the data is normally distributed around mean. Taking an example of complexity measure of clause ratio (C/T) in the simple speaking task (T1), the skewness statistics of 0.911 divided by the standard error of skewness (.204) equals 4.465. This value of 4.465 is greater than 3.00 indicating that C/T in the speaking test is markedly skewed. Likewise, for kurtosis, if the values are around zero, the data is considered to be normally distributed, while absolute values greater than 3.00 indicate the distribution is kurtotic. Table 4 shows the descriptive statistics, kurtosis, and skewness for the all outcome measures.
Table 4

*Descriptive Statistics for Performance Measures Before Transformation*

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Absolute Skewness</th>
<th>Skewness /Std. Error of Skewness (.204)</th>
<th>Skewness /Std. Error of Kurtosis (.406)</th>
<th>Kurtosis /Std. Error of Kurtosis (.406)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complexity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C/T) T1</td>
<td>1.704</td>
<td>0.402</td>
<td>0.911</td>
<td>4.465</td>
<td>0.812</td>
<td>2.001</td>
</tr>
<tr>
<td>T2</td>
<td>1.728</td>
<td>0.422</td>
<td>1.515</td>
<td>7.424</td>
<td>3.195</td>
<td>7.878</td>
</tr>
<tr>
<td>T3</td>
<td>1.837</td>
<td>0.414</td>
<td>1.483</td>
<td>7.265</td>
<td>4.077</td>
<td>10.052</td>
</tr>
<tr>
<td>T4</td>
<td>1.841</td>
<td>0.408</td>
<td>0.958</td>
<td>4.691</td>
<td>0.856</td>
<td>2.112</td>
</tr>
<tr>
<td><strong>Complexity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(W/T) T1</td>
<td>7.986</td>
<td>1.587</td>
<td>1.597</td>
<td>7.822</td>
<td>4.738</td>
<td>11.683</td>
</tr>
<tr>
<td>T2</td>
<td>7.379</td>
<td>1.063</td>
<td>0.670</td>
<td>3.281</td>
<td>1.596</td>
<td>3.935</td>
</tr>
<tr>
<td>T3</td>
<td>7.572</td>
<td>1.261</td>
<td>0.880</td>
<td>4.309</td>
<td>1.348</td>
<td>3.324</td>
</tr>
<tr>
<td>T4</td>
<td>7.138</td>
<td>1.155</td>
<td>0.405</td>
<td>1.983</td>
<td>2.541</td>
<td>6.266</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(E/T) T1</td>
<td>0.569</td>
<td>0.313</td>
<td>0.586</td>
<td>2.872</td>
<td>-0.202</td>
<td>-0.498</td>
</tr>
<tr>
<td>T2</td>
<td>0.498</td>
<td>0.331</td>
<td>1.715</td>
<td>8.403</td>
<td>5.356</td>
<td>13.207</td>
</tr>
<tr>
<td>T3</td>
<td>0.471</td>
<td>0.380</td>
<td>2.108</td>
<td>10.325</td>
<td>6.411</td>
<td>15.808</td>
</tr>
<tr>
<td>T4</td>
<td>0.474</td>
<td>0.361</td>
<td>1.399</td>
<td>6.852</td>
<td>2.230</td>
<td>5.499</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(EFC/T) T1</td>
<td>1.234</td>
<td>0.418</td>
<td>0.663</td>
<td>3.250</td>
<td>0.161</td>
<td>0.398</td>
</tr>
<tr>
<td>T2</td>
<td>1.311</td>
<td>0.452</td>
<td>1.093</td>
<td>5.356</td>
<td>2.539</td>
<td>6.261</td>
</tr>
<tr>
<td>T3</td>
<td>1.461</td>
<td>0.450</td>
<td>0.636</td>
<td>3.115</td>
<td>1.072</td>
<td>2.643</td>
</tr>
<tr>
<td>T4</td>
<td>1.459</td>
<td>0.473</td>
<td>0.591</td>
<td>2.896</td>
<td>0.957</td>
<td>2.361</td>
</tr>
<tr>
<td><strong>Fluency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(W/M) T1</td>
<td>82.884</td>
<td>23.356</td>
<td>0.394</td>
<td>1.932</td>
<td>0.797</td>
<td>1.964</td>
</tr>
<tr>
<td>T2</td>
<td>83.000</td>
<td>22.478</td>
<td>0.620</td>
<td>3.038</td>
<td>1.725</td>
<td>4.253</td>
</tr>
<tr>
<td>T3</td>
<td>12.510</td>
<td>4.349</td>
<td>1.107</td>
<td>5.422</td>
<td>1.973</td>
<td>4.865</td>
</tr>
<tr>
<td>T4</td>
<td>12.818</td>
<td>4.688</td>
<td>0.819</td>
<td>4.014</td>
<td>2.416</td>
<td>5.957</td>
</tr>
<tr>
<td><strong>Fluency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(P/T) T1</td>
<td>0.244</td>
<td>0.400</td>
<td>5.639</td>
<td>27.626</td>
<td>45.030</td>
<td>111.036</td>
</tr>
<tr>
<td>T2</td>
<td>0.257</td>
<td>0.371</td>
<td>5.474</td>
<td>26.814</td>
<td>42.959</td>
<td>105.929</td>
</tr>
<tr>
<td>T3</td>
<td>4.637</td>
<td>2.587</td>
<td>2.668</td>
<td>13.068</td>
<td>14.285</td>
<td>35.225</td>
</tr>
</tbody>
</table>

*Note.* C/T indicates the number of clauses per T-unit; W/T: words per T-unit; Accuracy - E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; Fluency - W/M: words per minute; P/T: number of pauses per T-unit; T1 = simple speaking; T2 = complex speaking; T3 = simple writing; T4 = complex writing.

As Table 4 shows, overall the distributions of performance measures are positively skewed, and many appear to be severely non-normal based on absolute skewness values greater than 1.
than 3.00. Similar findings can be seen in terms of kurtosis, suggesting that the data tends to be clustered around the mean. Therefore, a logarithmic transformation of the data was conducted to create more normal distributions in the data. Table 5 presents the descriptive statistics for performance measures after data transformation.

After transformation, most of the distributions can be considered normal for analysis purposes. Those DVs that remain skewed after transformation include error ratio (E/T) and words per minute (W/M) for T1, clause ratio (C/T) and W/M for T2, and error-free clause ratio (EFC/T) for T4. Similarly, the ratio of error-free clauses per unit (EFC/T) for the complex writing task and fluency measure of words per minute (W/M) in both simple and complex speaking tasks remain kurtotic after transformation. While kurtosis is not likely to have a large effect on violations of normality, skewness can oftentimes create problems in MANOVA; however, as repeated measures are less sensitive to these violations, the transformed data should be suitable for further analysis.
Table 5

Descriptive Statistics for Performance Measures After Logarithmic Transformation

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Absolute Skewness</th>
<th>Skewness/Std. Error of Skewness</th>
<th>Kurtosis/Std. Error of Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complexity (C/T)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>0.220</td>
<td>0.098</td>
<td>0.322</td>
<td>1.580</td>
<td>-0.206</td>
</tr>
<tr>
<td>T2</td>
<td>0.226</td>
<td>0.096</td>
<td>0.742</td>
<td>3.633</td>
<td>0.702</td>
</tr>
<tr>
<td>T3</td>
<td>0.254</td>
<td>0.091</td>
<td>0.556</td>
<td>2.723</td>
<td>1.074</td>
</tr>
<tr>
<td>T4</td>
<td>0.255</td>
<td>0.092</td>
<td>0.403</td>
<td>1.976</td>
<td>-0.081</td>
</tr>
<tr>
<td><strong>Complexity (W/T)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>1.115</td>
<td>0.104</td>
<td>0.298</td>
<td>1.462</td>
<td>-0.254</td>
</tr>
<tr>
<td>T2</td>
<td>1.090</td>
<td>0.095</td>
<td>0.176</td>
<td>0.862</td>
<td>-0.144</td>
</tr>
<tr>
<td>T3</td>
<td>1.127</td>
<td>0.103</td>
<td>0.172</td>
<td>0.843</td>
<td>-0.031</td>
</tr>
<tr>
<td>T4</td>
<td>1.103</td>
<td>0.117</td>
<td>-0.311</td>
<td>-1.525</td>
<td>0.585</td>
</tr>
<tr>
<td><strong>Accuracy (E/T)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>-0.317</td>
<td>0.271</td>
<td>-0.658</td>
<td>-3.221</td>
<td>0.356</td>
</tr>
<tr>
<td>T2</td>
<td>-0.389</td>
<td>0.285</td>
<td>-0.234</td>
<td>-1.149</td>
<td>-0.252</td>
</tr>
<tr>
<td>T3</td>
<td>-0.433</td>
<td>0.324</td>
<td>-0.318</td>
<td>-1.557</td>
<td>0.242</td>
</tr>
<tr>
<td>T4</td>
<td>-0.422</td>
<td>0.326</td>
<td>-0.415</td>
<td>-2.031</td>
<td>0.099</td>
</tr>
<tr>
<td><strong>Accuracy (EFC/T)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>0.066</td>
<td>0.149</td>
<td>-0.189</td>
<td>-0.925</td>
<td>-0.193</td>
</tr>
<tr>
<td>T2</td>
<td>0.092</td>
<td>0.148</td>
<td>-0.183</td>
<td>-0.898</td>
<td>0.358</td>
</tr>
<tr>
<td>T3</td>
<td>0.143</td>
<td>0.138</td>
<td>-0.384</td>
<td>-1.883</td>
<td>0.270</td>
</tr>
<tr>
<td>T4</td>
<td>0.139</td>
<td>0.153</td>
<td>-0.889</td>
<td>-4.353</td>
<td>2.497</td>
</tr>
<tr>
<td><strong>Fluency (W/M)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>1.900</td>
<td>0.132</td>
<td>-0.815</td>
<td>-3.991</td>
<td>1.784</td>
</tr>
<tr>
<td>T2</td>
<td>1.902</td>
<td>0.124</td>
<td>-0.837</td>
<td>-4.100</td>
<td>3.006</td>
</tr>
<tr>
<td>T3</td>
<td>1.071</td>
<td>0.148</td>
<td>-0.165</td>
<td>-0.809</td>
<td>0.774</td>
</tr>
<tr>
<td>T4</td>
<td>1.084</td>
<td>0.156</td>
<td>-0.382</td>
<td>-1.871</td>
<td>0.600</td>
</tr>
<tr>
<td><strong>Fluency (P/T)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>-0.992</td>
<td>0.636</td>
<td>-0.312</td>
<td>-1.530</td>
<td>-0.741</td>
</tr>
<tr>
<td>T2</td>
<td>-0.924</td>
<td>0.621</td>
<td>-0.602</td>
<td>-2.948</td>
<td>-0.483</td>
</tr>
<tr>
<td>T3</td>
<td>0.609</td>
<td>0.219</td>
<td>-0.060</td>
<td>-0.293</td>
<td>0.737</td>
</tr>
<tr>
<td>T4</td>
<td>0.571</td>
<td>0.239</td>
<td>-0.264</td>
<td>-1.295</td>
<td>1.227</td>
</tr>
</tbody>
</table>

Note. C/T indicates the number of clauses per T-unit; W/T: words per T-unit; Accuracy - E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; Fluency - W/M: words per minute; P/T: number of pauses per T-unit; T1 = simple speaking; T2 = complex speaking; T3 = simple writing; T4 = complex writing.

Linearity was also checked for all DVs. All relationships between DVs appeared to be linear. Multicollinearity and singularity were tested through a correlation analysis among
variables, with no indications of multicollinearity or singularity problems found in the data. A scatter plot also confirmed no multicollinearity issues with the current data set.

Finally, the homogeneity of variance for individual DVs was examined through residual error plots. The findings showed that the variable's residual (error) indicates consistent variance (homoscedasticity), confirming the homogeneity of variance across all DVs.

4.1.1.2. Data cleaning for SEM

Data cleaning and assumption checks were conducted with survey data for use in factor analysis and structural equation modeling (SEM). For both forms of analysis, the following assumptions regarding the data need to be satisfied: (a) no missing values; (b) multivariate normality; (c) no outliers; (d) linearity among latent variables; (e) absence of multicollinearity and singularity; (f) and small residuals.

Since SEM is sensitive to missing data, all existing data sets were submitted to a missing value analysis. There were a few cases of missing values but no systematic patterns were found among missing values. Therefore, all missing values were replaced with mean scores for their respective variables. One participant only filled out half of their survey and was subsequently dropped from the final analysis. No univariate outliers were detected in the data, likely due to the use of Likert scale items restricting the potential range of responses. Ten multivariate outliers were detected using AMOS and removed from the sample. In order to check for multicollinearity a Variable Inflation Factor (VIF) was calculated for all independent variables (IVs). VIF values over 3.00 are considered to be problematic, but the data all fell within acceptable levels. Lastly, in order to check whether the distribution of the residual covariances were symmetrical, a test of homoscedasticity carried out. The results showed that the residuals were centered around zero, satisfying the homoscedasticity assumption for SEM.
4.1.2. Factor analysis for construct validity

Factor analysis was used as a preliminary step to further data analysis using SEM. This form of analysis is useful for detecting problematic items and reducing the number of items per variable. It also helps develop the initial measurement model for inclusion in the full SEM. In addition, factor analysis can help confirm that there are clear underlying factor structures for the hypothesized constructs. This served as a basis for calculating composite scores (i.e., factor scores) for main the analyses.

Exploratory Factor Analysis (EFA) was selected over Principal Components Analysis (PCA) based on a priori theory about the presence of expected factors related to goal orientation, the L2 motivational self system, and L2 anxiety reviewed in the earlier chapters. In determining the specific number of underlying factors, several criteria were referenced, including Kaiser’s stopping rule (i.e., eigen values), the results of the scree plot, the number of non-trivial factors, and a priori criteria. First, based on Kaiser’s stopping rule, Eigen values over 1.000 were used to identify the number of factors. Along with this, the results of a scree plot were analyzed to identify the number of factors before a change in slope becomes visible in the plot. Based on these findings, factors were further identified as only those with four or more loadings over .300 (i.e., non-trivial factors).

Varimax rotation method was adopted as this maximizes orthogonality, which is relevant to the current study. Factor loadings over .300 were considered significant. Through a series of factor analyses, redundant items and those that loaded on multiple factors were considered problematic because those items are considered to interfere with the orthogonality of the factor structures.
The following section shows results from a factor analysis conducted for each motivational constructs. Adequacy of data for EFA was examined through Kaiser-Meyer-Olkin Measures of Sampling Adequacy (KMO) with KMO showing good factorability for survey items.

4.1.2.1. Learner variables (Goal Orientation, L2 Motivational Self System, L2 Anxiety)

Several aspects of the trait features of learner variables adopted in the study include goal orientation (e.g., mastery, performance-approach, performance-avoidance), the motivational L2 self system (e.g., ideal L2 self, ought-to L2 self, language learning experiences), and anxiety (e.g., speaking, writing), and three sets of factor analysis were conducted for each of the respective constructs.

First, 28 goal orientation survey items were entered into an EFA, which were hypothesized to fall into three distinct factors: (a) mastery orientation; (b) performance-approach orientation; and (c) performance-avoidance orientation. After eliminating problematic items, the best-fitting items were selected and their factor loadings and communalities are presented in Table 6. The loadings are presented according to the loading size. Communalities ($h^2$) are displayed in the rightmost column, indicating how much communality each item shares with other items in explaining the respective factor (See Appendix I for correlation matrix).
Table 6

*Factor Loadings for Goal Orientation After Varimax Rotation*

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prev3 (It is important for me I don't give impression to teachers/friends that I am not doing well)</td>
<td>0.838</td>
<td>0.094</td>
<td>0.711</td>
</tr>
<tr>
<td>Prev4 (One reason of studying English is in order not to make other people think that I am stupid)</td>
<td>0.732</td>
<td>-0.024</td>
<td>0.536</td>
</tr>
<tr>
<td>Per2 (The opinions my classmates hold about my speaking or writing performance are important to me)</td>
<td>0.636</td>
<td>0.061</td>
<td>0.408</td>
</tr>
<tr>
<td>Per10 (I prefer waiting to see how others perform the task so that I will not make the same mistakes)</td>
<td>0.475</td>
<td>-0.193</td>
<td>0.263</td>
</tr>
<tr>
<td>Prev5 (One important reason for studying English is not to make myself embarrassed because of English)</td>
<td>0.429</td>
<td>-0.105</td>
<td>0.195</td>
</tr>
<tr>
<td>Per5 (I feel successful in my speaking/writing task when I avoid many mistakes)</td>
<td>0.426</td>
<td>0.048</td>
<td>0.183</td>
</tr>
<tr>
<td>Per4 (I prefer my task performance to be graded only when I do well)</td>
<td>0.364</td>
<td>-0.097</td>
<td>0.142</td>
</tr>
<tr>
<td>Mas8 (I like speaking or writing tasks best when they make me learn new things)</td>
<td>-0.043</td>
<td>0.726</td>
<td>0.529</td>
</tr>
<tr>
<td>Mas12 (The most important goal when doing English tasks is to acquire new knowledge)</td>
<td>-0.020</td>
<td>0.710</td>
<td>0.505</td>
</tr>
<tr>
<td>Mas1 (Challenging tasks that arouse my curiosity are important to me)</td>
<td>0.006</td>
<td>0.565</td>
<td>0.319</td>
</tr>
<tr>
<td>Mas2 (I am confident I will do well in English tasks even though they are difficult)</td>
<td>-0.156</td>
<td>0.520</td>
<td>0.295</td>
</tr>
<tr>
<td>Mas11 (An important reason why I do English tasks is because I want to get better at it)</td>
<td>0.141</td>
<td>0.460</td>
<td>0.231</td>
</tr>
<tr>
<td>Mas5 (When I face difficulty in performing a speaking or writing task, I always try different ways until it is finished)</td>
<td>-0.115</td>
<td>0.309</td>
<td>0.109</td>
</tr>
</tbody>
</table>

**Total Variance Explained (%)**

|          | 18.660 | 15.393 | 34.053 |

*Note.* Highly loading items are displayed in **bold** to clearly display their loadings.

Principal Axis Factoring with varimax rotation revealed a two-factor solution, where Factor 1 seems to represent a performance goal orientation and an overriding concern for the opinions of others while Factor 2 appears to show a mastery orientation. Despite the possible
divergence in a performance orientation as performance-approach (performance) and performance-avoidance (prevention) orientations, they merged together comprising one factor, as a performance goal orientation. The two factors of performance orientation and mastery orientation together explained 34% of the total variance.

Next, 29 survey items for the three main constructs of the L2 motivational self system—ideal L2 self (IS), ought-to L2 self (OS) and language learning experience (Exp)—were entered into an EFA. Recursive factor analyses was used by removing some cross-loading items (i.e., variables that load on more than two factors) and redundant items, which led to the reduction of 29 items into 19 items, which were used in the final factor analysis. Table 7 reveals the results of this reduced factor analysis for the L2 motivational self system (See Appendix J for correlation matrix).

As Table 7 shows, a three factor solution was found for the 16 items using a Principal Axis Factoring extraction method with varimax rotation. Examination of bold-faced, high loading items for each factor shows that four factor labels suited the hypothesized structures of the L2 motivational self system. Factor 1 seems to represent ideal L2 self; Factor 2 likewise appears to represent L2 language learning experience; and Factor 3 represents the ought-to L2 self. The three factors explained 45.139% of the total variance.
Table 7

*Factor Loadings on L2 Motivational Self System After Varimax Rotation*

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal3 (I often imagine myself speaking English as if I were a native speaker of English)</td>
<td><strong>.831</strong></td>
<td>.085</td>
<td>.085</td>
<td>.705</td>
</tr>
<tr>
<td>Ideal1 (I often imagine myself living abroad and having a discussion in English)</td>
<td><strong>.817</strong></td>
<td>.095</td>
<td>-.004</td>
<td>.677</td>
</tr>
<tr>
<td>Ideal2 (I often imagine myself speaking English with international friends or colleagues)</td>
<td><strong>.779</strong></td>
<td>.102</td>
<td>.137</td>
<td>.635</td>
</tr>
<tr>
<td>Ideal6 (I often imagine myself writing English emails fluently)</td>
<td><strong>.535</strong></td>
<td>.018</td>
<td>.268</td>
<td>.358</td>
</tr>
<tr>
<td>Ideal4 (Whenever I think of my future career, I imagine myself using English)</td>
<td><strong>.510</strong></td>
<td>.289</td>
<td>.250</td>
<td>.406</td>
</tr>
<tr>
<td>Exp11(Compared to my friends, I think I was active in putting efforts for English learning)</td>
<td>.003</td>
<td><strong>.703</strong></td>
<td>.167</td>
<td>.523</td>
</tr>
<tr>
<td>Exp10 (I think my English learning effort has been successful so far)</td>
<td>-.013</td>
<td><strong>.680</strong></td>
<td>-.053</td>
<td>.465</td>
</tr>
<tr>
<td>Exp2 (Past English learning experience was really fun and enjoyable)</td>
<td>.096</td>
<td><strong>.630</strong></td>
<td>.010</td>
<td>.406</td>
</tr>
<tr>
<td>Exp1 (Reflecting back, I did not like my English classes. (reverse coding))</td>
<td>.036</td>
<td><strong>.537</strong></td>
<td>-.051</td>
<td>.292</td>
</tr>
<tr>
<td>Exp5 (My study experience with native speakers of English was fun and interesting)</td>
<td>.189</td>
<td><strong>.532</strong></td>
<td>-.120</td>
<td>.333</td>
</tr>
<tr>
<td>Exp4 (I have enjoyed watching English drama or listening English radio)</td>
<td>.163</td>
<td><strong>.462</strong></td>
<td>.017</td>
<td>.240</td>
</tr>
<tr>
<td>Ought6 (Studying English is important to me because other people will respect me more if I have a knowledge of English)</td>
<td>.181</td>
<td>.275</td>
<td><strong>.727</strong></td>
<td>.638</td>
</tr>
<tr>
<td>Ought5 (Studying English is important to me because an educated person is supposed to be able to speak English)</td>
<td>.201</td>
<td>.018</td>
<td><strong>.609</strong></td>
<td>.412</td>
</tr>
<tr>
<td>Ought3 (Studying English is important to me because I can gain the approval of my peers/teachers/family/boss)</td>
<td>.145</td>
<td>.118</td>
<td><strong>.602</strong></td>
<td>.398</td>
</tr>
<tr>
<td>Ought2 (I have to study English because if I do not study it, I’ll be letting down parents/teachers/friends)</td>
<td>.034</td>
<td>-.276</td>
<td><strong>.593</strong></td>
<td>.429</td>
</tr>
<tr>
<td>Ought1 (I study English because people surrounding me expect me to do so)</td>
<td>.011</td>
<td>-.157</td>
<td><strong>.529</strong></td>
<td>.305</td>
</tr>
<tr>
<td><strong>Total Variance Explained (%)</strong></td>
<td>16.753</td>
<td>15.244</td>
<td>13.143</td>
<td>45.139</td>
</tr>
</tbody>
</table>

*Note.* Highly loading items are displayed in **bold** to clearly display their loadings.
Finally, 16 anxiety items were run using EFA. Problematic items were again removed to identify the best fit and the clearest structure. The final set of survey items as well as their factor loadings and commonalities are shown in Table 8 (See Appendix K for correlation matrix).

Table 8

*Factor Loadings for Anxiety After Varimax Rotation*

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>( h^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpkAnx4 (I start to panic when I have to speak English without preparation)</td>
<td>.802</td>
<td>.225</td>
<td>.693</td>
</tr>
<tr>
<td>SpkAnx7 (I would not be nervous speaking English with native speakers. (reverse coding))</td>
<td>.767</td>
<td>.124</td>
<td>.604</td>
</tr>
<tr>
<td>SpkAnx8 (I don’t worry about making mistakes when speaking in English. (reverse coding))</td>
<td>.749</td>
<td>.068</td>
<td>.566</td>
</tr>
<tr>
<td>SpkAnx2 (I get nervous and confused when I am speaking English in front of other people)</td>
<td>.712</td>
<td>.245</td>
<td>.568</td>
</tr>
<tr>
<td>SpkAnx5 (It embarrasses me to volunteer answers in my English classes)</td>
<td>.637</td>
<td>.288</td>
<td>.489</td>
</tr>
<tr>
<td>WrtAnx2 (I’m not good at writing in English)</td>
<td>.087</td>
<td>.884</td>
<td>.789</td>
</tr>
<tr>
<td>WrtAnx8 (I don’t think I write in English as well as most other people)</td>
<td>.187</td>
<td>.795</td>
<td>.668</td>
</tr>
<tr>
<td>WrtAnx5 (When I hand in an English composition, I know I’m going to do poorly)</td>
<td>.124</td>
<td>.703</td>
<td>.509</td>
</tr>
<tr>
<td>WrtAnx1 (I have a terrible time organizing my ideas in an English composition course)</td>
<td>.276</td>
<td>.599</td>
<td>.436</td>
</tr>
<tr>
<td>WrtAnx4 (People seem to enjoy what I write in English (reverse coding))</td>
<td>.186</td>
<td>.509</td>
<td>.294</td>
</tr>
</tbody>
</table>

Total variance explained (%) 28.739 27.400 56.140

*Note.* Highly loading items are displayed in **bold** to clearly display their loadings.

As can be seen clearly in Table 8, anxiety is composed of speaking and writing anxiety, supporting divergent types of anxiety depending on modality. Five items loaded on Factor 1,
which appears to represent speaking anxiety, and five items loaded on Factor 2, which are composed of items that seem to represent writing anxiety. The total variance explained by the two factors was 56.140%.

*Internal consistency.* Based on the above factor structures for various aspects of motivational constructs, internal consistency of the selected items was examined adopting Cronbach’s alpha. Table 9 summarizes the results.

**Table 9**

*Descriptive Statistics and Cronbach’s alpha for Seven Motivational Factors*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Alpha</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery goal orientation</td>
<td>.759</td>
<td>3.189</td>
<td>.086</td>
</tr>
<tr>
<td>Performance goal orientation</td>
<td>.769</td>
<td>3.805</td>
<td>.152</td>
</tr>
<tr>
<td>Ideal L2 self</td>
<td>.795</td>
<td>4.273</td>
<td>.210</td>
</tr>
<tr>
<td>Ought-to L2 self</td>
<td>.706</td>
<td>3.603</td>
<td>.496</td>
</tr>
<tr>
<td>L2 learning experience</td>
<td>.737</td>
<td>3.796</td>
<td>.087</td>
</tr>
<tr>
<td>L2 speaking anxiety</td>
<td>.872</td>
<td>4.344</td>
<td>.064</td>
</tr>
<tr>
<td>L2 writing anxiety</td>
<td>.850</td>
<td>4.020</td>
<td>.044</td>
</tr>
</tbody>
</table>

Cronbach’s α values ranged from .706 to .872 for the seven factors. The results, along with the above factor analysis, show that items in each subscale were internally consistent overall and that subscales seem to reliably measure their respective unidimensional construct.

**4.1.2.2. Flow experience**

A preliminary factor analysis was conducted to examine how factors were formed for "flow" experience. Fourteen items on four subsets of the hypothesized flow experience were submitted for analysis: (a) interest; (b) willingness to repeat; (c) attention; and (d) control. As there were four different tasks and participants completed the same set of questionnaires upon completing each task, a factor analysis was conducted independently by task.
A series of iterative factor analyses were conducted to reduce the number of items by eliminating problematic items and to identify common items that load equally well across the four tasks conditions so that comparisons of flow experiences across the four tasks can be based on the same scales. Eleven items were selected for flow experiences as representing the factor structure of the four task settings in a consistent manner. Table 10 lists these ten items on flow experiences, which are ordered according to the underlying factor structures in the model.

Table 10

Selected Subscales of Flow from Factor Analysis

<table>
<thead>
<tr>
<th>Interest</th>
<th>repeat1 (I would do this task even if it were not required)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>interest5 (This task was interesting in itself)</td>
</tr>
<tr>
<td></td>
<td>interest2 (I found the experience very rewarding and felt good after completing it)</td>
</tr>
<tr>
<td></td>
<td>interest7 (This task aroused my imagination)</td>
</tr>
<tr>
<td>Attention</td>
<td>attention5 (When doing this task, I was aware of distractions (reverse coded))</td>
</tr>
<tr>
<td></td>
<td>attention4 (When doing this task, I thought about other things (reverse-coded))</td>
</tr>
<tr>
<td></td>
<td>attention3 (When doing this task, I was totally absorbed in what I was doing)</td>
</tr>
<tr>
<td>Control</td>
<td>control2 (When doing this task, I knew clearly what I wanted to do)</td>
</tr>
<tr>
<td></td>
<td>control3 (When doing this task, I had a feeling of control of what and how to write or speak)</td>
</tr>
<tr>
<td></td>
<td>control1 (When doing this task, I had a feeling of total control)</td>
</tr>
</tbody>
</table>

In general, the factor analysis conforms to the predicted structures, although two willingness-to-repeat items merged with interest items in all four tasks.

Finally, four sets data on flow experiences obtained from four task settings were submitted into one factor analysis. Table 11 reveals factor loadings and communalities of 44 items of flow experiences after varimax rotation (See Appendix H for correlation matrix).
Table 11

*Factor Loadings for Flow Experiences After Varimax Rotation*

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3interest5</td>
<td>.792</td>
<td>.059</td>
<td>.058</td>
<td>.635</td>
</tr>
<tr>
<td>*T4interest5</td>
<td>.716</td>
<td>.332</td>
<td>.117</td>
<td>.636</td>
</tr>
<tr>
<td>T3interest7</td>
<td>.704</td>
<td>-.133</td>
<td>.068</td>
<td>.517</td>
</tr>
<tr>
<td>T3interest2</td>
<td>.677</td>
<td>.146</td>
<td>.045</td>
<td>.482</td>
</tr>
<tr>
<td>*T3repeat1</td>
<td>.632</td>
<td>.328</td>
<td>.098</td>
<td>.516</td>
</tr>
<tr>
<td>*T4interest2</td>
<td>.630</td>
<td>.369</td>
<td>.131</td>
<td>.550</td>
</tr>
<tr>
<td>T4interest7</td>
<td>.621</td>
<td>.068</td>
<td>.032</td>
<td>.392</td>
</tr>
<tr>
<td>*T4repeat1</td>
<td>.594</td>
<td>.378</td>
<td>.049</td>
<td>.498</td>
</tr>
<tr>
<td>*T2interest5</td>
<td>.583</td>
<td>.366</td>
<td>.124</td>
<td>.489</td>
</tr>
<tr>
<td>*T2interest2</td>
<td>.556</td>
<td>.320</td>
<td>.047</td>
<td>.413</td>
</tr>
<tr>
<td>T2interest7</td>
<td>.543</td>
<td>-.014</td>
<td>-.044</td>
<td>.297</td>
</tr>
<tr>
<td>*T2repeat1</td>
<td>.512</td>
<td>.348</td>
<td>.123</td>
<td>.398</td>
</tr>
<tr>
<td>*T2control1</td>
<td>.432</td>
<td>.340</td>
<td>-.100</td>
<td>.312</td>
</tr>
<tr>
<td>T3control1</td>
<td>.387</td>
<td>.275</td>
<td>.139</td>
<td>.245</td>
</tr>
<tr>
<td>*T3attention5</td>
<td>.067</td>
<td>.044</td>
<td>.055</td>
<td>.009</td>
</tr>
<tr>
<td>control2</td>
<td>-.183</td>
<td>.756</td>
<td>-.019</td>
<td>.605</td>
</tr>
<tr>
<td>control3</td>
<td>.069</td>
<td>.690</td>
<td>-.062</td>
<td>.484</td>
</tr>
<tr>
<td>control1</td>
<td>.058</td>
<td>.683</td>
<td>.091</td>
<td>.477</td>
</tr>
<tr>
<td>T2control3</td>
<td>.186</td>
<td>.597</td>
<td>-.029</td>
<td>.392</td>
</tr>
<tr>
<td>*interest5</td>
<td>.492</td>
<td>.578</td>
<td>.063</td>
<td>.580</td>
</tr>
<tr>
<td>*interest2</td>
<td>.221</td>
<td>.552</td>
<td>.128</td>
<td>.370</td>
</tr>
<tr>
<td>T4control2</td>
<td>.218</td>
<td>.530</td>
<td>.067</td>
<td>.332</td>
</tr>
<tr>
<td>T4control3</td>
<td>.317</td>
<td>.507</td>
<td>.045</td>
<td>.359</td>
</tr>
<tr>
<td>T2control2</td>
<td>.194</td>
<td>.498</td>
<td>-.106</td>
<td>.297</td>
</tr>
<tr>
<td>*repeat1</td>
<td>.400</td>
<td>.486</td>
<td>.141</td>
<td>.416</td>
</tr>
<tr>
<td>T4control1</td>
<td>.208</td>
<td>.411</td>
<td>.305</td>
<td>.306</td>
</tr>
<tr>
<td>T3control3</td>
<td>.381</td>
<td>.408</td>
<td>-.016</td>
<td>.312</td>
</tr>
<tr>
<td>T3control2</td>
<td>.296</td>
<td>.405</td>
<td>.035</td>
<td>.252</td>
</tr>
<tr>
<td>T4attention3</td>
<td>.332</td>
<td>.146</td>
<td>.663</td>
<td>.571</td>
</tr>
<tr>
<td>attention5</td>
<td>-.184</td>
<td>.015</td>
<td>.660</td>
<td>.470</td>
</tr>
<tr>
<td>*attention3</td>
<td>.020</td>
<td>.359</td>
<td>.637</td>
<td>.535</td>
</tr>
<tr>
<td>T4attention4</td>
<td>.161</td>
<td>-.184</td>
<td>.621</td>
<td>.446</td>
</tr>
<tr>
<td>attention4</td>
<td>-.213</td>
<td>.164</td>
<td>.592</td>
<td>.423</td>
</tr>
<tr>
<td>T4attention5</td>
<td>.011</td>
<td>-.198</td>
<td>.565</td>
<td>.359</td>
</tr>
</tbody>
</table>
As can be seen in Table 11, a factor analysis with Principle Axis Factoring produced three factors for flow experiences, with factor 1 appearing to represent interest and willingness to repeat combined, factor 2 representing control, and factor 3 representing attention. Several items displayed complexity in terms of loading across multiple factors. Ten items loaded across both factors 1 (interest) and 2 (control), suggesting that interest and control are to some extent overlapping and that the feeling of control over a task may vary depending on one's interest and enjoyment of the task. Another abnormality appears in interest items from the simple speaking task (T1). All intended interest items in the simple speaking task cross-loaded for both interest and control, with higher loadings on control. The cross-loadings suggest that interest items were operating differently for different tasks sometimes. However, when flow items were analyzed within the same task situation, no cross-loading issues appeared. For example, when responses only from the simple speaking task were analyzed, three factor structures appeared as expected, which were interest, attention, and control. Likewise, although some cross-loading items looked problematic, when measured independently within a specific task condition, the items overall measured the constructs that they were intended to measure.

**Internal consistency.** Based on the above factor solutions, internal consistency was examined for selected items from Table 10 adopting Cronbach’s alpha. Descriptive statistics and Cronbach's alpha are provided in Table 12.
Table 12

Descriptive Statistics and Cronbach’s alpha for Flow Measures

<table>
<thead>
<tr>
<th>Scale</th>
<th>Alpha</th>
<th>Mean (SD)</th>
<th>Alpha</th>
<th>Mean (SD)</th>
<th>Alpha</th>
<th>Mean (SD)</th>
<th>Alpha</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest</td>
<td>.818</td>
<td>3.824 (.11)</td>
<td>.792</td>
<td>3.851 (.007)</td>
<td>.819</td>
<td>3.913 (.017)</td>
<td>.831</td>
<td>3.996 (.010)</td>
</tr>
<tr>
<td>Attention</td>
<td>.821</td>
<td>4.170 (.016)</td>
<td>.758</td>
<td>4.251 (.047)</td>
<td>.409</td>
<td>4.326 (.026)</td>
<td>.768</td>
<td>4.305 (.021)</td>
</tr>
<tr>
<td>Control</td>
<td>.771</td>
<td>3.650 (.262)</td>
<td>.677</td>
<td>3.518 (.247)</td>
<td>.814</td>
<td>4.261 (.032)</td>
<td>.781</td>
<td>4.220 (.077)</td>
</tr>
</tbody>
</table>

In general, the subscales of interest, attention, and control seem to measure their respective factors consistently as indicated by overall Cronbach’s alpha above .70, with the exception of control in the complex speaking task (α = .677) and attention in the simple writing task (α = .409). Relatively low alpha levels for control in the complex speaking and attention in the simple writing task seem to have appeared from two abnormal items observed in Table 12 (Control1 for simple speaking; Attention5 for simple writing). However, for further analysis, these two items were still included in order to compare scores using the same subscales. It was also the case that Cronbach’s alpha for control in the complex speaking task was close to the significance level (α = .677), indicating acceptable level of internal consistency.

4.2. Main Analysis

4.2.1. The effects of task features on task performance (CAF)

4.2.1.1. Descriptive statistics

In order to examine the effects of task features (i.e., task complexity, modality) on performance in CAF, descriptive statistics for learner performance under different task
performance conditions were examined. Although transformed data was used for significance testing, the descriptive statistics were based on the raw data for the sake of easy interpretation (Table 13). Figures 4–6 represent graphic configurations of the descriptive statistics for learner performance in four task conditions in terms of complexity, accuracy, and fluency, respectively.

Table 13

*Descriptive Statistics for Learner Performance in Speaking and Writing Tasks*

<table>
<thead>
<tr>
<th></th>
<th>Speaking</th>
<th></th>
<th></th>
<th>Writing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple</td>
<td>Complex</td>
<td>Simple</td>
<td>Complex</td>
<td>Simple</td>
<td>Complex</td>
</tr>
<tr>
<td>Complexity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/T</td>
<td>1.70</td>
<td>0.40</td>
<td>1.73</td>
<td>0.42</td>
<td>1.84</td>
<td>0.41</td>
</tr>
<tr>
<td>W/T</td>
<td>13.38</td>
<td>3.35</td>
<td>12.49</td>
<td>3.03</td>
<td>13.8</td>
<td>3.36</td>
</tr>
<tr>
<td>Accuracy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E/T</td>
<td>0.57</td>
<td>0.31</td>
<td>0.5</td>
<td>0.33</td>
<td>0.47</td>
<td>0.38</td>
</tr>
<tr>
<td>EFC/T</td>
<td>1.23</td>
<td>0.42</td>
<td>1.31</td>
<td>0.45</td>
<td>1.46</td>
<td>0.46</td>
</tr>
<tr>
<td>Fluency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W/M</td>
<td>82.75</td>
<td>23.32</td>
<td>82.95</td>
<td>21.41</td>
<td>12.49</td>
<td>4.43</td>
</tr>
<tr>
<td>P/T</td>
<td>0.24</td>
<td>0.40</td>
<td>0.26</td>
<td>0.37</td>
<td>4.65</td>
<td>2.58</td>
</tr>
</tbody>
</table>

*Note.* C/T: number of clauses per T-unit; W/T: words per T-unit; E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; W/M: words per minute; P/T: number of pauses per T-unit.

*Figure 4.* Performance in complexity. C/T refers to the number of clauses per T-unit; W/T refers to words per T-unit.
Figure 5. Performance in accuracy. E/T refers to the number of errors per T-unit; EFC/T refers to the number of error-free clauses per T-unit.

Figure 6. Performance in fluency. W/M refers to words per minute; P/T refers to the number of pauses per T-unit.

Descriptively, in terms of the first complexity measure and the number of clauses per T-unit (C/T) in speaking, participants overall tended to produce more clauses per unit in the complex task than in a simple task ($M = 1.70, SD = 0.40$ for simple; $M = 1.73, SD = 0.42$ for complex), while no mean differences were found in writing tasks ($M = 1.84, SD = 0.41$ for both simple or complex tasks). Regarding the second complexity index, the number of words per T-unit (W/T), interestingly, for both speaking and writing, simple tasks produced more words per
unit on average than complex tasks \((M = 13.38, SD = 3.35\) for simple; \(M = 12.49, SD = 3.03\) for complex).

As for the complexity effects on accuracy, when measured via the number of errors per T-unit \((E/T)\) in speaking, interestingly, the simple task performance showed slightly higher error rate \((M = 0.57, SD = 0.31)\) than the complex task \((M = 0.5, SD = 0.33)\). Higher error rate per unit, in turn, is likely to indicate a lower error-free clause ratio per unit \((EFC/T)\), and this can be seen in the lower ratio of error-free clauses in the simple task \((M = 1.23, SD = 0.42)\) compared to the complex task \((M = 1.31, SD = 0.45)\). However, in writing tasks, simple and complex tasks did not differ in terms of either measure of accuracy \((M = 0.47\) for the number of errors per unit; \(M = 1.46\) for the ratio of error-free clause per unit). Finally, in terms of fluency measures of the number of words produced per unit \((W/T)\) and the ratio of pause per unit \((P/T)\), no mean differences seem to exist between simple and complex tasks in either speaking or writing \((M = 0.47\) for the number of errors per unit; \(M = 1.46\) for the ratio of error-free clause per unit).

Next, as for modality, overall there seem to be large mean differences between speaking and writing tasks irrespective of task complexity. For complexity measures of the ratio of clauses per unit \((C/T)\), writing produced more clauses per T-unit \((M = 1.84, SD = 0.41\) for simple; \(M = 1.84, SD = 0.41\) for complex), compared to speaking \((M = 1.7, SD = 0.40\) for simple; \(M = 1.73, SD = 0.42\) for complex). However, regarding the number of words per T-unit \((W/T)\), speaking and writing seem to be similar with on average words of 12.49 to 13.80 per unit. With regard to accuracy measures across two modalities, speaking performances were less accurate than writing, as shown by the high error ratio per unit \((E/T)\) and low error-free clause ratio per unit \((EFC/T)\). Finally, for fluency measures of the number of words produced per minute \((W/M)\) and the number of pauses per unit \((P/T)\) there were substantial differences between the two modalities, as
anticipated. Fluency in terms of speed measured through the number of words produced per minute was about seven times higher in speaking ($M = 82.75$ for simple; $M = 82.95$ for complex) than in writing ($M = 12.49$ for simple; $M = 12.78$ for complex). Regarding breakdowns in fluency, measured via the number of pauses, writing showed a higher average ratio of pauses per unit ($M = 4.65$ for simple; $M = 4.27$ for complex) than speaking tasks ($M = 0.24$ for simple; $M = 0.26$ for complex), with writers on average pausing four times per unit and speakers pausing 0.20 times per unit.

To sum up, when it comes to complexity effects, descriptively, simple tasks seem to produce more syntactically complex sentences, but at the same time they produced more errors compared to complex counterparts in both modalities. No differences seem to exist in fluency based on task complexity alone. With respect to task modality effects, clear performance differences seem to appear for all performance measures of complexity, accuracy, and fluency, although the direction seems to vary depending on each performance measure.

4.2.1.1. Task complexity and task modality

Based on the above descriptive statistics presented in Table 13, Figures 7–9 illustrate differences in task performance in terms of complexity, accuracy, and fluency, respectively, depending on task complexity and task modality.
Figure 7. Task complexity and modality on complexity measures. Note: The graphs display task complexity in terms of C/T (left) and W/T(right); mode 1: speaking, mode 2: writing.

Figure 8. Task complexity and modality on accuracy measures. Note: The graphs display task accuracy in terms of E/T (left) and EFC/T(right); mode 1: speaking, mode 2: writing.
As can be seen in the above Figures 7–9, in general, similar patterns seem to exist between speaking and writing in complexity and fluency measures, as indicated by mostly parallel lines between the two modes. The same is not true, however, in the measures of accuracy (E/T, EFC/T), suggesting potential interaction effects. In other words, from simple to complex tasks, the amount of errors per T-unit (E/T) decreased in speaking, while the amount increased in writing. Along with the direction of change, the amount of change in error rate was larger in speaking than in writing, as can be seen in the slope of each line. Similarly, regarding the error-free clause ratio (EFC/T), accuracy in writing increased along with task complexity, although writing accuracy was relatively stable. Overall, given the slope of speaking and writing performance between simple and complex conditions, it seems that accuracy in speaking seems to be more susceptible to task complexity variables than writing. In addition, regarding fluency measures of the number of pauses per T-unit (P/T), the slopes for speaking and writing seem to be in slightly opposite directions, suggesting potential interactions between modality and task complexity.
Based on the descriptive analysis, a repeated measures MANOVA was run to investigate the effects of task complexity and modality overall. Condition and modality were used as the two independent variables, with each variable having two levels, and six outcome measures were employed as dependent variables. Within-subject multivariate tests indicated significant main effects of task complexity and modality ($F(6, 135) = 5.961, p = .000, \eta^2 = .209, \text{power} = .998$ for task complexity; $F(6, 135) = 1239.326, p = .000, \eta^2 = .982, \text{power} = 1.000$ for modality). However, there were no significant interaction effects between task complexity and modality ($F(6, 135) = 1.242, p = .289, \eta^2 = .052, \text{power} = .476$). Based on the significant main effects of task complexity and modality, a series of independent MANOVAs were conducted to examine the sources of these differences.

4.2.1.2. Task complexity

In order to identify complexity effects, two repeated MANOVAs were conducted separately with one for speaking and the other for writing. Two levels of task conditions (simple and complex) served as an IV and six performance measures (C/T, W/T, E/T, EFC/T, W/M, P/T) were submitted as DVs. A critical $p$-value of .002 was set for statistical significance throughout the study, which was based on a Bonferroni adjustment, representing the comparison-wise $p$-value; that is, experimental-wise $p$-value of .05 was divided by 27, the total number of comparisons made throughout the whole study.

First, for speaking tasks, significant complexity effects were found ($F(6, 135) = 4.181, p = .001, \eta^2 = .157$). Task complexity explained 15.7% of the total variance with substantial power (power = .974). Given the significant main effects of task complexity, univariate tests were conducted to identify the sources of differences after Bonferroni adjustment. The results are shown in Table 14.
Table 14

*Univariate Tests for Complexity Effects on Speaking Performance*

<table>
<thead>
<tr>
<th>Source</th>
<th>Measure</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Eta Squared</th>
<th>Observed Power³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>C/T</td>
<td>.003</td>
<td>1</td>
<td>.003</td>
<td>.516</td>
<td>.474</td>
<td>.004</td>
<td>.110</td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>.044</td>
<td>1</td>
<td>.044</td>
<td>8.134</td>
<td>.005</td>
<td>.055</td>
<td>.809</td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>.369</td>
<td>1</td>
<td>.369</td>
<td>6.283</td>
<td>.013</td>
<td>.043</td>
<td>.702</td>
</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>.048</td>
<td>1</td>
<td>.048</td>
<td>3.891</td>
<td>.051</td>
<td>.027</td>
<td>.500</td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>.000</td>
<td>1</td>
<td>.000</td>
<td>.086</td>
<td>.769</td>
<td>.001</td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>P/T</td>
<td>.328</td>
<td>1</td>
<td>.328</td>
<td>1.409</td>
<td>.237</td>
<td>.010</td>
<td>.218</td>
</tr>
<tr>
<td>Error (Complexity)</td>
<td>C/T</td>
<td>.682</td>
<td>140</td>
<td>.005</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>.756</td>
<td>140</td>
<td>.005</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>8.227</td>
<td>140</td>
<td>.059</td>
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</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>1.731</td>
<td>140</td>
<td>.012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>.735</td>
<td>140</td>
<td>.005</td>
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</tr>
<tr>
<td></td>
<td>P/T</td>
<td>32.570</td>
<td>140</td>
<td>.233</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. C/T: number of clauses per T-unit; W/T: words per T-unit; E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; W/M: words per minute; P/T: number of pauses per T-unit.

Applying a critical p-value of .002, none of the comparisons shown in Table 14 were statistically significant, indicating that task complexity had no significant role in predicting task performance in any measures of complexity, accuracy, or fluency.

The effects of task complexity in writing tasks were also examined through a repeated-measures MANOVA with two levels of task complexity (simple and complex) as an IV and six measures of performance (CAF) as the DVs. The multivariate test revealed significant task complexity effects, with task complexity explaining 9.1% of the total performance variance ($F(6, 135) = 2.247, p = .042, \eta^2 = .091, power = .773$). Based on this, the univariate main effects were examined with Bonferroni adjustment (Table 15).
Table 15

Univariate Tests for Complexity Effects on Writing Performance

<table>
<thead>
<tr>
<th>Source</th>
<th>Measure</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Eta Squared</th>
<th>Observed Power^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>C/T</td>
<td>.000</td>
<td>1</td>
<td>.000</td>
<td>.032</td>
<td>.859</td>
<td>.000</td>
<td>.054</td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>.042</td>
<td>1</td>
<td>.042</td>
<td>7.595</td>
<td>.007</td>
<td>.051</td>
<td>.781</td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>.009</td>
<td>1</td>
<td>.009</td>
<td>.137</td>
<td>.712</td>
<td>.001</td>
<td>.066</td>
</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>.001</td>
<td>1</td>
<td>.001</td>
<td>.072</td>
<td>.789</td>
<td>.001</td>
<td>.058</td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>.100</td>
<td>1</td>
<td>.100</td>
<td>6.493</td>
<td>.012</td>
<td>.044</td>
<td>.716</td>
</tr>
<tr>
<td></td>
<td>P/T</td>
<td>.102</td>
<td>1</td>
<td>.102</td>
<td>6.493</td>
<td>.012</td>
<td>.044</td>
<td>.716</td>
</tr>
<tr>
<td></td>
<td>C/T</td>
<td>.521</td>
<td>140</td>
<td>.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>.770</td>
<td>140</td>
<td>.006</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>9.145</td>
<td>140</td>
<td>.065</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>1.553</td>
<td>140</td>
<td>.011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>1.079</td>
<td>140</td>
<td>.008</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P/T</td>
<td>2.202</td>
<td>140</td>
<td>.016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. C/T: number of clauses per T-unit; W/T: words per T-unit; E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; W/M: words per minute; P/T: number of pauses per T-unit.

Based on the adjusted critical $p$-value of .002, the results in Table 15 also showed that none of the comparisons between simple and writing tasks in terms of complexity, accuracy, and fluency were statistically significant. In addition, eta squared values were very small, suggesting that complexity explains very little amount of the total variance.

4.2.1.3. Task modality

For examining the effects of task modality on performance, two sets of repeated MANOVAs were conducted, with one comparing two simple tasks and the other comparing two complex tasks. Modality across two levels (speaking and writing) was used as the IV, and six performance measures served as DVs. The comparison between speaking and writing in both task complexity conditions showed significant main effects of task mode (between simple tasks, $F(6, 135) = 866.160, p = .000, \eta^2 = .975$, power = 1.000; between complex tasks, $F(6, 135) =$
786.109, \( p = .000, \eta^2 = .972, \) power = 1.000). As eta-square values of .975 and .972 indicate, task modality explained a large amount of variance for the performance.

In order to identify the sources of the differences, univariate tests were conducted with a Bonferroni adjusted critical \( p \)-value of .002. Table 16 and Table 17 show univariate tests of modality effects in simple tasks and complex tasks, respectively.

Table 16

*Univariate Tests for Modality Effects Under Simple Tasks*

<table>
<thead>
<tr>
<th>Source</th>
<th>Measure</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Eta Squared</th>
<th>Observed Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality</td>
<td>C/T</td>
<td>.080</td>
<td>1</td>
<td>.080</td>
<td>13.332</td>
<td>.000</td>
<td>.087</td>
<td>.952</td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>.011</td>
<td>1</td>
<td>.011</td>
<td>1.430</td>
<td>.234</td>
<td>.010</td>
<td>.221</td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>.959</td>
<td>1</td>
<td>.959</td>
<td>13.913</td>
<td>.000</td>
<td>.090</td>
<td>.959</td>
</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>.413</td>
<td>1</td>
<td>.413</td>
<td>29.103</td>
<td>.000</td>
<td>.172</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>48.357</td>
<td>1</td>
<td>48.357</td>
<td>5202.393</td>
<td>.000</td>
<td>.974</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>P/T</td>
<td>180.736</td>
<td>1</td>
<td>180.736</td>
<td>1004.018</td>
<td>.000</td>
<td>.878</td>
<td>1.000</td>
</tr>
<tr>
<td>Error (complexity)</td>
<td>C/T</td>
<td>.843</td>
<td>140</td>
<td>.006</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>1.092</td>
<td>140</td>
<td>.008</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>9.647</td>
<td>140</td>
<td>.069</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>1.985</td>
<td>140</td>
<td>.014</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>W/M</td>
<td>1.301</td>
<td>140</td>
<td>.009</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>P/T</td>
<td>25.202</td>
<td>140</td>
<td>.180</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* C/T: number of clauses per T-unit; W/T: words per T-unit; E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; W/M: words per minute; P/T: number of pauses per T-unit.

As Table 16 shows, in comparing simple tasks in writing and speaking significant modality effects were found across all performance measures (for C/T, \( F(1, 140) = 13.332, p = .000 \); for E/T, \( F(1, 140) = 13.913, p = .000 \); for EFC/T, \( F(1, 140) = 29.103, p = .000 \); for W/M, \( F(1, 140) = 5202.393, p = .000 \); for P/T, \( F(1, 140) = 1004.018, p = .000 \)), except one complexity measure for the number of words per T-unit (W/T) (\( p = .234 \)). For complexity and accuracy measures, as eta-square values indicate, modality explained 8.7% of the total variance of the
clause ratio (C/T), 9.0 % for error ratio (E/T), and 17.2 % for the error-free clause ratio (EFC/T).

The effects sizes are moderate, but the results had substantial interpretive power, as the observed power values over .900 indicate. In terms of modality effects on fluency measures, extremely large effects sizes were found as can be seen in high eta-square values ($\eta^2 = .974$, power = 1.000 for W/M; $\eta^2 = .878$, power = 1.000), which can be interpreted as having substantial power.

Next, univariate tests on modality effects were examined for complex task performances. Table 17 displays the results.

Table 17

*Univariate Tests for Modality Effects Under Complex Tasks*

<table>
<thead>
<tr>
<th>Source</th>
<th>Measure</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Eta Squared</th>
<th>Observed Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality</td>
<td>C/T</td>
<td>.060</td>
<td>1</td>
<td>.060</td>
<td>14.006</td>
<td>.000</td>
<td>.091</td>
<td>.961</td>
</tr>
<tr>
<td></td>
<td>W/T</td>
<td>.012</td>
<td>1</td>
<td>.012</td>
<td>2.548</td>
<td>.113</td>
<td>.018</td>
<td>.354</td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>.077</td>
<td>1</td>
<td>.077</td>
<td>1.105</td>
<td>.295</td>
<td>.008</td>
<td>.181</td>
</tr>
<tr>
<td></td>
<td>EFC/T</td>
<td>.156</td>
<td>1</td>
<td>.156</td>
<td>13.563</td>
<td>.000</td>
<td>.088</td>
<td>.955</td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>47.242</td>
<td>1</td>
<td>47.242</td>
<td>4787.258</td>
<td>.000</td>
<td>.972</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>P/T</td>
<td>157.527</td>
<td>1</td>
<td>157.527</td>
<td>954.974</td>
<td>.000</td>
<td>.872</td>
<td>1.000</td>
</tr>
<tr>
<td>Error</td>
<td>C/T</td>
<td>.595</td>
<td>140</td>
<td>.004</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(complexity)</td>
<td>W/T</td>
<td>.674</td>
<td>140</td>
<td>.005</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>E/T</td>
<td>9.718</td>
<td>140</td>
<td>.069</td>
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<tr>
<td></td>
<td>EFC/T</td>
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<td>140</td>
<td>.011</td>
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</tr>
<tr>
<td></td>
<td>W/M</td>
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</tr>
<tr>
<td></td>
<td>P/T</td>
<td>23.094</td>
<td>140</td>
<td>.165</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* C/T: number of clauses per T-unit; W/T: words per T-unit; E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit; W/M: words per minute; P/T: number of pauses per T-unit.

Significant main effects were observed in measures of complexity (C/T, $F(1, 140) = 14.006, p = .000, \eta^2 = .091, \text{power} = .961$) and accuracy (EFC/T, $F(1, 140) = 13.563, p = .000, \eta^2 = .088, \text{power} = .955$)). As eta-square values indicate, modality explained 9.1% of the total variance of clause ratio per unit (C/T) and 8.8% of the variance for the error-free clause ratio.
(EFC/T). Both findings can be interpreted with substantial power. In terms of modality effects on fluency, significant mean differences were found in both the number of words produced per minute (W/M) \( F(1, 140) = 4787.258, p = .000, \eta^2 = .972, \text{power} = 1.000 \)) and the frequency of pauses per T-unit (P/T) \( F(1, 140) = 954.974, p = .000, \eta^2 = .872, \text{power} = 1.000 \). As eta-square values indicate, modality explained approximately 90% of the variance in both measures of fluency, and the results are interpreted as having substantial power.

Statistically significant findings, along with the earlier reported mean statistics, suggests that syntactic complexity measured via the number of clauses per unit was higher in writing than in speaking. For accuracy, writing tasks produced enhanced accuracy over speaking tasks, as can be seen in the lower number of errors and the higher ratio of error-free clauses per unit. Regarding fluency, speaking tends to show a higher rate of language production speed and less number of pauses per unit compared to writing, suggesting overall improved fluency.

4.2.2. The effects of task variables on learner experience

4.2.2.1. Perceived task difficulty

Given the prediction that task features affect learner perception of the tasks and experience, it was examined whether different task features (i.e., task complexity, modality) affect individuals' perception of task difficulty. Descriptively, on average, in both speaking and writing, complex tasks were perceived to be more difficult than simple tasks. In speaking, average perceived difficulty scores were found at 3.73 \( (SD = 1.03) \) for simple tasks, and at 3.86 \( (SD = 1.00) \) for complex tasks. In writing, the average scores were 3.23 \( (SD = .85) \) for simple tasks and 3.38 \( (SD = .93) \) for complex tasks. Comparing perceived difficulty between speaking and writing, overall, writing tasks were perceived as less difficult than speaking tasks across both task complexity conditions, although the gap between modalities seems small (0.493 for simple
conditions; 0.479 for complex conditions). Figure 10 illustrates the overall perceived difficulty scores for the four tasks.

![Perceived difficulty across four conditions](image)

*Figure 10. Perceived difficulty across four conditions.*

In order to examine statistical significance between the observed mean differences, a repeated measures ANOVA was conducted with a Bonferroni adjustment. Two levels of task complexity and two levels of task modality were used as IVs and their interaction effects were examined. A multivariate test showed significant main effects of complexity and modality ($F(1, 140) = 8.838, p = .000, \eta^2 = .059$, power = .840 for task complexity; $F(1, 140) = 71.400, p = .000, \eta^2 = .338$, power = 1.000 for modality). As predicted, complex tasks were perceived to be more difficult than their simple equivalents, and overall speaking tasks were perceived to be more difficult than writing tasks. However, no interaction effects between task complexity and task modality were found ($p = .757$).

4.2.2.2. Flow

Another area of interest concerns different levels of flow experience in response to the task features of task complexity and modality. Prior to examining task variable effects on flow as
the composite representation of interest, attention, and control, the effects of task features on the respective sub-components of flow were examined. Table 18 presents descriptive statistics for average responses for the three sub-components of flow and flow as a composite score. Figure 11 illustrate the descriptive statistics.

Table 18

*Descriptive Statistics for Flow Experience in Four Tasks*

<table>
<thead>
<tr>
<th></th>
<th>Speaking</th>
<th>Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple</td>
<td>Complex</td>
</tr>
<tr>
<td>Interest</td>
<td>Mean 3.82, SD 0.89</td>
<td>Mean 3.85, SD 0.81</td>
</tr>
<tr>
<td>Attention</td>
<td>Mean 4.17, SD 0.93</td>
<td>Mean 4.25, SD 0.89</td>
</tr>
<tr>
<td>Control</td>
<td>Mean 3.65, SD 0.83</td>
<td>Mean 3.52, SD 0.77</td>
</tr>
<tr>
<td>Flow (composite)</td>
<td>Mean 3.88, SD 0.67</td>
<td>Mean 3.87, SD 0.62</td>
</tr>
</tbody>
</table>

*Figure 11.* Average scores of sub-components of flow and flow as a composite score across four tasks.

Overall there seems to be little difference across the four tasks, although the differences between speaking and writing seem to be larger than the differences between simple and complex tasks. In terms of interest, participants reported higher levels of interest in writing tasks.
At this point, we will assume that

(M = 3.91, SD = 0.78 for simple; M = 4.00, SD = 0.82 for complex) than in speaking (M = 3.82, SD = 0.89 for simple; M = 3.85, SD = 0.81 for complex). Attention also seems to have been stronger in the writing conditions (M = 4.33, SD = 0.66 for simple; M = 4.30, SD = 0.85 for complex) than in speaking (M = 4.17, SD = 0.93 for simple; M = 4.25, SD = 0.89 for complex), but the differences appear to be rather small. Finally, the descriptive statistics showed that participants responded that they had less control over speaking tasks compared to writing tasks.

In order to check whether these differences were statistically significant, a repeated MANOVA was performed. The design included two independent variables for task complexity and task modality with each variable having two levels, and three dependent variables for interest, attention, and control. Using an adjusted p-value of .002, a multivariate test revealed that there were only significant effects for modality (F(1, 138) = 2.828, p = .041, η² = .058, power = .669, for complexity; F(1, 138) = 56.010, p = .000, η² = .549, power = 1.000), explaining 54.9% of the variance. Based on the large effect size, this finding suggests that modality plays a large role in determining learners' cognitive and affective experiences within a task. In contrast, the effects of task complexity failed to predict learner experience of flow.

Based on the multivariate significance tests, univariate tests were conducted to identify the sources of significance after Bonferroni adjustment. The critical p-value was lowered to .002, as set at the beginning of the analyses, by dividing experimental p-value of 0.05 by the comparison-wise value of 27 (0.05/27 = .002). Table 19 reveals the univariate test results for the effects of task complexity and modality on three aspects of flow experience.
As can be seen in Table 17, task modality produced mean differences in learner experiences of interest and control (\(p = .010\) for interest; \(p = .000\) for control), but not on the level of attention one may have on the task (\(p = .065\)). However, applying the adjusted Bonferroni critical value (\(p = .002\)) leads to rejecting the observed significance of the modality effects on interest, which is perhaps expected given the low effect size (4.7%). The effect of modality on control was large with modality explaining 52.0% of the variance. All of the findings have substantial power. The significance tests, along with descriptive statistics, suggest that participants found writing tasks more interesting and controllable compared to speaking tasks. The results are illustrated in Figure 12.
As can be expected from looking at Figure 12, there were no significant interaction effects between task complexity and modality on interest, attention, or control ($F(1, 138) = .847$, $p = .470$, $\eta^2 = .018$, power = .231).

In order to observe whether the same effects appear when combining three components of flow, a composite score of flow was employed for a repeated measured ANOVA for the effects of task complexity and task modality. It showed significant influences of modality on flow experience ($F(1, 140) = 52.292$, $p = .000$, $\eta^2 = .272$, power = 1.000), with modality explaining about 27.2% of the variance of flow experience. This finding is in line with the above results that examined the three components of flow as a dependent variable.

4.2.3. The effects of learner variables on task performance

The current study is also interested in the relationship between goal orientation and both anxiety and task performance. The relationship between these learner variables and task performance in terms of complexity, accuracy, and fluency was examined through correlation analysis. Based on the factor analysis conducted in the preliminary analysis, factor scores of each
learner variable were calculated through averaging their subscales and used for correlation
analysis. Tables 18–20 summarize correlation coefficients for the relationships between different
aspects of goal orientations (i.e., mastery orientation, performance orientation) and anxiety (i.e.,
speaking anxiety writing anxiety), on the one hand, and task performance of complexity,
accuracy, and fluency on the other. The relationship between learner variables and performance
measures in syntactic complexity under the four tasks is presented in Table 20. Tables 21 and 22
show the relationship between learner variables on accuracy and fluency, respectively.

Table 20.

Correlations Between Learner Variables (Goal Orientation, Anxiety) and Task Complexity
(n = 141)

<table>
<thead>
<tr>
<th></th>
<th>Speaking</th>
<th></th>
<th>Writing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple</td>
<td>Complex</td>
<td>Simple</td>
<td>Complex</td>
</tr>
<tr>
<td></td>
<td>C/T</td>
<td>W/T</td>
<td>C/T</td>
<td>W/T</td>
</tr>
<tr>
<td>Mastery orientation</td>
<td>.079</td>
<td>-.007</td>
<td>.163</td>
<td>.103</td>
</tr>
<tr>
<td>Performance orientation</td>
<td>-.084</td>
<td>-.023</td>
<td>-.130</td>
<td>-.113</td>
</tr>
<tr>
<td>Speaking anxiety</td>
<td>-.023</td>
<td>.035</td>
<td>-.125</td>
<td>-.072</td>
</tr>
<tr>
<td>Writing anxiety</td>
<td>-.036</td>
<td>.083</td>
<td>-.108</td>
<td>-.083</td>
</tr>
</tbody>
</table>

Note. * p < .05; C/T: number of clauses per T-unit; W/T: words per T-unit.
Table 21

Correlations Between Learner Variables (Goal Orientation, Anxiety) and Task Accuracy (n = 141)

<table>
<thead>
<tr>
<th></th>
<th>Speaking</th>
<th></th>
<th></th>
<th>Writing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple</td>
<td>Complex</td>
<td></td>
<td>Simple</td>
<td>Complex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E/T</td>
<td>EFC/T</td>
<td>E/T</td>
<td>EFC/T</td>
<td>E/T</td>
<td>EFC/T</td>
</tr>
<tr>
<td>Mastery orientation</td>
<td>.081</td>
<td>.039</td>
<td>.191*</td>
<td>.054</td>
<td>.117</td>
<td>.060</td>
</tr>
<tr>
<td>Performance orientation</td>
<td>-.016</td>
<td>-.050</td>
<td>-.054</td>
<td>-.081</td>
<td>.028</td>
<td>-.013</td>
</tr>
<tr>
<td>Speaking anxiety</td>
<td>-.004</td>
<td>.032</td>
<td>-.018</td>
<td>-.107</td>
<td>-.102</td>
<td>-.043</td>
</tr>
<tr>
<td>Writing anxiety</td>
<td>-.065</td>
<td>.049</td>
<td>-.107</td>
<td>-.049</td>
<td>-.127</td>
<td>.065</td>
</tr>
</tbody>
</table>

Note. * p < .05; E/T: number of errors per T-unit; EFC/T: error-free clauses per T-unit.

Table 22

Correlations Between Learner Variables (Goal Orientation, Anxiety) and Task Fluency (n = 141)

<table>
<thead>
<tr>
<th></th>
<th>Speaking</th>
<th></th>
<th></th>
<th>Writing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple</td>
<td>Complex</td>
<td></td>
<td>Simple</td>
<td>Complex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W/M</td>
<td>P/T</td>
<td>W/M</td>
<td>P/T</td>
<td>W/M</td>
<td>P/T</td>
</tr>
<tr>
<td>Mastery orientation</td>
<td>.086</td>
<td>-.123</td>
<td>.079</td>
<td>-.064</td>
<td>.006</td>
<td>-.068</td>
</tr>
<tr>
<td>Performance orientation</td>
<td>-.108</td>
<td>.159</td>
<td>-.040</td>
<td>-.051</td>
<td>-.076</td>
<td>.046</td>
</tr>
<tr>
<td>Speaking anxiety</td>
<td>-.065</td>
<td>.034</td>
<td>-.075</td>
<td>.074</td>
<td>.006</td>
<td>.047</td>
</tr>
<tr>
<td>Writing anxiety</td>
<td>-.005</td>
<td>.088</td>
<td>-.039</td>
<td>-.018</td>
<td>.073</td>
<td>.030</td>
</tr>
</tbody>
</table>

Note. W/M: words per minute; P/T: number of pauses per T-unit.

As can be seen in Tables 20–22, across four tasks and three aspects of task performance (CAF), only a few significant correlations were found between learner variables of goal orientation and anxiety and task performance. There was a positive association between mastery
goal orientation and a high number of errors per T-unit in the complex speaking task ($r = .191, p = .023$). As the correlation coefficient indicates, 19.1% of the variance in accuracy measures in the complex speaking task (i.e., the number of errors per T-unit) can be explained by mastery goal orientation, which is interpreted as having a moderate effect size.

Another significant relationship was found between performance goal orientation and syntactic complexity in the simple writing task. Performance goal orientation was negatively associated with the number of words per T-unit (W/T) in the simple writing task ($r = -.210, p = .012$). The correlation coefficient indicates a moderate effect size, whereby 21.0% of the total variance in complexity measures can be explained by performance goal orientation. The negative relationship indicates that high performance goal orientation tends to produce less complex sentence structures in a simple writing task.

4.2.4. The relationship between learner variables and task experience

Next, the effects of learner variables on task experience were investigated. Correlations between learner variables and experience outcomes of perceived task difficulty and flow were examined. Tables 23 and 24 present the relationships between learner variables (i.e., goal orientation and anxiety) and task experience. Table 23 addresses their relationships with perceived difficulty and Table 24 shows their relationship with flow under the four task conditions.
Table 23

*Correlations Between Learner Variables and Perceived Difficulty (n = 141)*

<table>
<thead>
<tr>
<th></th>
<th>Mastery orientation</th>
<th>Performance orientation</th>
<th>L2 speaking anxiety</th>
<th>L2 Writing anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived difficulty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>.047</td>
<td>-.052</td>
<td>-.012</td>
<td>.044</td>
</tr>
<tr>
<td>T2</td>
<td>.027</td>
<td>.014</td>
<td>.033</td>
<td>.066</td>
</tr>
<tr>
<td>T3</td>
<td>.044</td>
<td>-.054</td>
<td>-.115</td>
<td>-.027</td>
</tr>
<tr>
<td>T4</td>
<td>.016</td>
<td>.020</td>
<td>.009</td>
<td>.113</td>
</tr>
</tbody>
</table>

*Note. T1 = Simple speaking; T2 = Complex speaking; T3 = Simple writing; T4 = Complex writing.*

Table 24

*Correlations Between Learner Variables and Flow (n = 141)*

<table>
<thead>
<tr>
<th></th>
<th>Mastery orientation</th>
<th>Performance orientation</th>
<th>L2 Speaking anxiety</th>
<th>L2 Writing anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>-.055</td>
<td>-.021</td>
<td>.035</td>
<td>-.029</td>
</tr>
<tr>
<td>T2</td>
<td>-.019</td>
<td>-.086</td>
<td>-.063</td>
<td>-.003</td>
</tr>
<tr>
<td>T3</td>
<td>-.068</td>
<td>.001</td>
<td>.023</td>
<td>-.038</td>
</tr>
<tr>
<td>T4</td>
<td>.008</td>
<td>.002</td>
<td>.009</td>
<td>-.013</td>
</tr>
</tbody>
</table>

*Note. T1 = Simple speaking; T2 = Complex speaking; T3 = Simple writing; T4 = Complex writing.*

As Table 24 shows, there were no significant correlations between goal orientations and perceived difficulty or between anxiety and perceived difficulty under any of the four task performance conditions. In addition, Table 24 reveals that there were no significant correlations between goal orientation and any of the anxiety types or flow experience under any of the task performance conditions.

### 4.2.5. The relationships among learner variables

The current study also examines how learner variables for goal orientation, anxiety, and L2 motivational self system are related. Bivariate correlations were observed based on factor scores of each variable. The results are shown in Table 25.
As Table 25 indicates, components of L2 motivational self system are correlated with goal orientations as well as anxiety. First, relationships among components of the L2 motivational self system (e.g., ideal L2 self, ought-to L2 self, L2 learning experience) were observed. Positive relationships were found between ideal L2 self and ought-to L2 self ($r = .344$, $p = .000$) and between ideal L2 self and L2 learning experience ($r = .238$, $p = .004$) with both having moderate effect sizes. No relations were found between ought-to L2 self and L2 learning experiences ($r = .006$, $p = .947$).

In terms of the relationships between the L2 motivational self system and goal orientations, ideal L2 self was positively related to both mastery goal orientation ($r = .293$, $p = .000$) and performance goal orientation ($r = .366$, $p = .000$) with moderate magnitude. Ought-to L2 self was positively associated with performance goal orientation with a large effect size ($r = .645$, $p = .000$). A significant correlation was found between L2 learning experiences and
mastery orientation \((r = .576, p = .000)\). No other significant relationships were found between the L2 motivational self system and goal orientations.

The relationship between anxiety and the L2 motivational self system was observed. As can be seen in Table 25, the relationship was examined separately with different types of anxiety (i.e., speaking, writing), but overall the direction and significance of the associations were similar across both types of anxiety. Only the magnitude of association was different depending on the type of anxiety involved. Variance in speaking anxiety and writing anxiety overlapped at approximately 41.3\% \((r = .413, p = .000)\), suggesting that although both types of anxiety are related, they are considered as separate constructs of L2 anxiety. With regard to the relationship between anxiety and the L2 motivational self system, L2 anxiety was not significantly related to ideal L2 self \((p = .156 \text{ for speaking; } p = .230 \text{ for writing})\). However, both speaking and writing anxiety were positively associated with ought-to L2 self \((r = .226, p = .007 \text{ for speaking}; r = .192, p = .022 \text{ for writing})\), meaning that those with high ought-to L2 self tended to have higher levels of L2 anxiety. A negative relationship was found between L2 anxiety and L2 learning experience \((r = -.477, p = .007 \text{ for speaking}; r = -.501, p = .022 \text{ for writing})\). The relationships between anxiety and ought-to L2 self, and between anxiety and L2 learning experience were strong in general, while the strength of the relationship between anxiety and ideal L2 self was moderate.

Finally, with respect to the relationship between anxiety and goal orientation, anxiety was negatively associated with mastery goal orientation \((r = -.441, p = .000 \text{ for speaking}; r = .366, p = .000)\), but positively with performance goal orientation \((r = .397, p = .000 \text{ for speaking}; r = .283, p = .000)\). The strength of the relationship was moderate.
4.2.5. The effects of task variables and learner variables on task performance and task experience: Structural equation modeling (SEM)

In order to examine whether the hypothesized model on multiple direct and indirect relationship among variables is consistent with the observed data, structural equation modeling (SEM) was performed. To test a full SEM model, indicator items should be selected to represent latent variables while reducing the number of parameters tested in the model. For learner variables including goal orientation, the L2 motivational self system, and L2 anxiety, the two measured variables that showed the highest loadings for each factor in the factor analysis served as indicator variables. In terms of flow, interest, attention, and control served as indicator variables of flow, and for each indicator variable, the composite scores for each construct were used. For task performance, respective complexity (clauses per T-unit), accuracy (error-free clauses per T-unit), and fluency (words per minute) measurements served as indicator variables.

To assess the goodness-of-fit of the model, several model fit indices were adopted. In general, non-significant chi-square statistics indicate non-significant differences between the proposed model and the observed data such that a non-significant chi-square is desirable. However, chi-square statistics can be too strict and too sensitive to sample sizes so that other alternative assessment methods have been proposed and widely adopted. One method directly related to chi-square is the ratio of chi-square to the degrees of freedom, in which the ratio of less than 2 indicates a good model fit. Another evaluation method for model fit concerns comparative fit indices, also referred to as incremental indices, which assess absolute or parsimonious fit compared to a baseline model. The comparative fit index (CFI), normed fit index (NFI), and non-normed fit index (NNFI) are types of comparative fit indices, for which a value over .95 (or .90) is considered a good fit. Also, the root mean square error of approximation (RMSEA) method
can be used, with values over .10 indicating a poor fit and a value of less than .07 indicating a good fit. The third type of model fit assessment methods encompasses parsimonious fit indices, which account for the degree of parsimony in the model, types of which include the parsimony goodness-of-fit index (PGFI) with larger scores closer to 1.00 indicating a better fit. The fourth type pertains to residual-based fit indices, which include the root mean square residual (RMR) for which values of .08 or less are desirable, with smaller values representing a good fit.

Following the conventional ways of adopting multiple assessment methods, this study employed the three most commonly used model fit indices: chi-square ratio, CFI, and RMSEA. A chi-square ratio of less than 2 or 3 (or 5), a CFI of more than .90, and a RMSEA of less than .07 are considered indications of a good model fit.

Before examining model fit, methodological issues that have been raised need to be mentioned. In order to examine the contributions of both task variables and learner variables in the same model, data restructuring was performed so that the repeated data could be compared amongst each other, as if it were between-subject data. Although this method increases the likelihood of errors due to the violation of assumptions (i.e., the independence of pairs in each case), for the purpose of the analysis with the current design, this method was deemed necessary. In addition, any potential errors as a result of this would tend to underestimate the model, rather than overestimate it, so this method seems acceptable for the purposes of analysis. In this restructured data, categorical values were arbitrarily assigned to task complexity (1=simple, 2=complex) and modality (1=speaking, 2=writing). Furthermore, task performance consisting of complexity, accuracy, and fluency failed to constitute one factor so that complexity, accuracy, and fluency were adopted as independent measurement variables in the model.
The proposed model (RQ7) was tested with four sets of data obtained from the four task performances. Maximum likelihood estimation was employed. Figure 13 shows the proposed model that incorporated all task and learner variables under investigation to examine their effects on task performance and task experiences. The estimated standardized path coefficients and standardized regression weights of the indicator variables to latent variables are presented.
Figure 13. The proposed model examining the effects of task variables and learner variables on task performance and affective experiences. Flagged path coefficients are significant at * $p < .05$, and ** $p < .001$. $\chi^2(194) = 738.214$, $p = .000$. 

\[
\chi^2(194) = 738.214, \quad p = .000.
\]
Regarding the overall model fit, chi-square statistics showed significance, meaning that the proposed model and the observed data are significantly different. However, due to the strict nature of chi-square statistics, other model-fit indices were examined, which showed an overall acceptable model fit (Chi-square ratio = 3.805, CFI = .879, PCFI = .738, RMSEA = .071). Although the ratio of chi-square index indicates more than 2 as a cut-off for a good model fit (Ullman, 2001), there is no agreed upon level of chi-square ratio index for a good model. It has been suggested that the acceptable level ranges from less than 2 (Ullman, 2001) to less than 5 (Schumacker & Lomax, 2004). The PCFI indicates poor model fit, meaning that this model is not good in terms of parsimony, but CFI and RMSEA suggested that the model can be generally acceptable (CFI = .879, RMSEA = .071), resulting in mixed results.

Given the mixed results, in order to propose a better model, a few models were compared with the proposed model through the chi-square change to the change of the degree of freedom. First, a more parsimonious model was sought by removing non-significant paths and testing model fit improvement of the original model. In the first modified model (Model 2), three non-significant paths from learner variables to task performance and experience were removed, which included paths from mastery orientation to complexity, mastery orientation to optimal challenge, and L2 anxiety to optimal challenge. Table 26 shows chi-square statistics and model fit indices of the modified models.
As can be seen in Table 26, the model fit indices between the proposed model (Model 1) and the modified model (Model 2) were similar, so the better model is determined based on the chi-square difference test. There were three degrees of freedom differences from Model 1 to Model 2, and for three degrees of freedom, the significant chi-square value should be over 7.82 at the $p$-level of .05 and 11.34 at the $p$-level of .01. However, as Table 26 shows, the difference was only 1.615 between Model 1 and Model 2, indicating that the models are not significantly different.

Next, a better model was sought for by including observed relationships among variables, which were not defined in the original model. To this end, a third model (Model 3) was proposed based on the above changes in Model 2 as well as the observed relationships between ideal L2 self and performance orientation (RQ 5) and the direct influence of modality on flow (RQ4). As the Table 26 shows, chi-square differences between this model and Model 2 were found at 25.728, which indicate statistically significant differences ($df = 2, p < .01$). Although Model 2 has the benefit of being more parsimonious, Model 3 better describes the relationships between ideal L2 self and performance orientation and between modality and flow that were not present in Model 2. Furthermore, fit indices—chi-square ratio, CFI, and RMSEA—all showed slight improvement for Model 3, however, as expected, parsimony-adjusted CFI (PCFI) indicates that
the model became slightly worse in terms of parsimony due to the two additional paths between latent variables. The difference in the chi-square statistics of Model 1 and Model 3 was 24.113 ($df = 2$), indicating significant differences between the two models. Other model fit indices were better for Model 3 than Model 1. Therefore, the more parsimonious Model 3 was adopted as a better model. Figure 14 shows the modified mode (Model 2) and Figure 15 reveals the final model (Model 3) adopted in this dissertation.
Figure 14. A modified model (model 2) examining the effects of task variables and learner variables on task performance and affective experiences. Flagged path coefficients are significant at * $p < .05$, and ** $p < .001$. $\chi^2(197) = 739.829$, $p = .000$. 
Figure 15. The final model (model 3) examining the effects of task variables and learner variables on task performance and affective experiences. Flagged path coefficients are significant at * $p < .05$, and ** $p < .001$. $\chi^2(195) = 714.101, p = .000$. 
As can be seen in Figure 15, in terms of task variables on performance, task complexity negatively influenced syntactic complexity, whereas task modality positively influenced accuracy and fluency, meaning that writing positively influences accuracy and negatively influences fluency. Regarding the influence of task variables on optimal challenge and flow, high task complexity negatively predicted optimal level of challenge, but the coefficient indicates small effects. Task modality effects on optimal challenge were significant, and task modality also directly influenced flow; this may mean that writing provides more optimal challenge and more flow than speaking. In addition, optimal challenge significantly predicted flow, which consists of interest, attention, and control.

With respect to the relationships among learner variables, the model shows that ideal L2 self and ought-to L2 self predict mastery orientation and performance orientation, respectively, although the relationship between ideal L2 self and mastery orientation is weaker than that of ought-to L2 self and performance orientation. Both mastery orientation and performance orientation positively predicted positive L2 learning experience, even though mastery orientation was strongly associated with L2 learning experience. L2 learning experience negatively predicted high L2 anxiety, and high anxiety was positively predicted by performance orientation.

Finally, in terms of the link between learner variables and task performance and experience, no significant relationships were observed, and indeed these appear to be separate models. Learner variables seemed to compose one model while task experience and task performance seemed to compose another model. However, it should be noted that when these seemingly separate structures were examined individually, the model fit indices did not improve from those of the original combined model (Model 3). Model fit for each model was found at: $\chi^2(46) = 305.033$, $p = .000$, Chi-square ratio = 6.631, CFI =.868, PCFI = .605, RMSEA = 1.000
for learner variables; and $\chi^2(30) = 190.511$, $p = .000$, Chi-square ratio = 6.350, CFI = .933, PCFI = .622, RMSEA = .097 for task experience. Given the potential lack of model fit for the individual models, the results suggest that the underlying structure for learner variables and task experience and performance outcomes share some relationship, though what this may be is beyond the scope of the current study. As it is, the apparent disconnection between learner variables and task experience and performance variables runs counter to the predictions initially made in this study.
CHAPTER 5. DISCUSSION AND CONCLUSIONS

This chapter summarizes and discusses the research findings reported in Chapter 4. One objective of the study is to examine how task-related variables and learner variables influence both task performance and learners’ experience of tasks (i.e., flow). I examine the effects of the respective variables on outcome measures in the following order: (a) the effects of task features on task performance, (b) the effects of task features on task experience, (c) the relationship between learner variables and task performance, (d) the relationship between learner variables and task experience (i.e., flow), (e) the relationships among learner variables, and (f) the multifaceted relationships among all task and learner variables. Through the investigation of the independent functions of task and learner variables and their interactions, the study aims to uncover the dynamics of the act of task performance as a holistic affective and cognitive experience of task–learner interaction (Campbell, 1988). In the following sections, the research findings are discussed in relation to the research questions and hypotheses, and are situated within the existing literature. Pedagogical implications of the current study are addressed, followed by the limitations. This chapter concludes with directions for future research.

5.1. The Effects of Task Features on Task Performance

5.1.1. Task complexity effects on performance

RQ1-a. Task complexity effects: What differences in performance (in terms of complexity, accuracy, and fluency) are there between simple and complex tasks?

Hypothesis: L2 users will produce more complex and accurate but less fluent language in complex tasks than in simple tasks in both speaking and writing.
Findings from the comparison between simple and complex tasks in terms of performance failed to support the hypothesis. Participants’ performances in terms of complexity, accuracy, and fluency were not meaningfully different depending on task complexity. Previous findings were mixed in terms of the aspects of performance (i.e., CAF) that were influenced by task complexity. A few studies have shown syntactic complexity to be improved by greater task complexity (Michel et al., 2007), while others have shown beneficial impacts of task complexity on accuracy (Albert, 2011; Gilabert, 2007; Kormos & Trebits, 2011), with only one study, by Robinson (1995), demonstrating the predicted joint increase in complexity and accuracy. The current study showed, however, that task complexity does not affect performance. These findings also run counter to Robinson’s (2001b) hypothesis that task complexity facilitates complexity and accuracy improvement.

The observed findings raise a question with regard to the design of tasks, or the manipulation of task complexity by teachers. In other words, a question arises as to whether the complex tasks adopted in the current study are indeed conceptually more complex than simple tasks, especially given the repeated-measures design adopted in the study. Many previous studies (Kim & Tracy-Ventura, 2011; Kuiken & Vedder, 2011; Robinson, 2001b) have adopted a between-subject design (i.e., different participants were compared in terms of their task performance after performing tasks that differed in terms of level of complexity), while the current study adopted a repeated-measures design so that the comparisons were made at the within-individual level. All participants completed four tasks, which differed in terms of complexity and modality. As the repeated use of similar tasks result in practice effects, the four tasks were carefully designed, referring to the findings of the pilot study, to be similar in aspects besides complexity and modality, including content, familiarity, and vocabulary level.
Specifically, the content of all the tasks contained information on weather, living costs, sports or outdoor activities, salary or tuition, and benefits. Despite such efforts, potential task complexity differences may have been neutralized by the repeated exposure to similar tasks.

In addition, the lack of significant task complexity effects in this study can be interpreted in such a way that this study does not support Robinson’s (2001b) cognition hypothesis. Task complexity effects are mediated by the increased conceptual demands in tasks (Robinson, 2001b), but it is likely that task complexity manipulated via +/- elements failed to impose conceptual demands to participants. The manipulated task complexity may have been interpreted and transformed in a unique way by the current study’s participants. They may have adopted strategies to meet the complexities or overwhelming demands of tasks, for example, by adopting simplified problem-solving solutions. The study showed that some participants tended to adopt strategies that differed in terms of content, argument structure, and logic to solve tasks that were simpler or more complex; such variation in learners’ strategies can be seen in the language output from two participants in the examples below.

Simple speaking task
ID #69 (ratio of clause per T-unit (C/T) = 1.42; number of words per T-unit (W/T) = 7.59)

Hi my friend, I reviewed all the options that you provided for the exchange program and there I think the best option for you. So A college has frequent thunderstorm and tornadoes, and there many rain falls and hurricanes so I think the weather is not nice, and E college has frequent heavy snowfall during the winter, so I think the weather is not nice, and the Hamline university has extremely cold and snowy all year around except summer. I think the weather is not nice except summer, but it has heavy snow in winter, so I think it is not appropriate for you. And though the S university’s living cost is expensive but you think and though the S university’s living cost is expensive but you think and the A college and H college and A university have the similar living expenses compared to S university, about 3000 dollars so I think you may not feel to oppress. So I think S university is the best, though it has higher expenses, it has nice weather, and it is not that high compared to other 3 university, so I recommend you having an exchange program in S university.

Complex speaking task
ID #69 (ratio of clause per T-unit (C/T) = 1.73; number of words per T-unit (W/T) = 6.04)
I think Diego is the most suitable company for you. It has nice weather. It is located in Hawaii and the weather is sunny and mild. And although the salary is not that high. It has two months of vacation per year so I think the pay is quite reasonable. And the living cost is cheap. You need to spend only 1000 dollars and the housing offered by the company on free. And you can have outdoor activities including ocean sports. And there’s a big shopping mall so you can have other activities. And the working environment is good. And you have flexible working schedule. But there are other companies that has high salary but tight and fixed working schedule so I think you don’t prefer that company like JJ or the Modern company has high salary but you can’t enjoy no outdoor activities and the weather is hot and dry but cold in winter so it doesn’t have nice weather and the Diego company is mild weather in spring and cold in winter and living cost is 2500 and living cost is more expensive than Well company and In Ono the weather is extremely cold and heavy snow in winter so you can not enjoy the sports activities so I think Well company is best suit for you.

Simple speaking task
ID #84 (ratio of clause per T-unit (C/T) = 1.21; number of words per T-unit (W/T) = 10.65)
First, congratulation on your entrance international school like foreign college, and considering all your criteria nice weather and living expenses, it is hard to choose. And the 5 universities all have tough climate except number 4 S university, and this university has mild all year around and ocean coast, but dry desert, but nice weather but it is too high for living there, it's way over 1000 dollars per month, so I think this university has nice weather. But I would rather choose another college, and I thought E college is better than S university this university has strong wind and dry and have heavy snow falls however the living cost is too cheap. It's only 500 dollar per month, and it is better than thunder storm or tornadoes or hurricane. It's just snow fall and wind, just it is untolerable climate. And I thought that this is not dangerous atmosphere. However other college has tornadoes, lightening, and hurricane, extremely cold and heavy snow in winter and tornadoes per year. However second E college is not that dangerous, it is a little bit tough climate. However it can be tolerable and the living expenses is too low for you can enough to tolerate the climate. Also considering the low expenses, so I thought that you’d better choose the E college.

Complex speaking task:
ID #84 (ratio of clause per T-unit (C/T) = 1.68; number of words per T-unit (W/T) = 6.29)
I would choose the Well company. I think you should consider nice weather, high salary, living cost, cultural and sports activities, flexible working schedule. And considering day’s criteria, I choose Well company or Diego. This is because other companies like JJ Modern company and Ono is very bad weather like JJ is very tight and fixed working schedule. And this is not suit for flexible working schedule. And Modern company is very dry and hot climate but cold in winter. This is very bad for nice weather. And in 5 one, this company also very have very bad weather like cold and heavy snowy winter and company 3 and 4. Although these companies are a little bit of low in salary, but the other criterias are suit the criteria like they have nice weather, and not the high salary but suitable salary. And living cost is cheap and cultural and sports activities you can enjoy the cultural and sports activities this company because their weather is very good. And their working schedule is very flexible. And I choose Well company and this is because the living cost of Diego is a little bit high for the salary. However the living cost is a little bit high
like 2500 but Well company is 10000 dollar. So I think you should choose Well company as your occupation.

As can be seen in these examples, for the complex tasks the participants seemed to adopt simplified strategies for making their arguments. Although the instructions asked them to compare their choice with the other options, and they did so in the simple tasks, they did not do so in the complex tasks. For example, in the simple task, both participant #69 and participant #84 compared their choice with the other options in terms of the two criteria. However, they adopted different strategies in the complex task. Participant #69 simply repeated the characteristics of the chosen option without comparing it to the other options. Participant #84, rather than highlighting the benefits of one option, started to rule out the less preferred options one by one by mentioning why each one failed to meet the given criteria. In such unscripted speech, it might be too complex to compare five options in terms of five criteria, and in this case, it would be easier to remove available options, thereby choosing the one that remains in the end.

These examples suggest that although a task can be conceptually complex, once the problems it presents are solved by learners, the complexities can be represented in a simple way, whereby the goals of the task (i.e., message delivery) can be accomplished effectively. The participants’ strategies in the current study recall Breen’s (1987) distinction between task-as-workplan and task-as-process, which emphasizes that the ways in which students can appropriate a task, for example through their own manipulations, goal setting, and problem-solving strategies, may not fit a teacher’s intentions, as the activity unfolds in the actual task performance. For example, Hellermann and Doehler (2010) showed that task interpretation and performance, although mediated by teachers’ workplans, vary depending on individuals’ orientation and moment-to-moment contingencies of the interactive event. Similarly, in this study the monologic
task dynamics can be associated with the individual learners’ goals or strategies when encountering complex tasks.

Similarly, conceptual complexities in the complex tasks may have directed learner attention to problem-solving, thereby diverting their attention from linguistic complexity, as suggested by Skehan’s (1996, 1998) limited attentional capacity model. Kormos and Trebits (2012) cast doubt on an underlying assumption of Robinson’s (2001b) cognition hypothesis, referring to Levelt’s (1989) speech production model. According to Levelt (1989), speech production is composed of (a) conceptualization (concepts and messages are semantically planned), (b) formulation (messages are translated into subvocal speech by incorporating existing linguistic information), (c) articulation (preverbal speech is realized as speech through articulatory systems), and (d) monitoring (preverbal and produced speech is checked for accuracy and appropriateness). Adopting this model, Robinson’s argument that complex tasks direct learner attention to language form is based on the assumption that complexity in conceptualization is transferred to complexity in formulation, resulting in syntactic complexity in language (Kormos & Trebits, 2012, p. 443). However, Kormos and Trebits (2012) maintained that high demands in conceptualization may reduce available attention resources for formulation (Skehan, 1998), because formulation requires conscious attention for L2 learners. They also showed that different tasks may impose demands on either conceptualization or formulation of language production, leading to different task performance outcomes.

Recently, Wang and Skehan (2014) argued against Robinson’s cognition hypothesis based on several studies’ research findings that fail to support the prediction that complexity and accuracy will improve together (Foster & Tavakoli, 2009; Gilabert, 2007; Iwashita et al., 2001; Kuiken & Vedder, 2007; Michel et al., 2007; Robinson, 2007). Even though occasional findings
do support such joint enhancement (e.g., Ishikawa, 2006), Wang and Skehan asserted that it should be viewed with skepticism until high correlations between complexity and accuracy can be observed “at the individual level” (p. 158). From this perspective, the current study’s findings of no task complexity effects on performance suggest that it is possible that individual variations in terms of complexity and accuracy in performance may have blurred possible effects on performance.

5.1.2. Modality effects on performance

RQ1-b. Modality effects: What differences in performance (in terms of complexity, accuracy, and fluency) are there between speaking and writing tasks?

Hypothesis: The language elicited by writing tasks will be more complex and more accurate than the language produced in speaking tasks. Regarding fluency, it is expected that L2 writers will be less fluent than L2 speakers, due to the recursive nature of writing (Kellogg, 1996).

Regarding modality effects, the hypothesis was supported in that the participants’ written production was more complex and accurate but less fluent than their speech production. In writing, they produced more clauses per unit than in speaking (C/T), although no differences were found in the number of words per unit (W/T). The tendency of writing tasks to elicit more complex syntactic structures than speaking tasks has been shown in previous studies (Kormos & Trebits, 2012; Kuiken & Vedder, 2011, 2012). One exception is a study by Baba, Takemoto, and Yokochi (2013), which found that the participants’ sentences in speaking were longer than those in writing. They attributed their findings to EFL speakers’ tendency to link two T-units with coordination, given the communicative pressure to continue a conversation. Nevertheless, most
studies have suggested that greater complexity in writing is to be expected, based on the register and textual differences between spoken and written language.

Writing tends to be more formal than unscripted speaking and employ more complex sentence structures, as exemplified by frequent nominalization (e.g., Halliday, 1988). It is unclear in the current study whether the learners’ knowledge of the stylistic differences between speaking and writing may have resulted in their use of syntactically more complex structures in writing. It is possible that they had already acquired knowledge of stylistic differences between speaking and writing, considering that the participants had been exposed to academic writing as part of their university curriculum. However, it is unclear to what extent participants would have been aware of register differences, especially because this study’s task, giving advice to a friend, fits into a more personal and less formal genre of writing.

Regardless of the sources of the differences, this study, consistent with findings from previous studies, showed that writing is more effective than speaking in drawing learner attention to syntactic complexity. This supports Kormos’s (2014) conception of writing as more effective than speaking in drawing learner attention to form, which in turn implies that modality should be considered to have a resource-directing task character in Robinson’s (2001b) triadic framework. In addition to modality’s effects on performance differences, Weissberg (2000) showed that modality also affects different aspects of language development. Examining L2 learners’ syntax and accuracy development, he showed enhanced accuracy in speaking and the emergence of more syntactically innovative forms (language forms that had been hitherto unused by participants) in writing. These studies suggest that modality influences both task performance and the development of different aspects of language.
In terms of accuracy, the finding that written language was more accurate than spoken language supports the hypothesis. This finding was quite expected considering general language production differences between speaking and writing. Written text is generally considered more polished than unplanned spoken language because it is possible to monitor and revise during written language production (e.g., Wennerstrom, 2003). In contrast, unplanned speaking production tends to be incremental, and oftentimes, even noticed errors are ignored in favor of maintaining a flow of communication. Sufficient processing space is necessary in learners’ working memory to hold ephemeral speech output in mind (e.g., Ochs, 1979; Ravid & Tolchinsky, 2002) and to compare it to target-like language forms and the declarative knowledge they have. Considering the processing demands in L2 speech production (e.g., Adams, 2003), the current results that show that L2 learners produced more errors in speaking than in writing make sense.

In relation to L2 learners’ correction behaviors, the level of tolerance for errors can vary depending on the perceived purpose of an activity. Williams (1999) showed that L2 learners’ perception of task goals affected the amount of focus they paid to language form. She showed that if the goal of the activity was to communicate, as in the case of speaking, the learners tended to be less attentive to language form, compared to tasks where the perceived goal of the activity was language learning. Adams (2003) showed that L2 learners paid more attention to language form in a writing task compared to a speaking task. A likely explanation for these previous findings and the current findings is that the degree of attention to form may differ in speaking and writing, due to the general differences in the goals of speaking and writing tasks.

A practical methodological limitation of this study may explain the variation in correction behaviors; that is, the speaking performance, as it was being recorded, was incremental, thereby
reflecting aspects of process-based performance. On the other hand, the observed writing data reflect product-based performance, and as Adams (2003) pointed out, “learners’ writing may conceal self-corrections and other evidence of developing interlanguage rules or may reflect instructed rules that have not necessarily become part of learners’ internal grammar” (p. 349). In order to compare speaking and writing, this study removed false starts and corrected errors in speech production, examining the product-based aspects of speaking and writing. Despite this effort to make the modalities comparable, however, it must be acknowledged that the spoken data reflected more features of online processing than the written data, which is an inherently unavoidable issue in modality research.

In terms of fluency, both speed fluency (the speed of production) and breakdown fluency (frequency of pause) indicated a higher level of fluency in speaking than writing. The findings lend support to the hypothesis, which is in line with previous research findings. In general, for normal adults, speaking is six times faster than writing (e.g., Granfeldt, 2008), and this was the case in this study, with speaking producing about six times more words per minute than writing. As for breakdown fluency, writing was less fluent than speaking, as indicated by more pauses per T-unit, which also can be attributed to the recursive nature of the writing process (Kellogg, 1996). The relatively low pause ratio this study observed in speaking can also be attributed to speakers’ tendency to use discourse markers or continue talking to hold the floor.

5.1.3. Interaction effects of task complexity and modality in task performance

RQ1-c. What interaction effects exist between modality and task complexity regarding learner task performance (complexity, accuracy, fluency)?

Hypothesis: It is expected that task complexity effects on complexity, accuracy, and fluency will be stronger in speaking than in writing, as writing provides opportunities for on-line
planning that can reduce the effects of high complexity demands.

Contrary to the prediction, no significant interaction effects were observed. In terms of main effects of task complexity, no significant effects were found in either speaking or writing tasks. Similarly, the effects of modality on task performance were similar in terms of direction and significance for both simple and complex tasks. The observed lack of interaction effects suggests that task complexity and modality effects are independent of each other.

5.2. The Effects of Task Features on Task Experience

5.2.1. Task feature effects on perceived task difficulty

RQ2-a. Are there differences in learners’ perception of task difficulty depending on task features of task complexity and modality?

Hypothesis: It is hypothesized that complex tasks are perceived to be more difficult than simple tasks by L2 learners in both speaking and writing. For modality differences, speaking tasks are expected to be perceived as more difficult than writing tasks across both complexity levels, due to the on-line processing demands of speaking production.

The hypothesis was confirmed in that task complexity and modality functioned as significant variables determining the level of perceived task difficulty. The expected level of task complexity, operationalized through +/- elements, matched participants’ perception of task difficulty, which is in line with previous studies that showed that task complexity increases learners’ perception of task difficulty (Robinson, 2001b; Robinson & Gilabert, 2007).

The distinction between complexity and difficulty is worth maintaining, however, because each construct has different pedagogic implications. Task complexity is expected to influence the quality of task performance, as predicted by Robinson’s (2001b) cognition
hypothesis, while task difficulty is expected to have an impact on psychological and affective experience, which should in turn influence learner motivation and performance (Robinson, 2001b). Task difficulty can mediate the relationship between task complexity and task performance in that learners’ perception of task difficulty may lead them to adopt different strategies or show certain behaviors. For example, in the face of challenging tasks, some learners develop their own strategies, while others are discouraged from displaying their skills. Given the functional differences of the two related yet distinctive constructs, it should be kept in mind that task difficulty cannot necessarily predict the cognitive complexity that a task entails. Revisiting Robinson’s (2001a) cognition hypothesis, it is the cognitive complexity of tasks, rather than the psychological perception of difficulty, that influences task performance in terms of complexity, accuracy, and fluency (Derwing & Munro, 1997).

Next, with regard to task modality, speaking tasks were perceived to be more difficult than writing tasks across both levels of task complexity, supporting the hypothesis. Two likely accounts exist, first in terms of differences in task demands imposed by psycholinguistic processing differences, and second in relation to participants’ learning history regarding speaking and writing. The on-line processing demands in speaking can pose difficulties for EFL learners. Unlike in L1 speech production, the formulation and articulation of L2 utterances is not automatic for L2 learners (Kormos, 2006), thereby requiring a certain level of attention. Along with the attentional demands, online time pressure in speaking may impose additional cognitive demands on L2 learners. Writing, however, is relatively less constrained by online pressure, as writers can control the production processes, which may ease the cognitive burden of formulation and production.
In addition, participants’ learning experiences may account for the observed differences in the perception of task difficulty between speaking and writing. Participants’ general lack of confidence or unfamiliarity with speaking in the L2, which is related to their past learning experiences, may have affected their perception of the task difficulty. A number of studies have shown EFL learners to face challenges in developing oral proficiency (Al-ahdal, Alfallaj, Al-awaied, & Al-hattami, 2014; Al-Jamal & Al-Jamal, 2013; Hosni, 2004). Other studies have shown EFL students’ preference for writing over speaking (Baba et al., 2013). Baba et al. (2013) showed that Japanese EFL students preferred writing over speaking, and the preference was associated with their past learning experiences and contexts. Those with ESL learning experience preferred speaking, while those with only EFL learning experience preferred writing over speaking. They also showed that the participants’ performance was related to their preferred mode of tasks. Similarly, Pae (2013) showed that Korean EFL students had a generally higher level of L2 anxiety in connection to oral skills such as speaking and listening, compared to their anxiety level with written language skills such as writing and reading. Because of the possibility of modality-specific L2 anxiety being a source of task difficulty, a follow-up analysis was conducted to investigate whether differences existed in participants’ anxiety between L2 speaking and L2 writing, showing that participants of this study had a significantly higher level of anxiety in speaking than in writing ($t (1,140) = 4.014, p = .000$). It seems that participants’ reported challenges in speaking can be attributed to on-line processing demands in speaking as well as their relative lack of exposure to communicative language teaching and spoken language.

However, it should be noted that the role of modality in task difficulty that the current study observed may not apply to all genres of writing, as the writing task in this study was limited to narrative written production. In other words, the writing tasks adopted here were a
means of language learning and opportunities for output (i.e., writing for learning) rather than a
means of developing literacy skills (i.e., writing for writing). Indeed, many participants adopted a
letter-writing style, which is a typical example of a relatively informal type of writing, and they
addressed the audience of their writing tasks as a friend (e.g., Wennerstrom, 2003). Given the
potentially convoluted issues involved in comparing speaking and writing due to their varied
scopes and characteristics, this study’s findings on modality should be treated cautiously.

5.2.2. Task feature effects on flow

RQ2-b. Are there differences in flow experience depending on task features of task
complexity and modality?

Hypothesis: It is hypothesized that neither task complexity nor modality has a direct
influence on learners' flow experience, as flow experience is expected to be mediated by the
presence of optimal challenge, which differs according to each individual’s skills.

The findings support the hypothesis that task complexity would not be a mediator of flow, but do not support the prediction that modality would not predict flow. Regarding the
relationship between task complexity and motivational experience, only a few studies exist (Ben
Maad, 2012b; Ishikawa, 2011; Robinson, 2001b), which in general show that high task
complexity is associated with interest. Robinson’s (2001b) study showed that along with
increasing task complexity, L2 learners’ stress increased, although they felt more interest. The
mixed findings regarding stress and interest do not conform to the construct of flow, as flow is
characterized by the heightened, enjoyable feeling of happiness and interest that arises along
with some level of challenge (Csikszentmihalyi, 1990). However, as Robinson’s representations
of interest, stress, and confidence are based on one question, more empirical evidence is needed to generalize his findings.

Regarding the finding that no differences existed in flow experience across simple and complex tasks, there are a few possible explanations in reference to the condition of flow. Assuming that optimal challenge is required for flow, the condition of optimal challenge represented by the balance between perceived challenge and perceived skills must be met (Csikszentmihalyi, 1990). If flow occurs only in this condition of skill–challenge balance, the lack of difference in flow experience in the simple and complex tasks that this study observed can be attributed to two possibilities (Abuhamdeh & Csikszentmihalyi, 2012b): (a) no difference existed in the level of perceived difficulty between simple and complex tasks, or (b) no difference existed in the level of perceived skill between simple and complex tasks. In terms of the first possibility, the findings from RQ2-a on task complexity effects on perceived difficulty showed that participants perceived complex tasks to be more difficult than simple tasks. This argues against the possibility that the finding of no role of task complexity is due to no difference in perceived task difficulty.

As for the second possibility, it may be that a similar level of perceived skills was the cause of the lack of difference in flow experience between simple and complex tasks. A follow-up analysis revealed that participants’ perceived skills level for the completion of a task remained similar across both levels of task complexity ($F$ (1, 140) = .329, $p = .567, \eta^2 = .002$, power = .088). These findings together illustrate that although task complexity via +/- element manipulation affected participants’ judgment of the task difficulty levels, it did not alter the ways participants perceived their skills or capacity to complete the given complex tasks. Robinson (2001b) pointed out that ability-related learner variables are relatively stable, compared to
affective variables. It seems that manipulating +/- elements may affect the general complexity of a problem solving task without directly influencing the learners’ confidence or judgment of their ability to complete the task. Perhaps, manipulating other aspects of task demands such as task structures (Tavakoli & Skehan, 2005), familiarity (Nunan & Keobke, 1995), and planning opportunities (Ben Maad, 2012b) would have a stronger influence on learners’ perception of their own skills for a given task.

As for the findings on modality and flow, writing resulted in a higher level of flow experience than speaking. Adopting the assumption that optimal challenge is a mediator of flow, more flow in writing can be attributed to the unobserved function of optimal challenge in writing. Although the participants reported writing to be easier than speaking, they rated the writing tasks as ideal or optimal in terms of challenge level (i.e., neither too difficult nor too easy; \( t(140) = -2.256, p = .026 \) for simple tasks; \( t(140) = -2.298, p = .023 \) for complex tasks), and perceived skills (\( t(140) = -6.475, p = .000 \) for simple tasks; \( t(140) = -6.340, p = .000 \) for complex tasks). These findings suggest that although speaking provided more challenging task demands, writing produced more favorable conditions for flow experience to occur.

In addition to task performance conditions (i.e., optimal challenge), learners’ existing dispositions, attitudes, and motivation for both modalities may have affected their flow experience. Arguing against the view that optimal challenge is sufficient for flow experience, Abuhamdeh and Csikszentmihalyi (2012b) recently proposed that although optimal challenge is crucial for flow experience, the link can be mediated by learners’ intrinsic motivation or features of an activity, including goal-directedness (Elliot & Harackiewicz, 1994). Abuhamdeh and Csikszentmihalyi suggested that if activities were not performed with intrinsic motivation or with clear goals, flow was less likely to occur even in the presence of optimal challenge. From the
current data, it is hard to determine participants’ intrinsic motivation associated with speaking and writing. However, given that many studies have found negative relationships between anxiety and intrinsic motivation (e.g., Noels, Pelletier, Clément, & Vallerand, 2000), along with higher anxiety levels in speaking than in writing, it can be assumed that the current study’s participants’ intrinsic motivation was higher in writing than in speaking, which may have been reflected in their flow experience.

The overall optimal level of challenge the learners found, along with their relative confidence in writing compared to speaking (RQ2-a), also suggests another explanation that may run counter to the hypothesis of Csikszentmihalyi’s (1990) flow theory. Contrary to Csikszentmihalyi’s emphasis on complex tasks, it is possible that easier tasks are more facilitative of flow experience in certain contexts. Abuhamdeh and Csikszentmihalyi (2012a) noted that school-related or work-related activities are generally performed out of obligation rather than voluntarily, and in these less intrinsically driven learning contexts, individuals tend to enjoy relatively easier tasks more than challenging ones (Day & Bamford, 1998; Graef, Csikszentmihalyi, & McManama Gianinno, 1983). In the field of extensive reading (e.g., Day & Bamford, 1998), an ideally enjoyable reading level is one level lower than an individual’s current language skills. Kirchhoff (2013) showed that L2 learners engaged in extensive reading activities also experienced flow. In explaining the occurrence of flow with a relatively easy level of text in extensive reading, the author argued that L2 reading itself is a demanding meaning-construction activity, even when the level of specific elements such as vocabulary is low for the reader, in which case the optimal challenge condition for flow is satisfied. However, the findings can also be interpreted in a different way; flow can also occur when the given tasks are easy, especially in academic settings where learners are not generally intrinsically motivated (Abuhamdeh &
Csikszentmihalyi, 2012b). From this perspective, the current study’s finding of higher levels of flow experience in writing presumably may be due to the relative easiness and controllability of the tasks. A related finding showed that among the three flow elements of interest, attention, and control, factor loading of control on flow experience was the highest. This means that the feeling of control or goal-directedness contributed the most to the participants’ flow experience, as can be seen in this study.

5.3. The Effects of Learner Variables on Task Performance

RQ3. The effects of learner variables on task performance: What relationships exist between learner variables (goal orientation, L2 anxiety) and task performance in terms of complexity, accuracy, and fluency?

Hypothesis: It is expected that a mastery orientation and low anxiety will be associated with syntactic complexity, whereas a performance orientation and high anxiety will be associated with accurate performance. Fluency is expected to be associated with low anxiety.

Overall, these hypotheses were not supported by the current study. No significant relationships were found between goal orientations and task performance in any of the four task conditions with two exceptions: Performance orientation was associated with low syntactic complexity in the simple writing task, and mastery orientation was linked to low accuracy in the complex speaking task. Although limited, these results suggest that performance orientation is associated with non-risk-taking behaviors, or what Skehan (1996) referred to as “a conservative strategy” (p. 47), in which, for the sake of accuracy, learners choose to stay within their linguistic capacity rather than stretching their linguistic resources and increasing the risk of making errors. This finding is in line with the characteristics of performance orientation, where individuals seek
to obtain favorable judgment from others and avoid negative evaluations of their ability (Dweck, 1986).

The other finding of significance was the negative relationship between mastery orientation and accuracy in the complex speaking task. One explanation for this finding may be that mastery orientation, which represents an individual’s goals of learning and making progress through performing a task, tends to be associated with risk-taking behaviors, despite the increased risk of errors (Dweck, 1986). Following this logic, the relationship should have been mediated by increased syntactic complexity. However, there was no relationship between goal orientation and syntactic complexity, which was also confirmed in a follow-up regression analysis on the function of syntactic complexity as a mediator for the relationship ($p > .05$). A likely explanation for these findings is that the mediation may have occurred in other domains such as lexical complexity or syntactic elaboration that were not measured in the current study.

It also should be noted that the link between performance orientation and syntactic complexity appeared only in the simple writing task (the cognitively least demanding condition), and the relationship between mastery orientation and low accuracy appeared only in the complex speaking task (the cognitively most demanding condition). Even though researchers have suggested that individual differences effects become salient under demanding tasks (e.g., Kormos & Trebits, 2011; Robinson & Gilabert, 2007), given the asymmetrical emergence of the effects of mastery and performance orientations on performance, the conditions that maximally reveal the relationships between them remain unclear.

In terms of the relationship between anxiety and task performance, anxiety had no direct relationship with any aspects of task performance regarding complexity, accuracy, and fluency. Although some studies have shown the mediation of anxiety in determining the impact of task
complexity on performance (Kim & Tracy-Ventura, 2011; Robinson & Gilabert, 2007), none, to the best of my knowledge, has directly addressed the relationship between anxiety and performance complexity, accuracy, and fluency. A negative relationship between anxiety and fluency was expected based on previous findings that low levels of willingness to communicate are generally associated with high L2 anxiety (Baker & MacIntyre, 2000; MacIntyre & Charos, 1996; MacIntyre & Legatto, 2011; Yashima, Zenuk-Nishide, & Shimizu, 2004). However, the findings showed no direct relationships between L2 anxiety and complexity, accuracy, and fluency in task performance.

5.4. The Effects of Learner Variables on Task Experience

RQ4. The effects of learner variables on task experience: What relationships exist between goal orientation and anxiety, on the one hand, and perceived task difficulty and flow on the other?

Hypothesis: In terms of learner variables on perceived difficulty, it is expected that a strong mastery orientation and low anxiety will be associated with low perceived task difficulty, whereas high performance orientation and high anxiety will be associated with high perceived task difficulty. As for the effects of learner variables on flow, no direct relationship between goal orientation and flow is hypothesized, as the relationship is expected to be mediated by perceived task difficulty and anxiety.

The hypothesis was not supported by the current study, as no significant relationships were found between learner variables and task experience variables (perceived difficulty, flow). The findings suggest that even though goal orientations offer a behavioral framework in which one construes goals and sets plans for an activity, dispositional goals have no direct impact on
one’s perception of task difficulty and flow experience. Although trait-like learner features have been found to determine learner experience of tasks (Ben Maad, 2012a, 2012b; Hiromori, 2009), the relationship has been generally weak (Hiromori, 2009; Kormos & Trebits, 2012; Révész, 2011), compared to the direct influence of task variables and task conditions on learner experience (Kormos & Dörnyei, 2004; Ma, 2009; Poupore, 2014; Révész & Brunfaut, 2013). This may be due to the malleable and fluctuating nature of learner trait characteristics, which can be easily altered by a specific task performance situation (Hellermann & Doehler, 2010; Macintyre & Legatto, 2011; Robinson, 2001a). The findings suggest that, at least in terms of task difficulty and flow, situation-specific task conditions may have a stronger effect than existing learner characteristics on learner experience of tasks.

5.5. Interactions Between Task Features, Task Performance, and Experience

RQ5. Interactions between task design variables and task experience: Are the relationships between learner variables and task performance and affective outcomes similar across different task features of task complexity and modality?

Hypothesis: It is expected that the observed relationships will be consistent across various task performance conditions that vary in task complexity and modality, although the degree of strength is expected to vary.

This question cannot be answered because interaction effects assume significant main effects, and, as already discussed, the results failed to show main effects in the relationships among variables. However, relationships between goal orientation and task performance appeared under certain task circumstances. The findings of the negative correlations between performance orientation and syntactic complexity, and between mastery orientation and accuracy,
appeared in the least challenging task (simple writing) and in the most challenging task (complex speaking), respectively. Possible interactions or conditions of task performance warrant further investigation.

5.6. The Relationships Among Learner Variables

RQ6. What are the relationships between goal orientations, Dörnyei’s (2009) L2 motivational self system (ideal L2 self, ought-to L2 self, and L2 learning experience), and anxiety?

Hypothesis: It is expected that mastery goal orientation and performance orientation will be closely associated with Dörnyei’s (2009b) ideal L2 self and ought-to L2 self, respectively. L2 learning experience is expected to be positively related to mastery orientation and negatively related to performance orientation. Anxiety is expected to be positively related to performance orientation and ought-to L2 self, and negatively related to mastery orientation, ideal L2 self, and L2 learning experience.

The findings of the current study generally confirmed these predictions. The associations between goal orientation and the L2 motivational self system generally fulfilled the prediction. The expected relationships between anxiety and other motivational constructs were also confirmed, although the expected negative relationship between anxiety and ideal L2 self was not found. L2 learning experience was not associated with performance orientation, contrary to the prediction.

Regarding the findings on the two motivational frameworks of goal orientations and the L2 motivational self system, although they have not been directly compared and addressed in previous research, parallel relationships between major constructs of the motivational models can
be assumed based on the conceptual similarities (e.g., Higgins, 1987, 2012; Noels et al., 2000). There were positive relationships between mastery orientation and ideal L2 self and between performance orientation and ought-to L2 self, which are in line with the general similarities of the constructs. Motivational sources for both mastery orientation and ideal L2 self are largely internally driven (i.e., intrinsic motivation), while the sources for both performance orientation and ought-to L2 self are externally driven (i.e., concern for others’ evaluation).

Unexpected relationships were also observed, including one between ideal L2 self and performance orientation. Despite general similarities, the relationships between goal orientations and L2 motivational self system are not straightforward. The motivational source of mastery orientation is purely intrinsic (i.e., learning, advancement, progress), but the source for ideal L2 self can be both intrinsic and instrumental, yet internalized (i.e., learning English to succeed in one’s career; (Taguchi et al., 2009). In addition, even though performance orientation is generally driven by external sources, including avoiding negative evaluation and meeting others’ expectations, certain types of performance orientation can be more internalized than others.

Adopting the multilevel performance orientation framework (Horvath, Herleman, & McKie, 2006; Yeo & Neal, 2004; Yeo, Loft, Xiao, & Kiewitz, 2009), performance-avoidance goal orientation (i.e., avoiding negative evaluations by hiding one’s incompetence) reflects preventative aspects of ought-to L2 self, but performance-approach goal orientation (i.e., demonstrating one’s competence) can be internally driven. This means that performance-approach goal orientation can be associated with ideal L2 self, suggesting that multilevel goal structure may be a better framework than a dichotomous goal structure to represent the relationship between goal orientation and the L2 motivational self system.
As for the positive relationship between L2 learning experience and mastery orientation, the findings accord well with the generally accepted view that mastery orientation is adaptive and facilitative to learning, while performance orientation is associated with maladaptive learning behaviors (Dweck, 1986; Eum & Rice, 2011; Grant & Dweck, 2003; Lau & Lee, 2008; Payne et al., 2007; Wolters et al., 1996). Similarly, anxiety was negatively associated with externally driven types of motivation including ought-to L2 self and performance orientation. Gregersen and Horwitz (2002) conceptualized anxiety as a general characteristic of those who are concerned about others’ evaluation of them (p. 562), and anxiety arises from the fear of being negatively evaluated by others (Horwitz, Horwitz, & Cope, 1986). The current study’s findings showed that internally driven goal orientation and motivational self-concept tend to be related to positive L2 language experience and lower anxiety, while externally driven goal orientation and motivational self-concept tend to be associated with negative L2 experience and higher anxiety.

Other interesting relationships were observed among constructs of the L2 motivational self system. L2 learning experience was positively associated with ideal L2 self, but not related to ought-to L2 self, which generally supports previous findings (Papi, 2010; Taguchi et al., 2009). Interestingly, ideal L2 self was positively related to ought-to L2 self, which was also found in some previous research (Papi, 2010; Taguchi et al., 2009). Those with a strong image of an ideal L2 self also tend to have a strong image of their ought-to L2 self, consisting of an overall stronger sense of future-referenced self-concept. This also suggests that ideal L2 self and ought-to L2 self may fall on a continuum, as illustrated in the self-determination theory (Deci & Ryan, 1985; Noels et al., 2000). Expanding Deci and Ryan’s (1985) self-determination theory to L2 contexts, Noels et al. (2000) proposed that extrinsic motivation can be considered as a continuum depending on how much one is self-determined to perform a given activity. Self-determination
from the lowest to the highest level is (a) external regulation—motivation that is absolutely external to the person (i.e., rewards, social pressure); (b) introjected regulation—extrinsic motivation that has been somewhat internalized or incorporated into self (i.e., personalized pressure); and (c) identified regulation—the most internalized and self-determined form of motivation (i.e., motivated for personal goals or reasons). Based on this continuum of internalization in extrinsic motivation, the observed relationship between ought-to L2 self and ideal L2 self can be interpreted as a relationship between internalized aspects of ought-to L2 self (i.e., introjected regulation and identified regulation) and ideal L2 self.

5.7. The Relationships Among Learner Variables and Task Variables Affecting Task Performance and Task Experience

RQ7. What are the effects of task variables (task complexity, task modality) and learner variables (goal orientation, L2 motivational self system, and L2 anxiety) on task performance (complexity, accuracy, fluency) and task experience (task challenge, flow). Also, what are the relationships among these variables?

Hypothesis: It is expected that task complexity and modality influence the ways L2 learners perceive optimal challenge and experience flow; in other words, complex tasks and writing tasks are expected to be positively associated with optimal challenge of the tasks, which in turn is expected to influence flow experience (Csikszentmihalyi, 1975, 1990). It is expected that there will be a positive relationship between ideal L2 self and L2 learning experience and between ought-to L2 self and L2 anxiety. A negative relationship is expected between ought-to L2 self and L2 learning experience, and between L2 learning experience and L2 anxiety. The relationships among ideal L2 self, ought-to L2 self, and L2 learning experience are expected to
be mediated by goal orientation. Ideal L2 self is expected to be related to mastery orientation, and ought-to L2 self and performance orientation are expected to be positively associated. It is expected that a chain of relationships that links ideal L2 self, mastery orientation, and L2 learning experience will have a positive impact on optimal challenge (leading to flow), and performance outcomes. In contrast, it is expected that a series of positive relationships among ought-to L2 self, performance orientation, and anxiety will have a negative impact on optimal challenge and flow experience.

Regarding the comprehensive relationships among task and learner variables and task performance and task-specific experience, Structural Equation Modeling (SEM) generally confirmed the hypothesized relationships. Through this method, relative contributions of variables to task performance and task experience could be observed. In addition, SEM was able to show mediating effects or indirect relationships among variables that were unobserved in the correlation analysis. The direct relationships among learner variables were discussed in Section 5.6, and some of these relationships were replicated in the final model. Therefore, the discussion here is limited to the findings that were not addressed in the earlier section.

In terms of the overall model fit, the model fit indices showed that the proposed model is generally acceptable with the current data. First, the influence of task variable (task complexity, modality) on performance in terms of complexity, accuracy, and fluency (CAF) was examined. Although the complex tasks resulted in a low level of syntactic complexity with the critical $p$-value of .05, the application of $p < .01$, along with the small magnitude of the effects, indicated that task complexity effects were not significant (RQ1-a). Regarding the effects of modality on performance (CAF), writing was a significant variable to predict higher accuracy but low fluency. As for the magnitude of the relationships, as shown in the effect sizes in the MANOVA (RQ1),
the influence of modality was greater on fluency than on accuracy (for a discussion, see Section 5.1).

Second, regarding the influence of task variables on task experience of perceived task difficulty and flow, although both task complexity and modality played a significant role in predicting learners’ perception of task difficulty, only modality influenced the optimal challenge level of the tasks. This means that although higher task complexity increased the difficulty level of tasks, the influence was too small to affect optimal challenge which consisted of perceived difficulty and perceived skills. In contrast, task modality significantly predicted optimal challenge in which the fit between task difficulty and learners’ skills was considered optimal in the writing tasks. In addition, perceived optimal challenge was shown to be a significant predictor of flow experience to a greater extent, which supports Csikszentmihalyi’s (1975, 1990) claims about the conditions for flow. While the indirect influence of task features on flow was observed through the mediation of optimal task challenge, a direct influence of modality on flow was also found. However, no direct influence of task complexity on flow was observed. These findings suggest that modality can be a variable predicting the optimal challenge level of a task, but they also suggest that modality itself can be an important task variable determining a learner’s experience of flow.

Third, with respect to the relationships among learner variables (goal orientation, the L2 motivational self system), ought-to L2 self positively predicted performance orientation, which in turn was shown to influence L2 learning experience and L2 anxiety. On the other hand, ideal L2 self predicted mastery orientation at $p < .05$, but the small path coefficient, along with the failure to reach significance when applying a critical $p$-value of .01, leads to the conclusion that ideal L2 self and mastery orientation are not related. The modified model (Model 3) suggested
that ideal L2 self is even more strongly related to performance orientation, which was unexpected. The findings can be explained by adopting the multilevel goal orientation structure that includes both performance-approach and performance-avoidance goal orientations (for a discussion, see Section 5.3).

Both mastery orientation and performance orientation positively predicted L2 learning experience, counter to the hypothesis, which predicted a negative relationship between performance orientation and L2 learning experience. A stronger relationship was observed between mastery orientation and L2 learning experience, compared to the relationship between performance orientation and L2 learning experience. These findings also can be interpreted by adopting the multilevel structure of performance orientation, which consists of performance-approach and performance-avoidance. Although both types of performance orientation focus on the act of performance and consider others’ evaluation of one’s ability, performance-approach orientation is a relatively active type of goal orientation. Furthermore, contrary to the general view that performance orientation is maladaptive, recent studies have demonstrated facilitative functions of performance orientation in learning and performance (e.g., Elliot & Pekrun, 2007; Horvath et al., 2006; Vlachopoulos & Biddle, 1997). In other words, even performance goals of demonstrating one’s competence or hiding one’s incompetence can be a positive source of learner motivation. The model also showed that L2 learning experience negatively predicted anxiety, and mastery orientation positively predicted L2 learning experience, indicating an indirect and negative influence of mastery orientation and L2 anxiety. Performance orientation predicted anxiety both directly and indirectly through the mediation of L2 learning experience (for a discussion, see Section 5.3).
Fourth, with respect to the effects of learner variables on task performance, no direct influence of learners’ goal orientation on performance was supported (for a discussion, see Section 5.2). Fifth, regarding the effects of learner variables on task experience of flow as mediated by optimal challenge, neither goal orientation nor anxiety predicted optimal challenge, contrary to the study’s predictions. Under the assumption that flow is mediated by optimal challenge, no link between learner variables and optimal challenge, in turn, means no influence of learner variables on flow experience. It remains unanswered why the learner variables of goal orientation and L2 anxiety had no effect on the optimal challenge level of tasks. A tentative explanation is that an isolated task may not always feature learners’ existing characteristics, as goal orientation and L2 anxiety may appear or transformed in a unique way according to task situations. Furthermore, although two main components of optimal challenge, perceived task difficulty and perceived skills, are about the perception of the task situation (Csikszentmihalyi, 1997), one’s perceptions cannot be free of — and may even be more strongly affected by — the real task difficulty and actual skill levels.

Finally, in terms of the relative influence of task variables and learner variables on task complexity and task experience, the findings showed that the task feature of modality played a strong role in task performance and flow-related experience, whereas learners’ dispositional traits of goal orientation and anxiety did not predict either task performance or flow-related experience. Although the final model (Model 3) revealed two disconnected models in the same analysis, one among learner variables and the other among task experience variables, better model fit indices were observed when both models were run together in SEM compared to when the two models were run separately. It seems probable that there is some connection between the two models that links learner variables and other immediate task experiences and performance,
in terms of yet unexplored and unaccounted for variables. Future research can address other possible relationships among the variables of the two separate models.

The current findings can be explained in terms of the distinction between the trait and state nature of motivational constructs. The L2 motivational self system and goal orientation define overall patterns of goal-directed motivational behaviors, representing trait-like learner characteristics. On the contrary, state motivation pertains to motivation at a certain moment, which may or may not conform to one’s existing trait-like motivation or dispositions. Although one’s state motivation is influenced by existing trait-like learner features, learner motivation at a certain moment is also affected by immediate task performance conditions, task types, and learner affect at the moment of task performance, and it even fluctuates moment-by-moment during task performance (Macintyre & Serroul, 2015; Nitta & Baba, 2015; Piniel & Csizér, 2015). In other words, trait-like motivation cannot always guide learner behaviors in a specific task performance condition, as motivational dynamics exist within the overall behavioral patterns and dispositions.

In the current data, unexpected findings were observed regarding the constructs of task performance. Counter to the expectation that performance outcomes of complexity, accuracy, and fluency would represent one latent variable of task performance, they did not consistently load under the latent variable of task performance. In task-based assessment or performance assessment, the notions of complexity, fluency, and accuracy have been widely used to assess multiple aspects of learner performance (Pallotti, 2009; Wolfe-Quintero, Inagaki, & Kim, 1998), in line with the general consensus that “L2 proficiency is not a unitary construct but, rather, that it is multicomponential in nature” (Housen, Kuiken, & Vedder, 2012, p. 1). Although the relationships between the three constructs have been widely discussed (Ågren, Granfeldt, &
Schlyter, 2012; Housen et al., 2012; Housen & Kuiken, 2009; Kuiken & Vedder, 2012; Norris & Ortega, 2009; Towell, 2012), the ways the three constructs constitute “task performance” or “language proficiency” have rarely been researched. In this study, when the six measures of complexity, accuracy, and fluency were submitted to factor analysis, the expected three subcomponents of performance (complexity, accuracy, and fluency) did not emerge. A possible explanation may be found in underlying individual differences, along with the possibility that the participants’ attention was divided among the three aspects of performance; for example, if some individuals show improved performance with greater complexity, while others show improved accuracy, correlations between complexity and accuracy may not be consistent, resulting in murky factor structures (Wang & Skehan, 2014). Furthermore, with only six measures of performance, which are related to some extent (Wolfe-Quintero et al., 1998), it is hard to observe clear factor structures. Research that addresses the relationships among various performance measures seems necessary.

5.8. Educational Implications

The findings from this study provide educational implications for the use of tasks for language learning and teaching. This study views the act of task performance as a holistic educational activity, resulting from the dynamic interactions between learners and the learning environments planned by teachers and emerging in real performance situations. Focusing on the dynamics of task performance as task–learner interaction (Campbell, 1988), this study intended to provide educational insights on task performance reality by examining multifaceted aspects of task performance.
From a task design perspective, the significant influence of modality in both task performance and task experience indicates that writing was more effective than speaking in directing learner attention to language form with the current EFL participants. Writing tasks were shown to be more effective in eliciting more complex and accurate language forms than speaking. Along with previous studies that have found writing to have advantages over speaking in pushing L2 learners to stretch their linguistic capacity (Kormos, 2014; Kuiken & Vedder, 2012), the current findings suggest that teachers can adopt writing as a form-directed instructional tool. In other words, language teachers can use writing tasks to draw attention to language form. However, at the same time, this interpretation should be cautiously applied in educational settings, as language skills acquired through writing cannot be directly transferred to speaking. The use of writing tasks for the purposes of directing learner attention to form and developing form-related language skills should be accompanied by practices for transferring those skills to speaking as well. In this manner, form-focused language skills developed through writing can be maximally utilized and drawn on to support the development of forms in speaking.

Unlike modality, task complexity was not found to be a significant variable in determining learner task performance and task experience. Task complexity did not enhance task performance in terms of complexity, accuracy, and fluency; nor did it affect task experience of flow. These findings on task complexity remain tentative and should be interpreted with caution in terms of their pedagogic implications, as some previous studies have shown contradicting findings (Ishikawa, 2007; Kormos, 2011b; Kormos & Trebits, 2012; Kuiken & Vedder, 2012; Robinson, 1995). It is possible that the differences in the findings of the current and previous studies can be explained by methodological differences. Many previous studies adopted a between-subject design, and thus their findings may be limited when it comes to reflecting
within-individual performance variations. The current study’s repeated repeated-measures design more closely resembles real-world classroom practices; as Robinson (2001b) claimed, task complexity primarily concerns within-learner variation, rather than between-individual performance variation, which is better represented by “task difficulty.” Despite the tentative nature of the findings, this study suggests at least that complex tasks may not always lead learners to make efforts to express complex concepts. L2 learners as active agents seek ways to solve complexities in tasks and strategically perform tasks, so that the expected conceptual task complexity may not necessarily be realized as planned by teachers or task designers (Breen, 1987; Hellermann & Doehler, 2010). Teachers should understand the possible discrepancy between their own plans and learners’ actual performance as well as the dynamics of task performance as it unfolds in reality. Tasks designed with consideration of such dynamics would maximize L2 learning in instructional settings.

The study’s findings on the relationships between the L2 motivational self system and goal orientation suggest a pedagogic framework through which teachers can better understand language learners’ motivational structures. Although Dörnyei’s (2009b) L2 motivational self system has been widely accepted in SLA, its motivational structures relate only to learners’ future self-concept. However, this study illustrated how these self-related motivational constructs are associated with or realized as goal-oriented behavioral patterns. The study thus provides teachers a way to understand how particular types of goal-orientated behaviors may fit into the larger picture of motivational self-concept. In addition to showing the relationship between the two motivational constructs (the L2 motivational self system and goal orientation), the study found these motivational constructs to be related to L2 learners’ affect such as L2 anxiety and the evaluation of their past learning experience. Overall, internally driven motivation positively
influenced learner affect. The study also showed that performance orientation can positively influence one’s evaluation of past learning experience, although this orientation is associated with higher L2 anxiety. Teachers should be mindful of the positive functions of performance orientation (e.g., the desire to demonstrate one’s ability to others) for learner affect, and be able to use it as a resource to encourage their motivation, by, for example, complimenting learner performance or giving positive reinforcement. Nonetheless, as performance orientation is associated with L2 anxiety, the use of performance orientation should be accompanied by the consideration of learner anxiety.

Implications can be drawn from the crucial role of perceived optimal challenge in flow experience; the study showed that the optimal level of task challenge that is suitable for learners’ L2 skills is likely to produce a more enjoyable and engaging task experience. This indicates that in order to provide learners with positive learning experiences (i.e., flow), task levels should be considered first; although tasks can be challenging to a certain extent, they should be within learners’ perceived skill level so that the learners can feel a sense of control.

In addition to challenge levels, modality in itself influenced flow experience for the EFL participants in the current study. The EFL learners showed more favorable responses to written tasks in terms of the optimality of task difficulty and the flow experience, and writing itself was shown to be a significant predictor of flow experience. Teachers can use this information to boost students’ motivation or lead them toward positive learning experiences, especially at the beginning stage of a learner’s motivational development. As learners’ immediate and tangible learning experiences on a daily basis construct the learners’ general motivation (e.g., Papi, 2010; Taguchi et al., 2009) and influence their long-term learning success, teachers might be able to utilize modality as a means to develop and sustain learner motivation. While the EFL
participants in the current study favored writing over speaking, it must also be considered that modality preferences may be different depending on the language learning context (EFL vs. ESL) and the learners’ language learning history (Baba et al., 2013). Teachers can identify factors of positive motivational experiences and incorporate them in their language teaching practices.

Lastly, educational implications can be drawn from the finding that task features played a more significant role in influencing learners’ immediate task performance and flow experience than did learners’ existing motivational variables. This finding, in turn, makes clear the importance of teachers’ role in designing and selecting task materials to create more enjoyable and facilitative language learning environments. Although this study failed to show a direct influence of learners’ motivational variables on immediate task performance and experience, the importance of motivation cannot be ignored, as previous studies have shown the influence of individuals’ predispositions in immediate task performance (Ben Maad, 2012a, 2012b; Kim & Tracy-Ventura, 2011; Yeo & Neal, 2004). For example, research has demonstrated a strong link between immediate task experience and situationally constructed learner motivation as affected by the social members engaged in a task (Dörnyei & Kormos, 2000) and task-specific choices (Ma, 2009). While the direct link between learners’ existing motivation and task experience remains weak in this study, it is long-term learning success that these trait-like dispositions influence through interaction with individuals’ goal settings and the creation of a desired end-state in learning (Dörnyei, 2002, 2009b; Dweck, 1986; Masgoret & Gardner, 2003).

5.9. Limitations

Some limitations of the study should be acknowledged. Regarding the experimental design, a repeated-measures design was employed because this study was primarily interested in
within-subject variations, specifically as to how learners’ task performance and flow experiences change under different task complexity and modality conditions (Kormos & Trebits, 2012). Through this design, potential between-subject variables such as proficiency and general personality characteristics can be controlled for. However, at the same time, one issue of the study’s design is whether there existed differences across the four tasks other than the intended variables. In order to minimize practice effects, the study employed four similar tasks, which were intended to differ as far as possible only in terms of task complexity and modality. Although an effort was made to balance the four tasks, the possibility of unexpected differences between them cannot be ignored. Despite this limitation, a within-subject design was chosen because this design more closely reflects classroom reality than a between-subject design. As defined by Robinson (2001b), task complexity pertains to within-individual variations, and therefore, in a language classroom, teachers use task complexity criteria to sequence a series of tasks that would be performed by the same participants. In this sense, the findings provide pedagogically relevant and realistic implications, demonstrating how task performance and experience vary within individuals in response to teachers’ manipulation of task design.

Another methodological limitation of this study is that it was necessary to restructure the data to transform within-subject variables into between-subject variables. The statistical assumption of correlation analyses about the independence of pairs in each case was thus violated. Although this violation adds errors, the additional errors underestimate the model rather than overestimating the model. In other words, this violation neither improves the overall model fit (rather it deteriorates the model fit), nor influences the relationships among variables. Therefore, despite this issue, data restructuring was conducted to include within-subject variables (task complexity, modality) in the SEM model.
A further limitation concerns the measurement of flow experience. As flow represents momentary emotional and cognitive experience, it can be assessed most correctly when measured at the moment of task engagement, rather than retrospectively. However, such an intervention would be likely to distract the participants from their performance of the tasks, so the study chose to use retrospective questionnaires to be answered immediately after the learners completed each task. An issue with retrospective measures is that memory can be distorted depending on the perceived success of the task or cultural definitions of the activity. Csikszentmihalyi and LeFevre (1989) pointed out that retrospective methods such as questionnaires or diaries may not precisely reflect flow, as “cultural definitions of the activity might come into play to distort the actual event” (p. 815). In this study, nevertheless, the retrospective method was deemed best and therefore chosen to measure flow; future research, however, can incorporate methods to assess flow at the immediate moment of the experience. Examples of such assessment tools include the experience sampling method (ESM), in which learners report their experience with an activity (i.e., flow) in response to the beeping of an alarm that occurs at random during their daily life routines or activities (e.g., Schmidt & Savage, 1992).

Related to flow, it should be acknowledged that the notion of flow was used in a somewhat narrow way to reflect flow-like experience. Flow experience itself is a peak experience, which is represented as its presence or absence. That is, higher scores on flow measurements do not necessarily mean that a flow experience has occurred. However, research on flow has generally accepted that the higher the flow scores are, the more flow experience can be assumed to have occurred.

Finally, some limitations of SEM should be acknowledged. While SEM enables the observation of complex relationships among variables, the model only checks and confirms
whether the proposed model can be consistent with the data. In other words, an acceptable model does not mean the best model. A model can be improved or rejected depending on how path relationships are defined. Different paths that are drawn by the theory can improve the model fit. With the possibility of further improvement, the current model can be accepted tentatively until better models are identified.

5.10. Directions for Future Research

This study’s results suggest several directions for future research, which could address the aforementioned limitations. First, future studies could adopt a between-subject design in which all task-inherent factors such as familiarity and contents are completely controlled for. Further research could address other aspects of task complexity such as reasoning demands or planning. More varied levels of complexity could be incorporated to observe contrasting effects of task complexity on task performance and experience (Ben Maad, 2012b; Robinson, 2001b). Future research might also usefully employ other aspects of learner variables including ability-based learner features such as proficiency and aptitude. Related to the direct influence of task features on the experience of flow, future research could identify other task characteristics that may influence optimal challenge, flow, and performance. Task types or contents may be a factor determining flow experience (e.g., Poupore, 2014), which could also be examined in the future. Similarly, an attempt to identify flow conditions that are specifically relevant to L2 learning contexts would expand our understanding of flow and learner motivation. Although flow has been widely adopted in other disciplines, the concept has not been much applied in L2 learning contexts. With the increasing interest in positive psychology in SLA, more research that addresses L2-specific flow experience seems desirable (Dörnyei, Ibrahim, & Muir, 2014).
To conclude, this study has attempted to uncover interactions between task variables and learner variables in producing unique task performance and experience outcomes. The task variables were task complexity and task modality, and the learner variables included motivational and affective variables. Specifically, the study drew on Dörnyei’s (2009b) L2 motivational self system as a motivational framework, goal orientation theory as a task-specific behavioral framework, and anxiety as an emotional factor. The study showed how various motivational and affective constructs work together to produce unique task performance experiences and performance outcomes, interacting with various task features. While some unresolved issues remain, it is hoped that this study has provided insights that further our understanding of the multifaceted influence of task features and learner variables on task performance and experience.
Appendix A: Consent form (English)

University of Hawai‘i
Consent to Participate in Research Project:

The Effects of Task Design Features and Learner Variables on Task Performance and Task Experience

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My name is Minyoung Cho. I am a graduate student at the University of Hawai‘i at Manoa (UH) in the Department of Second Language Studies. As part of the requirements for earning my graduate degree, I am doing a research project. The purpose of my project is to investigate the effects of task design features (task complexity and modality) and learner feature (task orientation) on perceived difficulty of tasks, motivation, and task performance.

Activities and Time Commitment: If you participate in this project, I will meet with you three for experiment at the assigned laboratory. Throughout the experimental sessions with each session lasting about 30 - 40 minutes, you will complete a series of tasks. During the task, you will choose one option to argue and defend both orally or in written form, which is followed by a survey asking your experience of the tasks. You will be also asked to fill the blanks in a short English passage and complete a survey on your English learning motivation. I will audio-record your speaking task performance for linguistic analysis. The recording will utilized only for the purpose of this research project.

Benefits and Risks: Although there is no known direct benefit to individual participants, this study benefits society in general in that the results should help us understand the role of task features and learner characteristics in learner motivation and task performance. It is further hoped that findings of the current study will present pedagogic implications for L2 learning and teaching. There is little or no risk to you in participating in this project.

Confidentiality and Privacy: During this research project, I will keep all data in a secure location. Only my University of Hawaii advisor and I will have access to the data, although legally authorized agencies, including the UH Human Studies Program, can review research records. No identifiable personal information will be collected in this study and the information collected from this experiment will remain confidential.

Voluntary Participation: Your participation is completely voluntary and there is no penalty for refusing to participate. You can withdraw at any time without any penalty or loss.

Questions: If you have any questions about this project, please contact me at via phone (808) 721-8659 (+82-10-4840-3099) or e-mail (mycho@hawaii.edu). If you have any questions about your rights as a research participant in this project, you can contact the University of Hawai‘i, Committee on Human Studies (CHS), by phone at (808) 956-5007 or by e-mail at uhirb@hawaii.edu.

If you agree to participate in this project, please sign and date this signature page and return it to: Minyoung Cho, Principal Investigator.
Signature:

I have read and understand the information provided to me about participating in the research project, *The Effects of Task Design Features and Learner Variables on Task Performance and Task Experience.*

My signature below indicates that I agree to participate in this research project.

Printed name: _____________________________

Signature: _________________________________

Date: ____________________________

Please check the box below regarding the statement:

[ ] Yes  [ ] No  I agree to be recorded.

You will be given a copy of this consent form for your records.
Appendix B: Consent form (Korean)

하와이대학 마노아 캠퍼스
실험 참가 동의서:

The Effects of Task Design Features and Learner Variables on Task Performance and Task Experience
(과제 설계 요인과 학습자 변인의 과제 수행과 경험에 끼치는 영향)

하와이대학 마노아 캠퍼스
제 2 언어 연구전공 (Second Language Studies)
박사과정 조민영
(808) 721-8659
mycho@hawaii.edu

안녕하세요. 저는 하와이대학 제 2 언어 연구 학과에 박사 과정에 재학중인 조민영입니다. 저는 박사 학위의 필수 과정으로 연구를 진행합니다. 본 연구에서 저는 과제 복잡성, 양상, 과제 지향성의 과제 난이도, 동기, 수행에 끼치는 영향에 대해 연구하고자 합니다.

활동과 시간 소요: 본 연구에 참여하시게 되면, 참여자는 실험실을 총 3 회 방문하여 실험에 참가하게 됩니다. 한 번 방문 시 총 30 - 40 분 정도가 소요됩니다. 영어 말하기와 글쓰기를 통해, 주어진 상황에서 가장 적절한 선택을 하여 그 선택을 토대로 하는 과제를 수행하게 됩니다. 그 후에 과제를 수행한 결과에 관한 간단한 설문지를 작성하게 됩니다. 또한 영어학습에 관한 일반적인 설문지도 작성하고, 마지막으로 주어진 영어 지문에서 빈칸을 문제에 맞게 채우는 과제를 수행하게 됩니다. 말하기 과제를 수행할 때에는 오디오 녹음을 하게 됩니다. 이 녹음 자료는 본 실험 목적으로만 사용될 것입니다.

이익과 위험: 본 실험에 참가함으로 인한 참가자에게 주어지는 직접적인 이익은 없습니다. 하지만 본 연구는 영어 학습 활동에 끼치는 다양한 과제 요소들과 학습자 요소들이 어떻게 영어 활동에 영향을 끼치는지를 밝혀낼 수 있어서 이에 관한 사회의 전반적인 이해를 높이는데 공헌하고자 합니다. 또한 본 연구 결과는 제 2 언어학습과 교수법에 실용적인 지침을 제공하고자 합니다. 본 실험에 참가함으로 인한 위험은 없습니다.

비밀유지와 개인정보: 본 연구에서 수집된 모든 데이터는 안전한 곳에 보관될 것입니다. 연구자와 하와이대학의 연구자의 지도 교수만이 데이터를 볼 수 있으나, 법적으로 허용된 하와이 대학의 인간학 프로그램의 대리인은 본 데이터를 볼 권한을 가집니다. 어떠한 신분 확인 가능한 개인정보는 수집되지 않을 것이며, 본 실험에서 얻어진 모든 정보는 비밀로 보장될 것입니다.

자발적 참여: 실험 참여는 자발적으로 이루어지며, 실험에 불참함으로서 생기는 불이익은 없습니다. 실험 중이라도 언제든지 어떠한 불이익이나 손실 없이 실험 동의를 철회할 수 있습니다.
질문: 본 연구와 관련하여 질문이 있으시면 연구자에게 전화 (미국: 808-721-8659; 한국: 010-4840-3099) 혹은 이메일 (mycho@hawaii.edu)을 통해 연락하십시오. 본 실험 참여와 관련한 참여자의 권리에 대한 의문이 있으시면 하와이 대학 인간학 위원회 (Committee on Human Studies (CHS))로 전화 (808-956-5007) 혹은 이메일 (uhirb@hawaii.edu) 주십시오.

본 실험에 참여하기로 동의하시면, 다음의 동의 서명란에 서명하시고 연구자 (조민영)에게 제출하십시오.

서명

저는 위의 정보에 대해 충분히 숙지 하였으며, 본 연구 "과제 설계 요인과 학습자 변인의 과제 수행과 경험에 까치는 영향"에 참가하기로 동의합니다. 아래에 서명함으로써 저는 실험에 참가하기로 동의합니다.

이름: __________________________

서명: __________________________

날짜: __________________________

아래의 박스에 체크 하시오.

네 아니오 : 저는 본 실험의 오디오 녹음에 동의합니다.

참가자는 본 동의서의 사본을 받게 됩니다.
Appendix C: Simple speaking task

Exchange Program

Your friend is planning to apply for an exchange program for study abroad experience. After considering preliminary conditions, such as academic life, she narrowed down her options to five. Your friend is now asking for your advice. The exchange program you choose, however, has to satisfy two conditions. These criteria are:

(a) nice weather
(b) living expenses

A carefully considered choice has to be made, however. Read the five descriptions carefully, then explain which school you think is most suitable and fits the conditions best. Keep in mind that your choice does not have to reflect your personal preferences. Also, when you explain reasons, make sure to defend your choice in comparison to other options with detailed examples. Try to convince your friend that your choice is right and support it with arguments.

You have 2 minutes of preparation and 2-5 minutes to complete your answers.

If you are ready to read the five options, set the timer for 2 minutes (max) and start reviewing the five options.
Exchange program
1. Eckerd College
location: located on the west coast of Florida, year-long warm weather, miles of coastline, humid subtropical climate, frequent thunderstorm tornadoes, the highest annual rainfall in the nation, lightning hurricane seasons from June 1st to November 30th.
description: founded in 1958, student enrollment of 1,853, about 80 percent living on campus, on-campus housing ($450 per month), living expenses ($300 per month)

2. Elmhurst College
location: located 30 minutes from downtown Chicago, the third largest city in the US, strong wind, and dry, by the lake Michigan; frequent heavy snowfalls during the winter, but overall just enough snow for winter enjoyment, surrounded by apple and peach orchards
description: founded in 1940, student enrollment of 4,800, off-campus housing offered through the program (free), living expenses ($500 per month)

3. Hamline University
location: located in the Midwest of the US, Minnesota, midway between the adjacent downtowns of Minneapolis and St. Paul; 10,000 lakes, metropolitan, extremely cold and snowy all year round except summer, mild summer
description: student enrollment: 5200; strong in natural science (physics, chemistry, biology), double- or triple-occupancy residence halls on campus ($500 per month), living expenses ($300 per month)

4. San Jose University
location: south of the San Francisco Bay in the heart of downtown San Jose, mild all-year round, ocean coast, mountain ranges, dry desert and fruitful farm valley nearby
description: student enrollment of 22,521; museums, bike and hiking trails, and recreational facilities in and around the campus. The Pacific Ocean is only 30 minutes away by car, on-campus housing ($650 per month), living expenses ($500 per month)

5. Alfred University
location: northern New York State; 7 hours from New York City and 2.5 hours drive to Montreal, Canada; generally humid, variations in climate for four seasons, heavy snow in winter, about ten tornadoes per year
description: museums, theatres, restaurants, shops, and tourist destinations; beaches, mountain ranges, rivers, on-campus housing ($300 per month), living expenses ($500 per month)
Appendix D: Complex speaking task

Job selection

Your friend is choosing a company that he would work for. After considering preliminary conditions, such as potential personal growth, he has five options. Your friend is now asking for your advice. The job you advise, however, has to satisfy five conditions. These criteria are:

(a) nice weather
(b) high salary
(c) living cost
(d) cultural and sports activities
(e) flexible working schedule

Read the five descriptions carefully, then explain which job you think is most suitable and fits the conditions best. Keep in mind that your choice does not have to reflect your personal preferences. Also, when you explain reasons, make sure to defend your choice in comparison to other options with detailed examples. Try to convince your friend that your choice is right and support it with arguments.

You have 2 minutes of preparation and 2-5 minutes to complete your answers.

If you are ready to read the five options, set the timer for 2 minutes (max) and start reviewing the five options.
Choosing a job

1. JJ
living environment: located in California; year-long mild weather; living cost ($3500 per month) including housing, big shopping malls and restaurants nearby, mountains for hiking and biking, 30 minutes to the beach, many outdoor activities
working environment: salary of $70,000, tight and fixed working schedule (10 hours per day),

2. Modern company
living environment: located in the desert area in Arizona, dry and hot climate but cold in winter; living cost ($1000 per month), housing offered by the company (free), no outdoor activities, but indoor sports available
working environment: salary of $50,000, flexible working schedule (available for working home), benefits include insurance and education for children

3. Well company
living environment: located in Hawaii, sunny and mild weather, ocean and mountains nearby; living costs ($1000), housing offered by the company (free), outdoor activities including ocean sports, a big shopping mall
working environment: relaxed working environment; flexible working schedule; 2 months of vacation per year, $30,000 salary per year, travel support twice per year,

4. Diego
living environment: located in the city of New York, mild weather in spring and fall, cold in winter but good enough to enjoy winter sports; living costs of $2500 including housing, cultural activities (museums, theaters, restaurants), hiking to nearby mountains
working environment: flexible schedule (required to be in office only three a week), $35,000 salary per year, friendly and free working environment

5. Ono
living environment: located in the city of St. Paul, Minnesota, extremely cold and heavy snow in winter, due to heavy snow and rural nature, no outdoor activities available, not many activities in rural area, 3.5 hours from the city, living cost of $1,400 per month including housing
working environment: office work required but flexible working schedule, salary of $50,000 per year
Appendix E: Simple writing task

Applying for a graduate program

Your friend is planning to apply for a two-year of master's program in the US. She was accepted by five universities and now deciding which school she wants to attend. The schools' tuition fee and academic atmosphere seem all similar, and she narrowed down her options to five. Your friend is now asking for your advice. The graduate program you choose, however, has to satisfy the two conditions. These criteria are:

(a) financial support from the university
(b) cultural and sports experience

Read the five descriptions carefully, then write an essay of at least 150 words in which you explain which school you think is most suitable and fits the conditions best. Keep in mind that your text does not have to reflect your personal preferences. Also, when you explain reasons, make sure to defend your choice in comparison to other options with detailed examples. Try to convince your friend that your choice is right and support it with arguments.

You have 2 minutes of preparation and 15 - 20 minutes to write the text.

If you are ready to read five options, set the timer for 2 minutes (max) and start reviewing five options.
Graduate Program

1. Bloomington University
description: located in Bloomington, Indiana, state university; clear and sunny spring, dry and cold in fall and winter, heavy snow, rural area, farms and corn fields, 2 hours from a ski resort, no shopping malls nearby, strong student and alumni associations,
Support: one year of living expenses support ($20,000), departmental support for student organizations

2. Colorado University
description: located in the desert area of Colorado, dry climate; state university, rural area, very dry and hot in summer, not many outdoor activities except hiking in spring and fall, 4 hours drive from the Grand Canyon,
Support: two years of financial support for tuition and living expenses ($15,000 per year), small class size, close advisor-student working relationship

3. Boston College
description: located in Boston, Massachusetts, private university, quiet and friendly university town, mild in summer and cold winter, 30 minutes away from the downtown area, lots of cultural entertainment, museums, theaters, restaurants,
Support: graduate assistantship position for one semester ($7,000), a big department with many professors and students in different fields

4. Iolani University
description: located in Honolulu, Hawaii, state university, sunny and mild weather, lots of tourist attractions, restaurants, oceans and mountains, ocean sports, expensive apartment rent and high cost of living
Support: tuition and living expenses support for one year ($14,000), cultural diversity, historically renowned for its intensive program

5. Heimes University
description: located in Boston, Massachusetts, private university, quiet and friendly university town, urban life with museums, theaters, shopping malls, restaurants, heavy snow in winter, mild in summer,
Support: $10,000 of scholarship for one year, recently hired new professors, departmental efforts to grow the school
Appendix F: Complex writing task

Internship opportunity

Your friend is choosing a company that he would work for as an intern. After considering preliminary conditions, he has five options. Your friend is now asking for your advice. The position you advise, however, has to satisfy five conditions. These criteria are:

(a) nice weather
(b) salary
(c) living cost
(d) low workload
(e) intern programs for personal development

Read the five descriptions carefully, then explain which intern position you think is most suitable and fits the conditions best. Keep in mind that your choice does not have to reflect your personal preferences. Also, when you explain reasons, make sure to defend your choice in comparison to other options with detailed examples. Try to convince your friend that your choice is right and support it with arguments.

You have 2 minutes of preparation and 15-20 minutes to complete your answers.

If you are ready to read the five options, set the timer for 2 minutes (max) and start reviewing the five options.
Choosing an internship program

1. Sungju
the biggest Korean electronics company in San Francisco, California; sunny and mild climate, outdoor activities all year long; living expenses of $1,500 per month including housing
working environment: 10 hours of regular work and 3 hours of paid extra work required everyday (Monday-Friday); $2,000 per month salary for interns, intern exchange program with Google and other companies, free and open working environment

2. Assem Bank
a small local bank in Honolulu, Hawaii; sunny and breezy weather, summer sports and hiking; 9 hours of work required everyday (Monday-Friday); free dormitory-style housing offered by the company; living costs $400 per month
working environment: assisting international banking cooperation; $2,000 per month salary for interns ; relatively strict working environment; no educational programs for interns

3. Biz law firm
a mid-size law firm in northern Michigan; dry and cold weather, climate below zero from November to March; strong and cold wind; living expenses $600 per month including housing
working environment: reviewing and summarizing law journals; only 15 hours of work per week required; $1,000 per month salary for interns; flexible working schedule; easy and light workload; educational program for interns with class 10 hours per week

4. Ilshin
a small-size travel agent in Florida, humid climate, frequent rain, thunderstorms, and tornadoes; dormitory offered by the company (free); living expenses $500 per month
working environment: intern salary of $1,000 per month; flexible schedule and light work load (20 hours per week), travel opportunity to Europe for the best interns, professional development program for interns, collaborative team project with other companies

5. C-crop
one of the biggest harvest companies, rural area, 3 hours from Seattle, cloudy or rainy all year long, living expenses $700 per month including housing
working environment: managing and advising the corn harvesting system; salary of $3,000 per month for interns; high work demand (40 hours per week), mostly physical work; fixed work schedule; US tour and exchange program for interns, collaboration with general managers
Appendix G: Questionnaires (trait)

I. Task Orientation

Mastery orientation

1. Challenging tasks that arouse my curiosity are important to me.
2. I am confident I will do well in the speaking/writing task no matter how difficult it is.
3. It does not matter for me if the speaking/writing task is graded.
4. I prefer connecting task content to my personal experience.
5. When I face difficulty in performing a speaking/writing task, I always try different ways until it is finished.
6. I do not mind making many mistakes if I learn from them.
7. I feel more successful when I see my speaking/writing skill improving.
8. I like speaking/writing tasks best when they make me learn new things.
9. I prefer using notes rather than memorizing parts of the task.
10. I cannot be satisfied with my performance just because I receive a positive reaction from my teacher.

Performance orientation

1. Performing better than the other students makes me confident.
2. The opinions my classmates hold about my speaking/writing performance are important to me.
3. Demonstrating my speaking/writing skills to others is important.
4. I prefer my task performance to be graded only when I do well.
5. I feel successful in my speaking/writing task when I avoid many mistakes.
6. I prefer memorizing to improvising in order to handle the difficult parts of the task.
7. I feel more comfortable with familiar tasks rather than new ones.
8. My constant fear of failure always motivates me to be successful.
9. I do not want to take risks when I feel unable to complete the task.
10. I prefer waiting to see how others perform the task so that I will not make the same mistakes.
11. One important reason I study English is to avoid looking stupid in English class.
12. One important reason for studying English is because I don't want to display my lack of English skills to others.
13. It is important for me I don't give impression to teachers/friends that I am not doing well.
14. One reason of studying English is in order not to make other people think that I am stupid.
15. One important reason for studying English is not to make myself embarrassed because of English
II. Anxiety

Speaking
1. I never feel quite sure of myself when I am speaking English.
2. I get nervous and confused when I am speaking English in front of other people.
3. I feel very self-conscious about speaking English in front of other students.
4. I start to panic when I have to speak English without preparation.
5. It embarrasses me to volunteer answers in my English classes.
6. I am afraid that the other people will laugh at me when I speak English.
7. I would not be nervous speaking English with native speakers. (reverse coding)
8. I don’t worry about making mistakes when speaking in English. (reverse coding)

Writing
1. I have a terrible time organizing my ideas in an English composition course.
2. I’m not good at writing in English.
3. I never seem to be able to clearly write down my ideas in English.
4. People seem to enjoy what I write in English. (reverse coding)
5. When I hand in an English composition, I know I’m going to do poorly.
6. I am afraid that my English teacher is ready to correct every mistake I make.
7. I am afraid of writing essays in English when I know they will be evaluated.
8. I don’t think I write in English as well as most other people.

III. L2 Motivational Self System

Ideal L2 self
1. I often imagine myself living abroad and having a discussion in English.
2. I often imagine myself speaking English with international friends or colleagues.
3. I often imagine myself speaking English as if I were a native speaker of English.
5. I often imagine myself studying in a university where all my courses are taught in English.
6. I often imagine myself writing English emails fluently.
Ought-to L2 self

1. I study English because people surrounding me expect me to do so.
2. I have to study English because if I do not study it, I'll be letting down parents/teachers/friends.
3. Studying English is important to me because I can gain the approval of my peers/teachers/family/boss.
4. It will have a negative impact on my life if I don't learn English.
5. Studying English is important to me because an educated person is supposed to be able to speak English.
6. Studying English is important to me because other people will respect me more if I have knowledge of English.

L2 learning experience

1. Reflecting back, I did not like my English classes. (reverse coding)
2. Past English learning experience was really fun and enjoyable.
3. I felt a sense of achievement when I successfully completed English tasks.
4. I have enjoyed watching English drama or listening English radio.
5. My study abroad experience was fun and interesting. (only those with experiences)
6. Whenever I was given English tasks, I was enthusiastic to complete it successfully.
7. I think I spent more time/effort on studying English than my friends did.
8. It was fun for me to communicate with foreigners in English.
9. Throughout my English learning experiences, I always tried different things/ways to learn English more effectively.
10. I think my English learning effort has been successful so far.
11. Compared to my friends, I think I was active in putting efforts for English learning.
Appendix H: Questionnaires (state)

I. Perceived Task Difficulty
   1. This task was difficult.
   2. This task was easy (reverse-coded).

II. Perceived Challenge/Skills balance (task difficulty)
   1. This task was too difficult (reverse-coded).
   2. This task was too easy (reverse-coded).
   3. Although this task was quite difficult, I believed that I could complete it well.
   4. I felt competent enough to meet the high demands of the task.
   5. I was able to complete the task successfully regardless of how difficult the task is.
   6. I was able to manage the task without too much difficulty.

III. Flow Experience

   Interest
   1. This task was interesting in itself.
   2. This task was fun for me.
   3. I found the experience very rewarding and felt good after completing it.
   4. This task aroused my imagination.

   Willingness to repeat
   1. I would do this task again.
   2. I would do this task even if it were not required.

   Attention
   1. When doing this task, I was aware of distractions (reverse-coding).
   2. When doing this task, I was totally absorbed in what I was doing.
   3. When doing this task, I thought about other things (reverse-coding).
   4. It took no effort to keep my mind on the task.
   5. When doing this task, I was distracted and thought about other things (reverse-coding).

   Control
   1. When doing this task, I had a feeling of total control.
   2. When doing this task, I knew clearly what I wanted to do.
   3. When doing this task, I had a feeling of control of what and how to write or speak.
Appendix I: Questionnaire (trait) (Korean)

Participant ID: _________________________

다음 주어진 설문에 본인의 해당 정도를 표시하세요.

<table>
<thead>
<tr>
<th>구분</th>
<th>매우 그렇지 않다</th>
<th>그렇지 않다</th>
<th>그렇지만 그렇지도 않다</th>
<th>그렇다</th>
<th>매우 그렇다</th>
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<tbody>
<tr>
<td>1</td>
<td>나에게 있어 나의 호기심을 자극하는 어려운 영어 과제는 중요하다</td>
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<td>2</td>
<td>나는 이때까지 내 친구들보다 영어를 공부하는데 더 많은 시간과 노력을 쏟았다고 생각한다</td>
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<td>3</td>
<td>나는 영어 작문을 제출할 때 내가 잘하지 못했다는 것을 안나</td>
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<tr>
<td>4</td>
<td>내가 학교에서 다른 사람들보다 영어 과제를 더 잘 했을 때 특히 만족감을 느낀다</td>
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</tr>
<tr>
<td>5</td>
<td>돌아켜보면 나는 과거에 영어 수업 시간을 좋아하지 않았다</td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>내 생각에 다른 사람들은 나의 영어 작문을 읽는 것을 좋아하는 것 같다</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>내가 영어 과제를 하는 이유는 그것을 통해 영어를 잘하고 싶기 때문이다</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>나는 새로운 영어 과제를 수행하는 것보다 익숙한 과제를 하는 것을 선호한다</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>영어 말하거나 쓰기 과제를 할 때 어려움에 처할 때, 나는 언제나 그것을 끝까지 해낼 다른 방법을 찾으려고 한다</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>나의 원어민과의 영어 학습 경험은 즐겁고 흥미로웠다</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>나는 다른 사람 앞에서 영어로 이야기할 때 긴장되고 혼란스럽다</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
나의 과거의 영어 학습 경험이 정말로 재미있고 즐거웠다.

돌이켜보면 나는 성공적으로 영어 과제를 완성할 때에 성취감을 느꼈다.

영어를 공부하는 것은 내가 나의 동료, 선생님, 친구, 혹은 상사에게 인정을 받을 수 있기 때문에 중요하다.

나는 실패를 안 했을 때에, 나의 영어 말하기 혹은 쓰기 과제를 성공적으로 했다고 느낀다.

영어 과제가 주어졌을 때, 언제나 나는 그것을 성공적으로 완성하기 위해 열정적이었다.

나는 내가 영어 과제를 잘 했을 때에만 내 과제 수행이 성적이 매겨지기를 원한다.

나는 영어 말하기 또는 쓰기 과제가 어려울지라도 잘 해낼 자신이 있다.

영어 쓰기 할 때에, 나의 생각을 정리하는 것은 힘들다.

나는 다른 사람들만큼 내가 영어 쓰기를 잘한다고 생각하지 않는다.

나는 내가 영어로 말할 때 다른 사람들이 나를 비웃을까봐 두렵다.

내 친구들이 나의 영어 말하기 또는 쓰기 수행을 어떻게 생각하는지는 나에게 중요하다.

나는 종종 외국에 살면서 영어로 대화하는 나의 모습을 그려본다.

내가 영어 과제를 수행함에 있어 그 과제들이 성적이 매겨지는지의 여부는 나에게 그다지 중요하지 않다.

외국인과 영어로 의사소통 하는 것은 나에게 있어 즐거운 일이었다.

외부의 어떤 평가보다, 내가 스스로가 나의 영어 말하기 혹은 쓰기 실력이 향상 되고 있음을 볼 때 나는 더 성공했음을 느낀다.

나는 영어 글쓰기를 잘 하지 못한다.

나는 단지 선생님으로부터 긍정적인 피드백을 받았다는 이유로 나의 영어 과제 수행에 만족할 수 없다.
나에게 있어 나의 영어 말하기 또는 쓰기 실력을 다른 사람들에게 보여주는 것은 중요하다.

나의 성공적인 미래를 생각할 때는 언제나 영어를 쓰는 내 모습을 떠올린다.

나는 종종 원어민처럼 영어를 말하는 나의 모습을 그려본다.

나는 영어 과제를 수행할 때 외우는 것 보다는 메모를 사용하는 것을 더 선호한다.

나는 영어 과제를 수행할 때 실수 하지 않기 위해 다른 사람들이 어떻게 하는지를 보고 기다렸다가 하는 것을 선호한다.

친구들과 비교해서 나는 영어 학습을 위해 지금까지 열심히 노력해왔다.

내가 영어의 지식이 더 많으면 다른 사람들에게 인정받을 수 있기 때문에 영어를 공부하는 것은 나에게 중요하다.

나는 누군가가 내 영어 작품/에세이를 평가할 때에, 에세이 쓰는 것이 두려다.

나는 준비 없이 영어로 말을 시작하면 당황하기 시작한다.

나는 주변 사람들이 내가 영어 공부하기를 기대하기 때문에 영어를 공부한다.

내가 다른 학생들보다 영어 과제를 더 잘 수행한다는 것은 나의 자신감에 중요한 원천이 된다.

나는 종종 영어 이메일을 유창하게 쓰는 내 모습을 그려본다.

나는 다른 학생들 앞에서 영어로 이야기할 때 남의 시선을 매우 의식한다.

나는 원어민과 영어로 말할 때 긴장 하지 않는다.

나는 영어 선생님이 내 모든 실수를 고칠 준비가 되어있는 것 같아 두려하다.

나는 영어로 말할 때 실수 하는 것에 대해 두려워하지 않는다.
나는 종종 모든 수업이 영어로 진행되는 대학교에서 공부하는 나의 모습을 그려본다.

나는 어떠한 영어 과제를 통해 내가 새로운 것을 배울 수 있을 때 그 과제들을 가장 좋아한다.

내가 영어 공부를 하지 않으면 그것은 나의 삶에 부정적인 영향을 끼칠 것이다.

나는 영어로 말할 때 걸코 내 스스로에게 확신을 가지지 못한다.

내가 영어 공부를 하지 않으면 부모님, 선생님, 혹은 친구들을 실망시킬 것이기 때문에 나는 영어 공부를 해야한다.

영어 수업 시간에 내가 영창해 보이지 않기 위함은 내가 영어 공부를 하는 중요한 이유이다.

영어 과제를 하는 가장 이유는 새로운 지식을 얻기 위함이다.

나는 내가 어떤 과제를 수행할 수 없다고 느낄 때에, 위험을 감수하고 싶지 않다.

나는 영어 실수로부터 내가 배울 수 있다면 실수 하는 것을 꺼려하지 않는다.

나는 종종 내가 외국 친구들이나 동료와 영어로 이야기하는 모습을 그려본다.

나는 나의 영어 학습 노력은 지금까지는 성공적이었다고 생각한다.

나는 영어 공부를 하는 중요한 이유는 나의 부족한 영어 실력이 다른 사람에게 보여지는 걸 원치 않기 때문이다.

나는 영어로 나의 생각들을 명확하게 잘 쓰지 못하는 것 같다.

영어 수업시간에 선생님이나 친구들에게 내가 영어 과제를 잘 못하고 있다는 인상을 주지 않는 것은 나에게 중요하다.

나는 영어 과제의 어려운 부분을 수행할 때 즉석에서 만들어내는 것보다는 외우는 것을 선호한다.

교육을 잘 받은 사람은 영어를 잘 말할 수 있어야 하기 때문에 영어를 공부하는 것은 나에게 중요하다.
실패에 대한 두려움은 내가 영어를 잘할 수 있게 언제나 동기를 부여한다.

나는 지금까지 영어 드라마, 영화를 보거나 라디오를 듣는 것을 즐겨왔다.

나는 영어 과제의 내용을 나의 개인적인 경험과 관련시키는 것을 선호한다.

영어를 공부하는 중요한 이유중 하나는 다른 사람들이 내가 영어를 못한다고 생각하지 않게 하기 위함이다.

영어 공부를 하는 중요한 이유는 영어 때문에 스스로를 당황스럽게 만들고 싶지 않기 때문이다.

전공: __________________

공인 영어 시험 점수가 있으면 적어주세요.

▶ 토익: __________________
▶ 토플: __________________
▶ 텔스: __________________

해외에서 체류/국제학교 재학 경험이 있습니까?
네 / 아니오

있다면, 언제, 어디에서, 얼마나 동안 있었는지 쓰세요.

______________________________
Appendix J: Questionnaire (state) (Korean)

Participant ID: _____________ Task Type: __________________________

다음 주어진 설문에 본인의 해당 정도를 표시하세요.

<table>
<thead>
<tr>
<th></th>
<th>매우 그렇지 않다</th>
<th>그렇지 않은 것이다</th>
<th>그렇지 않다</th>
<th>그렇다</th>
<th>매우 그렇다</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>이 과제는 꽤 어려웠지만 나는 이것을 잘 끝낼 수 있을 것이라 믿었다</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>이 과제는 쉬웠다</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>이 과제는 어려웠다</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>나는 이 과제를 큰 어려움 없이 수행할 수 있었다</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>아무리 어려운 과제일지라도 나는 이것을 성공적으로 잘 끝낼 수 있다고 믿었다</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>나는 이 과제의 높은 난이도에 부응할 능력이 있다고 믿었다</td>
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</tr>
<tr>
<td>7</td>
<td>이 과제는 나의 상상력을 자극했다</td>
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</tr>
<tr>
<td>8</td>
<td>내가 이 과제를 하는 동안 특별한 노력 없이도 과제에 집중할 수 있었다</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>이 과제는 그 자체로 흥미로웠다</td>
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<td></td>
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</tr>
<tr>
<td>10</td>
<td>나는 이러한 과제를 다시 할 의향이 있다</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>이 과제를 하는 동안 나는 무엇을 어떻게 말하고 싶어 할지에 관해 스스로 통제할 수 있던 것 같다</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>12</td>
<td>나는 이 과제를 수행할 때 완전히 몰입 하였다</td>
<td></td>
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</tr>
</tbody>
</table>

217
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>나는 본 과제가 재미있었다.</td>
</tr>
<tr>
<td>14</td>
<td>이 과제를 수행할 때 나는 과제와 관련 없는 다른 것이 생각났다</td>
</tr>
<tr>
<td>15</td>
<td>나는 이 과제가 비록 의무가 아니라도 다시 할 의향이 있다</td>
</tr>
<tr>
<td>16</td>
<td>이 과제를 수행할 때 나는 정신을 산만하게 하는 다른 것들을 인지할 수 있었다</td>
</tr>
<tr>
<td>17</td>
<td>나에게 이 과제는 그 자체로 흥미로웠다</td>
</tr>
<tr>
<td>18</td>
<td>과제를 하는 동안 나는 내가 무엇을 하고자 하는지 명확하게 알고 있었다</td>
</tr>
<tr>
<td>19</td>
<td>나는 이 경험이 매우 보람 있고 이것을 끝낸 후에 기분이 좋았다</td>
</tr>
<tr>
<td>20</td>
<td>과제를 하는 동안 나는 그 과정을 완전히 통제할 수 있음을 느꼈다</td>
</tr>
<tr>
<td>21</td>
<td>이 과제는 너무 쉽고 지루했다</td>
</tr>
<tr>
<td>22</td>
<td>이 과제는 나에게 너무 어려웠다</td>
</tr>
</tbody>
</table>
Appendix K: Correlation matrix for subscales of goal orientation

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<tbody>
<tr>
<td>1. Mas1</td>
<td>1.000</td>
<td></td>
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<tr>
<td>2. Mas2</td>
<td>.411</td>
<td>1.000</td>
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<td>3. Mas5</td>
<td>.171</td>
<td>.367</td>
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<td>4. Mas8</td>
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<td>5. Mas11</td>
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<td>6. Mas12</td>
<td>.336</td>
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<td>.153</td>
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<td>7. Per2</td>
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<td>-.032</td>
<td>-.091</td>
<td>.015</td>
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<tr>
<td>8. Per4</td>
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<td>-.152</td>
<td>.025</td>
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<td>-.054</td>
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<tr>
<td>9. Per5</td>
<td>-.018</td>
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<td>.094</td>
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<td>10. Prev3</td>
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