

Cognitive and Linguistic Deficits in Second Language Writing

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Abstract

The purpose of the present study is twofold. In its theoretical part, it focuses on accounts of L₂ acquisition that are cognitive in nature and those that are linguistic in orientation. My discussion of these two accounts is based on the premise that it is perfectly proper for Second Language Acquisition (SLA) research to postulate theories of its own to explain its own area. It is, also, appropriate for SLA research to take insights and methods from other disciplines when they are useful to it. In its empirical part, the present study reports on the outcomes of an experiment carried out by the author on (15) second language learners. The experiment was designed to examine the written output of foreign students enrolled in the English Language Institute at the University of Pittsburg, USA. It attempts to find answers for the following questions: (1) are students' errors in grammatical structures, as they will appear in their written output, due to deficiency in their conscious grammar rules, or to deficiency in their abilities to transfer this knowledge (if it exists) to other language tasks such as writing compositions in English?, (2) can conscious rules of grammar guide students' performance in monitoring (self-correcting) their written output once their attention is drawn to an error?, and (3) what is the role of 'attention' in shaping L₂ learners' linguistic behaviors in essay writing, unfocused and focused correction tasks? The implications of the overall results for current theories of SLA is discussed.

Keywords: Linguistic approaches to L₂ acquisition; Cognitive approaches; Attention, Knowledge representation

INTRODUCTION

During the last decade, there has been substantial growth in interest in the analysis of texts of various types. To a large extent, emphasis has been given to the analysis of spoken text. More recently, attention has been turned to the analysis of written text. In this regard Krashen (1982: 41) points out that "studies of second language writing are sadly lacking". And of the four skills that are discussed and (supposedly) taught with equal emphasis in our foreign language classrooms, writing is perhaps the most poorly understood and the skill that is given, in fact, the most cursory attention. This situation

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was due to the fact that, for too long, proficiency in English has meant only oral proficiency. In other words, communicating in English has always been associated with students' ability to speak appropriately. What makes the situation even worse is that recent attention to communicative competence, with its emphasis on sociolinguistic factors of language use, has led to the erroneous impression that communication is an oral phenomenon. A rationale for the delayed use of writing was grounded in principles of behavioral psychology and structural linguistics: written language was essentially a recording of speech, and a learner could code writing only through reference to the oral code, which was previously and thoroughly mastered.

Writing has been the focus of much discussion in the literature for more than 30 years. Writing attracted the attention of researchers and language teachers. As Coombs (1986:115) suggests, "writing in a foreign language constitutes an important part of language proficiency. Like speaking, writing shows that the individual can use the language to communicate". In this regard, Buckingham (1979), also, maintains that writing is no less communicative in intent than speech. Writing, like speech, is intended to reach a specific audience with specific recognized characteristics, and has the intent of inducing, maintaining, eliminating specific mental or physical behaviors in reader. However, there exists, at present, no coherent, comprehensive theory of second language (L₂) writing. This can be explained in part by the newness of L₂ writing as an area of inquiry, but an equally important reason is the prevalent assumption that L₁ and L₂ writing are, for all intents and purposes, the same. This, largely unexamined, assumption has led L₂ writing specialists to rely for direction almost exclusively on L₁ composition theories (Silva, 1993). Therefore, L₂ writing specialists need to look beyond L₁ writing theories to better describe the unique nature of L₂ writing, to look into the potential sources of this uniqueness (cognitive, developmental, social, cultural, educational, linguistic), and to develop theories that adequately explain the phenomenon of L₂ writing. Johns (1990:24), rightly, maintains that "in the 1980s, English as a second language composition research developed and matured to an extent never imagined by the oral - aural proponents of the 1960s and early 1970s. Most of this research, however, has been drawn from research in first language (L₁) composition, which in turn is based upon L₁ theory".

For students who learn English as a second or foreign language, they "must learn to create written products that demonstrate mastery over contextually appropriate formats for the rhetorical presentation of ideas as well as mastery in all areas of language", (Kroll, 1990: 140). About native - speaker writing, Collins and Genter (1980:67) make the following observation: "Much of the difficulty of writing stems from the large number of constraints that must be satisfied at the same time. In expressing an idea, the writer must at least consider four structural levels: Overall text texture; paragraph structure, sentence structure (syntax), and word structure. Clearly the attempt to coordinate all these requirements is a staggering job'.

On the other hand, recent years have seen a growing concern with the role of conscious processes in SLA. This concern is frequently centered on the Noticing. Hypothesis of Schmidt (1990; 1993; 1994; 1995a; 1995b; Schmidt and Frota, 1986). The present study

examines the Noticing Hypothesis: the claim that L₂ learners must consciously notice the grammatical form of the input they receive in order to acquire grammar. The hypothesis is a claim about how input becomes intake. It claims that conscious awareness (noticing) of grammar plays an important role in the process of L₂ acquisition. In the strong form of the hypothesis, noticing is a necessary condition for learning. In its weaker version, noticing is helpful, but might not be necessary. As Truscott (1998) points out, the hypothesis also has strong and weak forms in another respect. In the weak version, learners need only be aware of the input in a global sense; they do not have to notice any details of its form'.

LITERATURE REVIEW

The study of Second Language Acquisition (SLA) had its origins in attempts to solve practical problems. Until quite recently, research in this area was widely regarded as falling entirely within applied linguistics, and many still see the primary motivation for this research as that of contributing directly to the solution of the complex and socially important problems surrounding foreign and L₂ instruction (Ritchie and Bhatia, 1996; Gass & Mackey, 2011; Lillis & Curry, 2011; Larsen & Cameron, 2007). Broadly speaking, SLA research grew out of many language-related disciplines. Linguistics was influential through linguists who were concerned with society and bilingualism, such as Weinreich. First language acquisition came in through the adaptation of the 1960s techniques and ideas originally devised to confirm or disconfirm Chomsky's ideas. Language teaching was brought in by applied linguists trying to develop language teaching through a better understanding of language (Cook, 1993). In other words, five major groups of researchers have contributed to our understanding of L₂ acquisition: (1) foreign-language educators who are worried about their students' progress; (2) child-language researchers who noticed that L₂ acquisition might be similar in interesting ways to L₁ acquisition; (3) linguists who wanted to use L₂ acquisition to test notions about language universals; (4) psycholinguists who were interested in language processing issues, and (5) sociolinguists and anthropologists who are interested in how language is used in various social settings (Snow, 1998; Sebba et al., 2011; Van Patten and Williams, 2008). Specifically speaking, linguistics provides a useful perspective on L₂ learning and has led to stimulating ideas and research. Yet it must be remembered that linguistics is only one of the discipline that SLA research can draw on; the full richness of the disciplines rests on the variety of ways that second languages impinge on the minds and lives of L₂ users. Multiple sources of information are needed to build a picture of the language knowledge in the mind (Cook, 1993: 269).

Theoretical framework

Over the last two decades, a variety of approaches to L₂ acquisition (SLA) have appeared. Each of these approaches has contributed crucially to what is now a conceptually richer field. According to Atkinson (2011: xi), diversity is the ground But efforts to bring the diverse approaches into engagement and interaction are crucial for progress to be made in the field. It must be kept in mind, however, that squeezing diverse SLA approaches into a single comparative framework is no easy task. It is increasingly apparent that SLA is an

extremely complex and multifaceted phenomenon. For this reason, it, now, appears that no single theoretical perspective allows us to understand SLA adequately. It, therefore, becomes necessary for all the varied perspectives to engage, one another, to 'talk' to each other, to discover how they relate, differ, complement, overlap, contradict in order to show how they can lead us toward a richer, more multidimensional understanding of SLA (Atkinson, 2011: xi). It is fair to say that the dominant theoretical influences in [SLA] have been linguistic and psycholinguistic (Mitchell & Myles, 1998: x).

The field of linguistics and cognitive psychology contain separate paradigms for describing second language acquisition. Linguistic theories assume that language is learned separately from cognitive skills, operating according to different principles from most learned

behaviors (Spolsky, 1985). It may be worth-mentioning, at the outset, that it is not always possible to classify particular theories of L₂ acquisition as exclusively 'cognitive' or 'linguistic' as often both perspectives are drawn on. As Ellis (2008: 347) has maintained, the two perspectives are not mutually exclusive, and in all probability, a comprehensive theory of L₂ acquisition will need to incorporate elements from both. It is perfectly proper for SLA research to postulate theories of its own to explain its own area. It is also proper for it to offer its discoveries to other disciplines to help them solve their problems. It is, also, appropriate for SLA research to take insights and methods from other disciplines when they are useful to it. SLA research cannot redesign the whole of the human mind to fit its own convenience, ignoring all the disciplines that also deal with the mind (De Bot et al., 2007; Eskildsen, 2008). In this connection, Cook (1993: 8) points out that "second language acquisition began to be recognized as a discipline in its own right during the 1970s. Yet there had already been approaches to L₂ learning that made use of ideas from linguistics, either directly or indirectly via first language acquisition research". She, further, argues that although linguistics provides a useful perspective on L₂ learning and has led to stimulating ideas and research ... yet it must be remembered that "linguistics is only one of the disciplines that SLA research can draw on ... Multiple sources of information are needed to build up a picture of the language knowledge in the mind" (p. 269-70). I do, personally, believe that there is no single scientific truth. As McLaughlin (1987: 6), correctly, points out, "disciplines tend to become fragmented into 'schools', whose members are loath to accept, and are even hostile to the views of other schools using different methods and reaching different conclusions. Each group becomes convinced that it has a corner on 'truth'. One philosophical position contends that truth can never be known directly and in its totality. Multiple ways of seeing result in multiple truths:

Scientific progress is achieved as we come to illuminate progressively our knowledge in a particular domain by taking different perspectives, each of which must be evaluated in its own right".

Linguistics and Second Language Acquisition Research

Linguistic approaches to second language (L2) research deal with minds that are acquiring, or have acquired, knowledge of more than one language. In this connection, Cook (1993:1) maintains that "relating second language acquisition to linguistics means looking at the nature of both linguistics and second language research". Chomsky (1986) defined three basic questions for linguistics: 1) what constitutes knowledge of language? 2) how is knowledge of language acquired? and 3) how is knowledge of language put to use? As Cook (1993) has maintained, for second language research these questions need to be rephrased to take in knowledge of more than one language, in other words as, multilingual rather than monolingual goals. Cook, also, argues that the above three questions are central to the relationship between linguistics and second language research. The following section will shed light on these questions.

The major goal of linguistics is to describe the language contents of the human mind; its task is to represent what native speakers know about language; their linguistic competence. In this sense, "linguistics is based on the internal reality of language in the individual mind rather than on the external reality of language in society" (Cook, 1993: 1). Second language research answers the 'knowledge' question by describing the grammars of the second language speaker, their differences and similarities from that of a monolingual speaker, and how they interact with each other. A second goal for linguistics is discovering how knowledge of language comes into being; that is, how linguistic competence is acquired by the human mind. Cook (1993) argues that Chomsky proposes to achieve this goal by describing how innate principles of the child's mind create linguistic competence, that is to say how the child's mind turns the language input it encounters into a grammar by using its built-in capabilities. Phrased in another way, knowledge of language is not only created by the human mind but also constrained by its structure. Second language research answers the 'acquisition' question by seeing how this complex state of knowledge of two languages originates (see Wong, 2004; Wyse, 2001). A third goal for linguistics is discovering how knowledge of language is put to use. This means, according to Chomsky, seeing how it relates to thinking, comprehension, and communication (see Firth & Wagner, 2007; Lightbown & Spada, 2006). Second language research answers the 'use' question by examining how knowledge of both languages is put to use (Cook, 1993: 3). In the light of the above discussion, it may be clear that the main foundation of the present study is the Chomskyan goals for linguistics, in which knowledge of language is the central issue. One reason for concentrating on the Chomskyan view is its central position as the most comprehensive theory in current linguistics. Another reason is that linguistic theories such as functionalism have not been applied to L2 learning (see Tomlin, 1990).

Moreover, Chomsky divides linguistics into E-language (External language) and I-language (Internal language) approaches. The former approach is concerned with behavior and with social convention, that is, it is concerned with language as an external social reality. The latter approach, on the other hand, is concerned with mental reality and with knowledge; that is, it is concerned with representing the internal aspects of the mind and, hence, it is based on linguistic competence. As Chomsky puts it, "linguistics is the study of I-language, knowledge of I-language, and the basis for attaining this

knowledge” (Chomsky, 1986: 18). A related distinction that underlies linguistics is that between ‘competence’ and ‘performance’. According to Chomsky (1965: 4), the speaker’s knowledge of language is called linguistic competence, whereas the speaker’s use of this knowledge is ‘performance’. Linguistics is mainly concerned with ‘competence’, not ‘performance’.

To conclude, much of the previous discussion has assumed that language is represented and acquired by the human mind in ways that are different from any other knowledge. Linguistics theories have often assumed that language is learned separately from cognitive skills and operated according to principles that differ from most learned behaviors (Spolsky, 1985). This assumption is represented in analysis of unique language properties such as developmental language order, grammar, knowledge of language structures, social and contextual influences on language use, and the distinction between language acquisition and language learning.

Cognitive Frameworks: Basic Premises Preliminaries

Wallace (2007: 18) points out that the term, “Cognitivism” is typically used to denote the doctrine that (1) “the mind/brain is the necessary and sufficient locus of human thought and learning; and (2) such thought and learning is a form of information processing”. “The common research objective of cognitive science is to discover the representational and computational capacities of the mind and their structural and functional representation in the brain”. (The Sloan Foundation, 1978: 75-76). Larsen-Freeman (2007: 775) described the cognitive approach to SLA as “one that does not see language as behavior, one that no longer ignores the mind, one that puts cognitivism squarely at the forefront of its explanations”. As Atkinson (2011: 1) points out “language may be a social semiotic”, but above all it is a cognitive product. Its development is, therefore, first and foremost a cognitive process. Davis (1995: 427-428), also, states that “theorists and researchers tend to view SLA as mental process, that is, to believe that language acquisition resides mostly, if not solely, in the mind”. As Doughty and Long (2003: 4) have argued, language learning, like any other learning, is ultimately a matter of change in an individual’s internal mental state. As such, research on SLA is increasingly viewed as a branch of cognitive science.

The cognitive framework of learning emerges from cognitive psychology and is based, in part, on information processing and, in part, on studies and theory that have evolved over the past fifteen years or so, on the role of cognitive processes in learning (see Wong, 2004). In cognitive psychology, mental processing plays a central role in all learning and is the basic mediating variable for influences on learning that are external to the learner, such as task characteristics and complexity, or internal influences such as developmental level, ability, or motivation. Rather than stressing innate, universal linguistic processes, affective factors, input, or interaction as causative factors for L2 development, Cognitive Theory sees second language learning as a mental process, leading through structured practice of various component subskills to automatization and integration of linguistic patterns (Schulz, 1991). For more details, see Tyler, 2011; Robinson & Ellis, 2011; Conley, 2008).

Cognitive Theory maintains that skills become automatic or routinized only after analytical processes. Controlled analytical processes are seen as 'stepping stones' for automatic processes (McLaughlin 1987). Rather than positing a hierarchical development of linguistic structures, such as suggested by Interlanguage Theory, Cognitive Theory posits a hierarchy of complexity of cognitive subskills which lead from controlled practice to automatic processing of language. As the learner develops increasing degrees of mastery, he or she engages in a constant process of restructuring to integrate new structures with those previously learned. The following are some common factors in the cognitive approaches to L2 acquisition:

- 1) The mind is seen as a single overall 'network' in which everything is connected; "language universals" derive from universal properties of the human mind" (MacWhinney and Bates, 1989: 6);
- 2) Speech production is information-processing; a process of activating the network in all its complexity, driven top-down to achieve particular goals;
- 3) Learning is a progress from declarative, 'controlled', well-attended, data to procedural, 'automatic' non-attended, processes (Leow, 2000, 2001).
- 4) Learning is acquiring strengths for parts of this network based on frequency of occurrence; "language acquisition is cue-driven distributional analysis" (MacWhinney and Bates, 1989: 26) (see Sharwood-Smith, 2004).

Human beings are capable of learning an almost limitless number of skills. Research has shown that improvement is possible with practice. However, there seem to be definite limits to the level of proficiency that an individual may reach in the performance of any particular skilled activity. The prediction of performance limits is of major interest to human performance theory. On the other hand, it is seldom possible to predict when or if an individual has reached the limits of his capacity in a particular activity because actual performance approaches these limits so slowly. The changes in performance that occur when learning multidimensional activities, which require the individual to do more than one thing simultaneously, require time and effort. Attention must be devoted to each component of the movement, and beginning attempts at the skill are often slow and error prone. Eventually, with practice, performance improves to the point where multidimensional tasks can be carried out quite rapidly and accurately. The development of automaticity for tasks requiring multiple dimensions may require many hours of practice. Research indicates that the rate of acquisition for complex tasks may be enhanced by developing an appropriate practice schedule. In this regard, Ellis (2011) argues that although cognitive accounts of L2 acquisition are still concerned with what the learner 'knows', knowledge is considered to be inseparable from actual use. The focus, then, is not on abstract linguistic knowledge, but on the extent to which the learner has achieved mastery over the formal and functional properties of language and mental processes involved. The basic assumption of all cognitive theories is that 'mastery' is gradable and that there are degrees of 'knowing'. It is with regard to this notion of 'mastery' that the theories can be seen as cognitive in nature" (Ellis, 2008: 348).

Attention and Human Performance

Attention capacity refers to our ability to do more than one task at the same time. Many experiments have shown that our ability to attend to several sources of information simultaneously is severely restricted (Broadbent, 1971). The human can be regarded to have limited-capacity that can, only transmit a limited amount of information per second. Whenever this amount is exceeded, people make errors. According to Broadbent's (1971) model of attention, a human who must process information that exceeds channel capacity will make mistakes. Two characteristics of attention are selectivity and mental effort. Selectivity is necessary to keep us from becoming overloaded with too much information. Early theories of attention (Broadbent, 1958; James, 1890) thought selectivity occurred at a bottleneck, a stage that could process only one message at a time. Broadbent's filter theory specified that the bottleneck occurred at the perception or pattern recognition stage, and attention was represented by a filter that preceded this stage. Treisman (1960) modified Broadbent's filter theory to allow for the occasional recognition of words on an unattended channel. She proposed that a filter mechanism attenuated to an unattended message. Important words or expected words could be recognized on the unattended channel if their thresholds were low enough to be exceeded by the attenuated message. Unlike Broadbent and Treisman, Deutsch and Deutsch (1963) suggested that the bottleneck occurs after perception and determines what is selected into memory.

The results of many experiments on selective listening failed to agree on the location of the bottleneck. This limitation led to a shift in theorizing that encouraged more flexible views of the stage at which the selection of attended information occurs. Capacity theories emphasize the amount of mental effort that is required to perform tasks and are concerned with how effort is allocated to different activities. A capacity theory supplements a bottleneck theory by proposing that the ability to perform simultaneous activities is limited when the activities require more mental effort than is available. An important issue to consider when looking at attention is how an individual changes his resource allocation so as to be able to go from the performance of a single task to the performance of multiple tasks. Understanding this phenomenon is critical for developing skill in performing either high workload tasks or tasks which require multiple concurrent levels of processing. William James (1890: 403-404) suggests that:

Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness is of its essence. It implies withdrawal from some things in order to deal efficiently with others.

James (1890) identified two important features within the phenomenon of attention. First, attention is limited. An individual can attend to only one thing at a time or think only one thought at a time. Attention also appears to be serial in that we appear to attend to or perform first one thing, then another, and we find it very difficult (sometimes impossible) to mix certain activities. Furthermore, attention is often conceived as a relatively slow and serial activity, the focus of attention being in one "place" at one time (see Tomlin & Villa, 1994; Schmidt, 1995a, b; 2001). It has been equally clear to

researchers in the field of attention that normal human behavior could not take place if all activity had to be governed by attentive processes operating in such a limited fashion. Almost any skilled activity, whether involving actions (e.g., sports, music performance, typing, automobile driving, flying an airplane) or mental operations (e.g., reading, retrieving information from memory, perceiving) is carried out with such a complex set of operations occurring in parallel that much of the behavior must be occurring outside the normal focus of attention. Partly for this reason, researchers have incorporated various types of automatic processes into their theories (Schneider & Fisk, 1982a; Schneider & Fisk, 1982b; Schneider & Fisk, 1984; Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977).

From Cognitive Psychology to (SLA)

SLA Research: Acquisition and focus on form

As Mangubhai (2006:1) points out, in the last twenty-five years a number of insights have been achieved through research on the processes of second language acquisition/learning. He, further, claims that Second Language Acquisition (SLA) has been in existence as a field of study for over 25 years, applied linguistics as a field just over 40 years (if we take the influential book by Halliday, McIntosh and Stevens (1964) as the beginnings of applied linguistics). One of the most interesting insights that have been offered by SLA research is that “adults and adolescents can ‘acquire’ a second language” (Mangubhai, 2006: 2). The focus of this insight is the word ‘acquisition’ in the sense that Krashen (1982, 1985, 1991, 1994) has used it in distinguishing it from the term ‘learning’. Acquisition is non-formal, subconscious way of picking up a second language through exposure to it. It, therefore, refers to implicit knowledge, rather than explicit knowledge. The term has generally been associated with children learning their first language in contexts that are informal, meaningful and not planned. The claim, however, is that it is not just children who can acquire a language, but adults can do so also provided there is a large amount of exposure, or input. Some evidence for this comes from the early work of Elley and Mangubhai (1983). Further examples of acquisition through reading have been documented in Elley (1991) and Krashen (1993a; 1993b).

Another line of research has, however, addressed the question of whether anything can be learned unless it is noticed. One of the earliest writers to discuss noticing in the field of SLA was Schmidt (Schmidt, 1990; 1992; 1993) who has emphasized the importance of noticing in second language learning. While he has acknowledged that there can be acquisition, he has argued that most second language learners learn the second language and hence, the concept of noticing is critical to understanding SL development. In this connection, Ellis (2002) rightly points out that research has not been able to settle this question definitively and it remains to be of on-going interest. In his discussion of this issue, Ellis (2005: 306) has argued that the “bulk of language acquisition is implicit learning from usage. Most knowledge is tacit knowledge; most learning is implicit; the vast majority of our cognitive processing is unconscious”. He does agree with Krashen (1982) that implicit and explicit learning are different, but unlike, Krashen, he sees a role for explicit instruction and thus he can be seen to subscribe to a weak interface between the two types of knowledge, implicit and explicit.

Research in SLA has shown that learners need to focus on form in order to develop a more complete grammatical repertoire in the second language. Evaluations of the immersion programs in Canada talk about their obvious success in teaching a second language, French. It has been noticed, however, that while students seemed to show a great amount of fluency in the use of French, the range of grammatical structures that were used in their communication was limited. This means that despite the provision of large amounts of comprehensible input provided in the immersion classrooms, many students did not acquire the full range of grammatical structures. This situation led to what is called “form-focused instruction”, defined as “any pedagogical effort which is used to draw the learners’ attention to language form either implicitly or explicitly”. This is a slightly different definition from that of Long (1991) where he talks about ‘focus on form’. The intended outcome in ‘focus on form’, according to Long, is “noticing”, defined by Long and Robinson (1998) as the allocation of one’s attentional resource at a particular moment to a form. The evidence for the efficiency of ‘focus on form’ is growing. However, there are some who are still not convinced of its effectiveness (Sheen, 2005).

SLA research on attention and noticing

Over the past two decades, researchers in the field of second language acquisition (SLA) have become increasingly interested in concepts traditionally associated with cognitive psychology, such as memory, learning ability, and connectionism. Ellis (2002:299) points out, “we are now at a stage at which there are important connections between SLA theory and the neuroscience of learning - and memory”. The concept of attention has become especially important because of its crucial role in so many aspects of SLA theory, such as input, processing, development, variation, and instruction. Tomlin and Villa (1994) suggest that there are four conceptions of attention in SLA. One is that of attention as a limited capacity system. The idea being that the brain may be presented (through the sensory system) with an overwhelming number of stimuli at any given time, and it seems impossible to process them all. The limitations of attention refer not only to the amount (or duration) of attention that may be given to a single stimulus but also to the number of stimuli that may be attended to simultaneously. This leads to a second conception of attention, namely that it constitutes a process of selection. The overwhelming amount of incoming stimuli force the attentional system to be selective. The third conception of attention involves controlled rather than automatic processing of information. The underlying assumption here is that some tasks require more processing effort, and hence a higher degree of attention, than others. A person may therefore perform two tasks at the same time, especially if one requires automatic processing (low attention). By the same token, it is more difficult to perform two tasks if both require controlled processing (high attention). The fact that controlled processing of two simultaneous tasks is sometimes possible led researchers to develop a fourth conception of attention, which is that it must involve a process of coordination among competing stimuli and responses. In this process, attention must be established, maintained, discontinued, and redirected in order to perform different actions.

Posner and Petersen (1990) describe attention in terms of three networks: alertness, orientation, and detection. Alertness refers to a general state of readiness to receive input.

The higher the level of alertness, the faster the speed of selecting information for processing will be. Orientation to the alignment of attentional resources to a particular stimulus from among a host of stimuli. Orienting attention to a stimulus facilitates the processing of that stimulus. Orientation differs from alertness in that a learner might for example be ready to learn (alertness) but not know whether to focus on form or meaning (orientation). Detection is probably the most important network in attention; it refers to the cognitive registration of a stimulus. Once a stimulus is detected, it becomes available for further processing. Although detection does not necessarily imply awareness, Schmidt (2001) suggests using the term registration to refer to stimuli that are detected without awareness. According to Schmidt (1994: 179), noticing refers to the “registration [detection] of the occurrence of a stimulus event in conscious awareness and subsequent storage in long term memory”. Schmidt is careful to distinguish noticing from understanding, which he defines as “recognition of a general principle, rule or pattern” (1995: 29). Understanding represents a deeper level of awareness than noticing, which is limited to “elements of the surface structure of utterances in the input” rather than underlying rules (Schmidt, 2001: 5).

Much of Schmidt’s work ties findings from cognitive psychology into SLA theory. As N. Ellis (1994: 10) points out, “Schmidt is one of the few linguists who have adopted the conceptual and experimental rigors of experimental psychology in answering questions concerning the role of consciousness in L2 acquisition”. Reviewing the psychological literature on consciousness has led Schmidt to propose the Noticing Hypothesis, which states that “noticing is the necessary condition for converting input into intake” (1990: 129). Since then, a considerable amount of research has addressed the issue of noticing in SLA. The noticing hypothesis seems to have been motivated by a seminal study by Schmidt and Frota (1986) which documents the role of noticing for a beginner learning Portuguese in Portugal over a period of 22 weeks. Their findings question the assumption that language acquisition is a purely subconscious process (Krashen, 1982), since the learner clearly noticed some of the grammatical structures he seemed to have acquired. Different results were obtained in a similar study by Altman (1990, as cited in Schmidt, 1990), who monitored her own acquisition of Hebrew over a period of five years. Altman was unable to identify the source of half of the new verbs she had learned. She concluded that awareness was not necessary in learning vocabulary. Schmidt and Frota also admit that they were unable to trace much of what had been acquired to what had been noticed. Self-reports are inherently subjective. Moreover, memory effects may play a role depending on the amount of time that passes before the diary entry is made. Nevertheless, first person accounts seem to be the most valid method for assessing what is noticed.

One of the most influential attentional studies in SLA was conducted by VanPatten (1990), who investigated the notion of attention as a limited resource (Broadbent, 1957, as cited in Robinson, 1995). More specifically, the study examined whether learners were able to consciously attend to both form and meaning when processing input. Results showed that the content only and lexical groups significantly outperformed the form and morphology groups. This led VanPatten to conclude that it was difficult, especially for

beginners, to notice content and form at the same time. Moreover, he postulated that learners would notice meaning before form, since their primary objective is to understand the propositional content of utterances. VanPatten's findings have led SLA researchers to try to find ways to help learners focus on both form and meaning. One such way is input enhancement, which refers to the manipulation of certain aspects of the input (e.g., form) to make them more salient and thereby more noticeable to learners (Sharwood-Smith, 1993). Typographical input enhancement usually entails italicizing, using boldface, or underlining in order to highlight the target structure.

A more innovative experimental design by Leow (1997, 2000) provides further evidence for the facilitative role of awareness in SLA. Leow (1997) used a crossword puzzle task as input that was designed to initially induce learner error. Eventual clues in the puzzle provided learners with the correct form, thereby increasing their chances of noticing the mismatch. Similar results were found in a subsequent study (Leow 2000). Results showed that participants who displayed evidence of awareness performed better on the post-exposure tasks than those classified as unaware. In a similar experimental design, Rosa and O'Neill (1999) investigated the role of awareness in acquiring syntactic structures. Among other things, the study found that awareness seemed to increase learners' ability to recognize the syntactic structures on the post-test. There was also a strong correlation between awareness and intake. Leow (2001) also used think-aloud protocols to examine how typographical input enhancement affects learners' noticing of the formal imperative in Spanish. Results showed that 33% (7 out of 21) of the enhanced group mentioned the target forms in their protocols as compared with only 12% (2 out of 17) in the unenhanced group. No statistically significant differences were found between the two groups for: (a) amount of reported noticing of the targeted form, (b) comprehension, and (c) intake as measured by recognition. However, significant correlations were found in both groups between noticing and recognition. Leow points out that the effects of typographical enhancement may have been diminished by the length of the input. When faced with a long reading passage, learners might be using more global noticing strategies in order to process the large amounts of input. This would probably shift attention toward meaning and away from form, since the former is more important for comprehension. Leow's explanation seems to be supported by VanPatten's (1990) findings that attention to both form and meaning is difficult. However, the modality of the input in this case (written) differed from that in VanPatten's study (aural). Could modality differentially affect attention to meaning and form? Wong (2001) tried to address this question with a partial replication of VanPatten (1990). His variations included the addition of a written mode of input and using English (instead of Spanish). Findings for the aural input mirrored those of VanPatten, since there was a significant decrease in performance when participants had to attend to both content and form. However, no significant difference was found when the input was written (which incidentally took less time to read than the aural input). Moreover, when processing both form and meaning, the listening task proved more difficult than the written task, suggesting once again that different modalities may impose different attentional demands (Chun & Zhao, 2006).

The next section reviews evidence that human performance is the result of two qualitatively different processes referred to as automatic and control processing and describes many of the attentional phenomena in terms of this distinction.

Automatic and Control Processing

Automatic processing is a fast, parallel, fairly effortless process that is not limited by short-term memory (STM) capacity, is not under direct subject control, and is responsible for the performance of well-developed skilled behaviors. Automatic processing typically develops when subjects process stimuli consistently over many trials. Functions of automatic processing include the following: (1) they are used to performed habitual behaviors; (2) they may be used to interrupt ongoing control processing and forcefully reallocate attention and resources, and (3) they may be used to bias or prime memory in preparation for later inputs.

There is rarely any task in which processing is purely controlled or purely automatic (Schneider and Fisk, 1983). In general, the two processes share the same memory structure and continuously interact. Automatic processing may initiate control processing by causing an orienting or attentional response, and controlled processing may activate an automatic process. In this connection, Schneider et. al. (1984) argues that the complementary interaction of automatic and control processing enables a system with a stringent capacity limitation to perform complex processing. Those aspects of behavior that can be processed consistently are automatically processed and do not use up resources. However, because nodes activated by automatic processing decay rapidly, control processing can be used to maintain a few critical nodes in memory. As Schneider and Fisk (1983) maintain, the interaction of automatic and control processes allows a limited capacity processor to accomplish very complex tasks.

The question which imposes itself is how does automatization occur?'. A widely accepted view has been that during the course of practice, implementation of the various steps becomes more efficient. The individual gradually combines individual effortful steps into integrated components, which are then further integrated until eventually the entire process is a single highly integrated procedure, rather than an assemblage of individual steps (Anderson, 1983). An alternative explanation, called "instance theory", has been proposed by Logan (1988) who has suggested that automatization occurs because we gradually accumulate knowledge about specific responses to specific stimuli. For example, when learning to drive, an accumulated wealth of specific experiences forms a knowledge base from which the person can quickly retrieve specific procedures for responding to specific stimuli (for example, oncoming cars or stoplights). "Because highly automatized behaviors require little effort or conscious control, we can often engaged in multiple automatic behaviors, but we can rarely engage in more than one labor-intensive controlled behavior" (Sternberg, 1996: 76). The process by which a procedure changes from being highly conscious to being relatively automatic is automatization or proceduralization (Sternberg, 1996: 75). According to Sternberg (1996: 73), automatic processes involve no conscious control. That is, for the most part, automatic processes occur outside of conscious awareness, demand little or no effort or even intention, are performed as parallel processes... In contrast, controlled processes are

not only accessible to conscious control but also require it; such processes are performed serially (sequentially, one step at a time) and take a relatively long time to execute (at least, as compared with automatic processes). Control processing is characterized as a slow, generally serial, effortful, capacity-limited, subject-regulated processing mode that must be used to deal with novel or inconsistent information. Control processing is expected when the subject's response to the stimulus varies from trial to trial.

From the automatic-control processing perspective, skill does not develop from practicing the skill per se, but rather from practicing consistent components of the skill. Consistent practice develops automatic component processes that exhibit fast, accurate, parallel processing. In this regard, Schneider and Shiffrin (1977) and Shiffrin and Schneider (1977) demonstrated that performance should change due to the development of automatic processes when subjects are given extensive, consistent practice. Consistent practice is assumed to occur when the stimuli and responses are consistently mapped (CM); that is, across training trials the subject makes the same overt or covert response each time the stimulus occurs. If the stimuli and responses are variably mapped (VM) across trials; that is, the responses change across trials, no automatic processing should develop and performance should change little with practice. According to Schneider et. al. (1984: 2), "it would be hard to find any task that is not accomplished through the use of both automatic and control processes. Even brief consideration of any complex task makes it clear that such tasks are carried out with a mixture of automatic and control processes.

Functions of the attentional system

Our attentional system performs many functions other than merely turning out familiar stimuli and turning in novel ones. The four main functions of attention are 1) selective attention, in which we choose to attend to some stimuli and to ignore other; 2) vigilance, in which we watchfully wait to detect the appearance of a particular stimulus; 3) search, in which we actively seek out particular stimuli, and 4) divided attention, in which we prudently allocate our available attentional resources to coordinate our performance of more than one task at a time.

Selective attention

The process of "selective attention" is one in which "the organism selectively attends to some stimuli, or aspects of stimuli, in preference to others" (Kahneman, 1973: 3). As Schneider et. al. (1984) argues that this concept presupposes that there is some bottleneck, or capacity limitation, in the processing system and that subjects have the ability to give preference to certain stimuli so that they pass through this bottleneck easily and at the expense of other stimuli. In his discussion of 'selective attention', Sternberg (1996: 82) provides the following example: "suppose you are at a dinner party. It's just your luck to be seated next to someone who sells 110 brands of vacuum cleaners and describes to you in excruciating detail the relative merits of each brand. As you are talking to this blatherer, who happens to be on your right, you become aware of the conversation of the two diners sitting on your left. Their exchange is much more interesting especially because it contains juicy information you had not known about one

of your acquaintances. You find yourself trying to keep up the semblance of a conversation with the blabbermouth on your right while tuning in to the dialogue on your left. Cherry (1953) referred to this phenomenon as the cocktail party problem, based on his observation that cocktail parties are often settings in which selective attention is salient. Selectivity is the result of capacity limits of the human information-processing system. These limits are relative; they depended on the type of activity. Well practiced tasks are automatic and require mental effort and engage attentive processes. In this connection, Haberland (1997: 66) argues that theories differ in terms of the respective roles attributed to attentive and to automatic processes. According to so-called bottleneck theories of attention, the two types of processes are serial: automatic processes are followed by attentive processes. According to other theories, attentive and automatic processes occur in parallel throughout processing.

There are two main interpretations of the adaptive function of selective attention. One view emphasizes the richness and complexity of the information that is presented to the senses at any one time, and the consequent risk of confusion and overload (Broadbent, 1958). The other view emphasizes the diverse and incompatible response tendencies that may be instigated at any one time, and the consequent risks of paralysis and incoherence. The function of attention in the first view is to ensure adequate perceptual processing of the currently important sensory messages; in the second view, it is to ensure adequate execution of the currently most important action. Four varieties of selective attention are identified: 1) detection; 2) filtering; 3) search, and 4) resource allocation. First, detection involves noticing the absence or presence of a stimulus or the difference between a pair of stimuli. Detection depends on the observer's sensitivity as well as the observer's response bias to be lenient or strict. Detection involves the judgment as to whether a stimulus is present (for example, did I hear the phone ring? Was there a knock on my door?). Second, filtering involves the selection of one of several messages on the basis of its attributes. According to filter theories, analysis of information prior to the filter is automatic but superficial. Subsequent analyses are deeper but they require more cognitive resources are deeper but they require more cognitive resources and more time (Haberlandt, 1997: 64). Filtering involves concentration on one of several inputs while excluding others. For example, when you are having lunch in the dining hall, and there is the din of dishes and chairs being moved in the background, there are usually several conversations. On your left, people are talking sports; on your right, they are complaining about a quiz; and you are chatting with a friend about a recent trip she took. You are listening to her, tuning out the other conversations. This is the prototypical filter situation; you are selecting one of several simultaneous messages. Cognitive psychologists seek to "understand the mechanisms that enable us to filter a message by asking the following questions; (1) how is information filtered?; (2) what aspect of information is being filtered? , and (3) where in the stream of information processing does the filter occur? (Haberlandt, 1997: 73). Third, search refers to the identification of a target among a set of distractors. When targets and distractors differ consistently, the search is automatic. When targets and distractors are mixed, however, the viewer's full attention is required (Haberlandt, 1997: 64). Search refers to "a scan of the environment for particular features-actively looking for something when you are not sure where it will

appear" (Sternberg, 1996: 86). As with vigilance, when we are searching for something, we may respond by making "false alarms". In the case of search, false alarms usually arise when we encounter distractors, which are non-target stimuli that divert our attention away from the target stimulus.

Distractors cause more trouble under some conditions than under others: 1) when the target stimulus has no unique or even distinctive features; 2) as the similarity between target and distractor stimuli increases, so does the difficulty in detecting the target stimuli. Thus, targets that are highly similar to distractors are hard to detect; targets that are highly disparate from distractors are easy to detect, and 3) another factor that facilitates the search for target stimuli is similarity (uniformity) among the distractors. That is, searching for target stimuli against a background of relatively uniform (highly similar) distractors is fairly easy, but searching for target stimuli against a background of highly diverse distractors is quite difficult. According to Duncan and Humphreys' (1992) similarity theory, the difficulty of search tasks depends on the degree of similarity between the targets and the distractors, as well as on the degree of disparity among the distractors, but not on the number of features to be integrated.

Divided Attention

Early work in this was done by Neisser and Becklen (1975). It was noticed that the attentional system must coordinate a search for the simultaneous presence of two or more features—a relatively simple, if not easy task. At times, however, the attentional system must perform two or more discrete tasks at the same time. In this regard, Neisser and Becklen hypothesized that improvement in performance would have occurred eventually as a result of practice. They also hypothesized that the performance of multiple tasks was based on skill (due to practice), not one special cognitive mechanisms. Spelke, Hirst, and Neisser (1976) used a dual-task paradigm to study divided attention during the simultaneous performance of two activities. They found that the speed and accuracy of simultaneous performance of two was quite poor for the simultaneous performance of two controlled processes. The two tasks that were examined were 1) reading for detailed comprehension, and 2) writing down dictated words. Spelke and her colleagues found out that, given enough practice, the subjects' performance improved on both tasks. That is, they showed improvements in their speed of reading and accuracy of reading comprehension. Subjects' performance on both tasks reached the same levels that the subjects had previously shown for each task alone. They suggested that these findings showed that controlled tasks can be automatized so that they consume fewer attentional resources. Pashler (1994) argued that when people try to perform two overlapping speeded tasks, the responses for one or both tasks are almost always slower. When a second task begins soon after the first task has started, speed of performance usually suffers.

In divided attention tasks, the subjects are asked to spread attention over as many stimuli, or potential stimuli, or sources of stimuli, as possible. In focused attention tasks, the subject attempts to place all available attention on just one stimulus, type of stimuli, or source of stimuli, ignoring and/or excluding all other inputs. In this regard, Shiffrin (1988:34) points out that "As a general rule, subjects find it extremely difficult to divide

attention. When there are more tasks to be carried out, more stimuli to be attended, more potential stimuli to be attended, more potential stimuli to be monitored, or more attributes to be attended, performance is reduced". Kahneman and Treisman (1984) argued that whereas the basic information-processing model assumes a central, fixed capacity pool of resources, divided attention is possible. That is interference is reduced or eliminated when concurrent tasks differ sufficiently from one another... thus speech and music, or auditory and visual words, can more easily be processed in parallel than two auditory or two visual messages of the same type. These observations suggest that the brain is organized as a modular system, and that interference arises chiefly within rather than between the separate, semi-independent subsystems. They, further, argue that humans have a rather impressive ability to process multiple stimuli even in the same modality and of the same type. This has led to the idea that there is a type of information processing "which requires no resources...is totally automatic" (Schneider and Shiffrin, 1977).

THE PURPOSE

The purpose of this study is to examine the written output of foreign students enrolled in the English Language Institute at the University of Pittsburgh in order to investigate whether or not there is a relationship between the accuracy of the written communicative production of foreign students and their achievement in grammar tasks that only require mechanical manipulation of grammar rules. In other words, this study attempts to find answers for the following questions:

1. Are students' errors in grammatical structures, as they will appear in their written output, due to deficiency in their conscious grammar rules, or to deficiency in their abilities to transfer this knowledge (if it exists) to other language tasks such as writing compositions in English?
2. Can conscious rules of grammar guide students' performance in monitoring (self-correcting) their written output once their attention is drawn to an error?
3. Is there another explanation for students' errors in both the written texts and correction tasks other than the linguistic one?

Hypotheses

The hypotheses of this study was that the foreign students who participated in the experiment would not be able to utilize their knowledge of English grammar effectively in writing because it was too vague or fragmentary. In addition, they may fail to correct their errors in the unfocused correction task due to cognitive deficits which are, also, responsible for their errors in writing. Their performance in the focused correction may be better than their performance in both writing and the unfocused correction task. The improvement in their performance may be due to the decrease in their cognitive load since their attentions will be drawn to specific and limited number of errors.

METHOD

Subjects

Fifteen subjects participated in this study. They were from a variety of language backgrounds. There were nine females and 6 males. Two subjects were under twenty years of age. Seven subjects were between twenty and twenty-five years old. Six subjects were over twenty-five years of age. Three subjects had studied English in their home countries for more than eight years. One subject had studied English in her home country for exactly eight years, three for seven years, six for six years, one for four years, and one for five years.

Only four subjects indicated that their previous English classes gave the most attention to writing. Emphasis on grammar was mentioned as the core of most subjects' previous English classes. None of the subjects had ever been in an English-speaking environment before coming to the USA. Twelve had been in the USA for less than one year. Three had been in the USA for more than a year, one of them for more than sixteen years.

Table 1 shows the distribution of the subjects of this study according to their native countries.

Table 1. Distribution of the subjects according to their countries.

Country	Number of subjects
Japan	5
Taiwan	4
Malaysia	1
Turkey	1
Indonesia	1
Brazil	1
Saudi Arabia	1
Korea	1

Instruments

The instruments of this study consisted of four tasks:

Questionnaire

A questionnaire was constructed to elicit information from each subject about his/her name, country, sex, age, linguistic background, and the extent of his/her exposure to the English language. Each subject was also asked to pinpoint the most difficult areas of grammar that always troubled him/her when he/she wrote in English (see Appendix 1).

Free composition

The subjects were asked to write an essay of about two hundred words. The topic was "The Value of Learning English." It was chosen because it was related to students' interest and not technical. In order to keep the classroom's atmosphere as natural as possible, students' regular teachers assigned this task as if it were a regular class assignment. Written instructions were given to the students before they wrote. To guarantee that

every student knew what he/she should do, teachers read the instructions and asked students to feel free to ask questions if they did not understand. Specifically, students' attention was drawn to the necessity of concentrating on both form and meaning. The time allowed was forty minutes (see Appendix 2).

Focused/unfocused correction tasks

The basis of these two tasks was the morphosyntactic errors that appeared in each student's essay. In an unfocused correction task, all sentences with morphosyntactic errors were provided. Each sentence contained one or more errors from the individual's essay. Each student was told that there were grammatical errors in the sentence and was asked to correct them. Written instructions were given to each student. The time allowed for this task was fifteen minutes (see Appendix 3).

Having done this task, students were given written instructions on how to work on the "focused correction task" (see Appendix 4). In the focused correction task the same sentences from the student's essay were presented. This time, the students' attention was drawn to the specific errors (i.e., the errors were underlined). Before students started to work on this task, their regular teacher explained the written instructions clearly and slowly. Students were asked to correct the errors that appeared in each sentence (see Appendix 4).

Interviews

Each student was interviewed to explain his/her performance in the essay, the unfocused correction task and the focused correction task. I interviewed the students individually. The meetings were held in the students' lounge in the Department of Linguistics. Conducting the interview, with each subject took about twenty to, thirty minutes. Every subject had the opportunity to choose the time of the interview. However, I had to reschedule three of the meetings because their subjects failed to keep their appointments. Subjects (13) preferred to meet in Hillman library. During the interview, students were asked to explain why changes were made and were probed to clarify as often as necessary. No feedback on the correctness of the changes was given before the end of the interview. Students' explanations were tape-recorded, and transcribed (see Appendix 5).

DATA ANALYSIS

The data analysis had a quantitative and a qualitative, interpretative part. The quantitative part consisted of a statistical comparison of the number of errors in the composition, unfocused correction and focused correction tasks (by means of one-way ANOVA). First, the number of students' errors in the essay, unfocused correction and focused correction tasks was calculated. Students' errors in the unfocused correction task were counted as either remaining ones that were previously made in the essay (and never corrected), or new errors. Similarly, students' errors in the focused correction task were categorized as either remaining, or new errors. Second the frequency distributions and Descriptive statistics for students' errors in the essay unfocused correction and focused correction tasks, were made. The qualitative part was an analysis of each student's conception of the grammatical rules that were violated in order to explain any

discrepancies between their performances in the tasks. This analysis was inductive, based entirely on the individual's explanations, and aimed at accounting for the differences between the tasks

RESULTS

Summary Statistics

Table 2. Number of students' errors in the essay unfocused correction and focused correction tasks.

Subject	Essay	Unfocused Correction			Focused Correction		
		Remaining	New	Total	From Remaining	From New	Total
1	8	4	3	7	1	2	3
2	27	8	5	13	1	3	4
3	9	3	1	4	0	0	0
4	18	7	4	11	0	4	4
5	23	7	1	8	3	2	5
6	17	11	1	12	12	0	12
7	9	1	5	6	3	0	3
8	12	6	0	6	0	2	2
9	12	4	5	9	2	1	3
10	7	1	4	5	0	0	0
11	15	8	0	8	6	2	8
12	11	2	2	4	2	1	3
13	9	2	4	6	6	1	7
14	11	5	0	5	3	1	4
15	25	8	2	10	3	2	5

The following analysis represents the frequency distributions and descriptive statistics for students' errors in the essay, unfocused correction and focused correction tasks.

A. The Essay

Table 3. The distribution of subjects' errors in the essay

Number of Errors	Number of Students
7	1
8	1
9	3
11	2
12	2
15	1
17	1
18	1
23	1
25	1
27	1
TOTAL	15

B. Unfocused correction task

Table 4. The distribution of subjects' errors in the unfocused correction task.

Number of Errors	Number of Students
4	1
5	1
6	3
7	2
8	2
9	1
10	1
11	1
12	1
13	1
TOTAL	15

C. Focused correction task

Table 5. The distribution of subjects' errors in the focused correction task

Number of Errors	Number of students
0	2
2	1
3	4
4	3
5	2
7	1
8	1
12	1
TOTAL	15

Table 6. The mean, Standard deviation and other measures of central Tendency of subjects' errors in the essay.

Mean 14.200	Std err 1.665	Median 12.000
Mode 9.000	Std dev 6.450	Variance 41.600
Kurtosis -.383	S E Kurt 1.121	Skewness .920
S E Skew .580	Range 20.000	Minimum 7.000
Maximum 27.000	Sum 213.000	

Table 7. The Mean, Standard deviation and other measures of Central Tendency of subjects' errors in the unfocused correction task.

Mean 7.600	Std err .742	Median 7.000
Mode 6.000	Std dev 2.874	Variance 8.257
Kurtosis -.799	S E Kurt 1.121	Skewness .548
S E Skew .580	Range 9.000	Minimum 4.000
Maximum 13.000	Sum 114.000	

Table 8. The Mean, Standard deviation and other measures of Central Tendency of subjects' errors in the focused correction task.

Mean	4.200	Std err	.788	Median	4.000
Mode	3.000	Std dev	3.052	Variance	9.314
Kurtosis	2.091	S E Kurt	1.121	Skewness	1.121
S E Skew	.580	Range	12.000	Minimum	.000
Maximum	12.000	Sum	63.000		

Table 9. ANOVA summary table.

SOURCE	SS	D.F.	MS	F
Type of Task	775.60	2	387.80	35.530*
Error	305.73	28	10.92	

*P<0.01

The statistical analyses indicate that the condition (essay, unfocused correction, focused correction) affected the number of errors made by students. Students made the most errors in the essay, the fewest errors in the focused correction task. The mean number of errors in the essay is 14.2 with a standard deviation of 6.5. The mean number of errors in the unfocused correction task is 7.6 with a standard deviation of 2.9, while the mean number of errors in the focused correction task is 4.2 with a standard deviation of 3.1.

The following figure illustrates the decrease in number of errors made by the subjects in the three tasks.

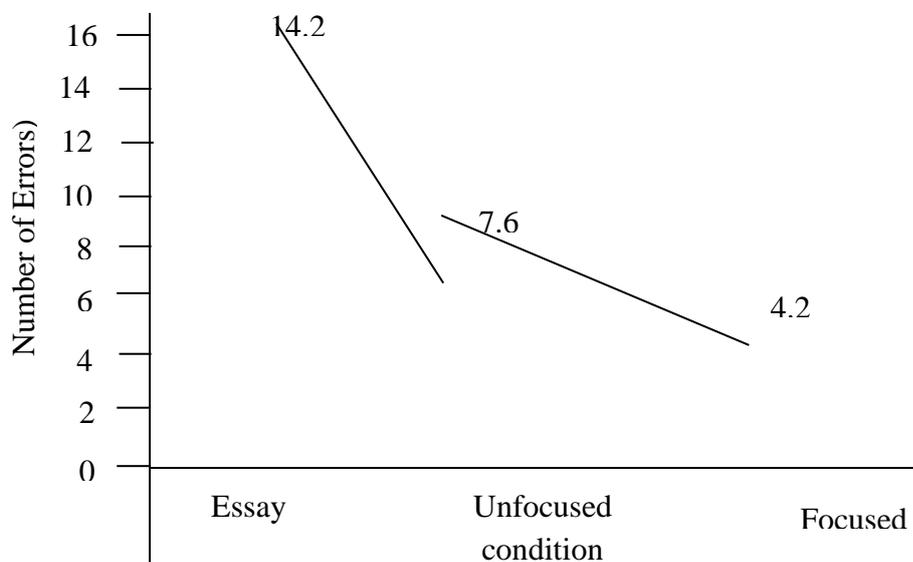


Figure 1. Plot of mean number of errors under the three conditions (the essay, the unfocused correction and the focused correction task).

DISCUSSION

The results of this study demonstrate that students' errors in the essay were not just due to carelessness or forgetfulness as some of the subjects claimed during the interview. An examination of the performance of the subjects suggests that deficiency in their knowledge of grammar results in inaccurate composition writing and unsuccessful correction of errors. When asked to correct their errors, L₂ learners with deficiency in

conscious knowledge of grammar seem to rely on their "feelings" about the structures of the target language. However, since these "feelings" are based on incorrect knowledge, L2 learners tend to follow false assumptions and, in turn, their corrections of errors are unsuccessful. In addition, they appear to search for various ways to express the meanings of their erroneous sentences in new forms, but many of these contain new errors. Thus, it can be concluded that relying on "feelings and experience" (to use Subject (4)'s words), without having adequate conceptual knowledge of grammar rules leads to unsuccessful performance, even if students' attention is drawn to their errors. This conclusion is based on four pieces of evidence. First, many errors do not get corrected in the unfocused correction task. An examination of the performance of the subjects shows that none of the subjects was able to correct all his/her errors in the unfocused correction task.

Secondly, even when the error is identified (as in the focused correction task), students often fail to correct it. Subject (6) made twelve errors in the unfocused correction task, eleven of which were previously made in the essay and never corrected, and only one of which was new. Although his attention was drawn to his errors, he was unable to correct them successfully. All he did was either leave the incorrect structures as they were or use new structures which were also incorrect. He made twelve morphosyntactic errors in the same structures he had used incorrectly in the unfocused correction task. This clearly suggests that he lacks the necessary knowledge of grammar and, consequently, drawing his attention to his errors did not improve his performance. Likewise, Subject (1) was unable to see or correct the errors although they were underlined for her. That is, although her attention was drawn towards a specific grammar error, she could not correct it; instead, she tended to express the meaning of the sentence in a different form which sometimes happened to be correct. Moreover, because she appeared to be lacking accurate grammar knowledge, the new versions of her erroneous sentences contain yet more grammar errors.

Third, many new errors are introduced, even when the subjects are paying attention. Subject (1) for example, made three new errors in the unfocused correction task, and two new errors in the focused correction task. Subject (2) made five new errors in the unfocused correction task, and three new errors in the focused correction task. Subject (7) made six errors in the unfocused correction task; five of them were new. Five of the nine errors made by Subject (9) were new, and four of the five errors made by Subject (10) were also new in the unfocused correction task. Subject (13) made six errors in the unfocused correction task, four of which were new.

Finally, even when the subjects' errors are eliminated, it is often because students tend to write new sentences instead of correcting them. For example, Subject (1) tended to focus more on the semantic aspect of her sentences than on their grammatical accuracy. In other words, she did not use grammar knowledge to correct her erroneous sentences. Instead, she tended to use what one could call "stylistic variations" of those sentences, which happened to be correct. Likewise, Subject (2) managed to reduce the number of his errors from twenty-seven errors in the essay to thirteen in the unfocused correction task because his new sentences were correct. Subject (11) also managed to reduce the number of his errors from fifteen errors in the essay to eight in the unfocused correction

task. She managed to correct some of her errors in the essay by coming up with new sentences that happened to be correct. An examination of Subject (12)'s performance also shows that the decrease in the number of errors in the unfocused and the focused correction tasks is due to the fact that she tended to change the whole sentence in such a way that avoided the structures she previously used in the essay. She made eleven errors in the essay, four in the unfocused correction task, and three in the focused correction task. Subject (8) clearly stated that she was relying on making new sentences rather than correcting the already written erroneous sentences:

S.281. See the sentence is not good...the meaning...I have to change it, all of it...it is not clear...so I changed the words. I didn't make attention for grammar...I want this sentence to mean anything.

To sum up, this study shows that the students' unsuccessful performance in the essays was due to their fragmentary knowledge of grammar. No matter how attentive L2 learners are in performing language tasks, their performance in error correction tasks will be unsuccessful as long as their knowledge of grammar is fragmentary.

Analyzing the subjects' performance in essay writing and two correction tasks support the general hypothesis of the present study: the subjects' performance in the tasks displayed various degrees of competence in English. That is, the overall competence of L2 learners is not systematic or unitary all the way. This implies that a good student in solving grammar problems is not necessarily good at writing. Also, successful performance, either in writing or grammar tasks does not necessarily guarantee successful and accurate verbal explanations on students' part. Moreover, the results of the present study support the hypotheses that students' performance in the correction tasks would be better than that in the writing task. And, their performance in the focused correction task would be better than that in the unfocused correction task. Relatedly, students' poor performance in writing, at least at the sentential level, is mainly due to a deficiency in their knowledge of grammar.

Accordingly, interpreting the subjects' behavior in the writing and the error correction tasks seems to support the non-interface position introduced earlier in the review of literature. Consequently, it would be a mistake to judge L2 learners' knowledge on the basis of their performance, since both knowledge (competence) and performance are unrelated. One can argue, then, that successful performance does not necessarily mean coherent and complete linguistic knowledge, and vice versa. Relatedly, although linguistic knowledge appears, in some situations, to be a factor in determining the type of performance, it can not be concluded that it is a prerequisite to successful performance. Regarding error correction, the non-interface position predicts that linguistic knowledge can help L2 learners to make changes in their linguistic output. The results of the present study, partially, support such a prediction. However, in some cases, L2 learners may not be able to use their linguistic knowledge in making successful changes.

In addition to the above analysis, another interpretation can be provided, which is based on cognitive psychology's perspective. That is, in addition to the deficiency in grammar knowledge as a reason for students' inaccurate composition writing, there is another possible reason that makes these students commit many morphosyntactic errors in

writing such as the many constraints that writing in a foreign language imposes on foreign language learners and deficiency in students' abilities to transfer their knowledge of grammar to complex tasks such as writing. It can be argued that composing in English as a second language is a multidimensional activity which requires L2 learners to do more than one thing simultaneously. This argument is compatible with the principles of the attention theory. Two important features within the phenomenon of attention have been identified: 1) an individual can attend to only one thing at a time or think only one thought at a time; 2) attention appears to be serial, and we find it very difficult to mix certain activities, that is, the focus of attention is only on one place at one time. Our ability to attend to several sources of information simultaneously is severely restricted. Consequently, a human who must process information that exceeds his channel capacity will inevitably make errors.

This study, then, supports the claim that second language learner has difficulty in attending to both form and content in the input. In other words, the attentional resources are limited and therefore it is difficult to understand the content of input when the attention is allocated to a certain form in the input. This can serve as evidence supporting such theoretical and pedagogical proposals as consciousness-raising (Rutherford & Sharwood-Smith, 1985) input enhancement (Sharwood-Smith, 1993; Alanen, 1995), and focus on form (Doughty & Williams, 1998). They all start with the common assumptions that (1) a focus on meaning is necessary with a sufficient amount of input; (2) a certain level of conscious attention to form is also necessary; (3) it is difficult, however, to pay attention to form while processing input for meaning; and (4) therefore some sort of encouragement to attend to form is helpful and facilitative for SLA. The present study, then, provides some evidence for Assumption 3; simultaneous attention to form and meaning is difficult. Furthermore, these studies favor focus on form. VanPatten (1990: 295) suggests that "if attention to form needs to be conscious at some point, then the input must be easily comprehended". Therefore, the learner is able to allocate most of the attentional resources to the form on the spot, which will facilitate the processing and acquisition of that form (Stubbs, 2007; De Bot et al., 2007).

This study shows that although 'noticing' or 'conscious awareness' may have some positive effect on L2 learners' performance; this effect, however, is constrained by two important factors: (1) learners' overall linguistic competence, and (2) the nature of the task; that is, whether it requires controlled or automatic processing of information. These two factors determine the amount of attention and degree of coordination on the part of L2 learners. In this sense, this study does not exclusively support Schmidt's Noticing Hypothesis. Rather, it supports the claim that Noticing is necessary but not sufficient condition for conveying input into intake. As a whole, this study supports the claim that L2 learners have difficulty in attending to both form and content in the input. This is why conscious awareness or 'Noticing' is not sufficient condition for converting input into intake.

The subjects' performance in essay writing can be analyzed in the light of what "Divided attention" phenomenon maintains. To remind the reader, research on this phenomenon shows that, at certain times, the attentional system must coordinate a search for the

simultaneous presence of two or more features. To put it simply, the attentional system must perform two or more discrete tasks at the same time. In such a case, “the speed and accuracy of simultaneous performance of two activities was quite poor” (Spleke, Hirst, and Neisser, 1976). Relatedly, it was also hypothesized that the performance of multiple tasks was based on skill (due to practice), not on special cognitive mechanisms (Neisser & Becklen, 1975).

In “divided attention” tasks, the subjects are asked to spread attention over as many stimuli, as possible. In this regard, Shiffrin (1988:34) points out that, “as a general rule, subjects find it extremely difficult to divide attention. When there are more tasks to be carried out, more stimuli to be attended..... Performance is reduced”. Many studies show that subjects’ exhibit reduced performance when they try to accomplish simultaneously an increased number of tasks or to attend simultaneously to an increased number of stimuli. These are studies of divided attention deficits. Also, much research in attention assumes that there is a limited pool of attentional resources or capacity that can be distributed across tasks. For example, according to simple capacity models, if the subject has 100 units of capacity and is required to perform two tasks each requiring 75 units, performance should decline when shifting from performing the tasks individually to performing them simultaneously.

Subjects’ performance in the two correction tasks reflects what “Selective Attention” phenomenon maintains. In these tasks, subjects relatively attend to a certain “stimuli” or aspects of stimuli, in preference to others. As Kahneman (1973) and Schneider et al. (1984) point out, this concept presupposes that there is some capacity limitation, or some bottleneck in the processing system; however, subjects have the ability to pass through this bottleneck and at the expense of other stimuli, by giving performance to certain stimuli. In the present study, subjects gave preference to “form” only at the expense of ‘meaning’; and their major focus was on correcting the errors they previously made in essay writing. What is worth mentioning, here, is that some students were able to correct only some of their errors, but not all errors. And, the number of the corrected errors differed from one subject to another. In this regard, it can be argued that selectivity is the result of capacity limits of the subjects’ information-processing system; and these limits are relative, and they depended on the type of activity itself. Students’ performance in the correction tasks was better than that in the essay writing. And, more specifically, their performance in the “focused” correction task was better than their performance in the “unfocused” correction task. This observation can be explained in the light of the four varieties of “selective attention”: (1) detection; (2) filtering; (3) search, and (4) resource attention.

First, as a result of ‘selective attention’, the subjects’ ability to detect the errors increased. That is, their ability to notice, what is missing or incorrect in the sentence they previously wrote in the essay’ has been improved. It must be emphasized, however, that this ability depends on the observer’s sensitivity and his ability to respond. Second, the subjects; ability of ‘filtering’ has been improved; that is, they were able to select, analyze deeply, and concentrate on a particular item and exclude others. Third, as a result of noticing; deep analysis, and concentration, the subjects’ search mechanisms have become

automatic. In this regard, Cave and Wolfe's (1990) theory of "guided search" seems to be quite pertinent. To remind the reader, the guided-search model suggests that search involves two consecutive stages: (1) Parallel stage, in which the individual simultaneously activates a mental representation of all the potential targets, and (2) Serial stage, in which the individual sequentially evaluates each of the activated elements, according to the degree of activation, and then chooses the true targets from the activated elements. In focused attention tasks, the subjects attempt to place all available attention on just one stimulus, ignoring and / or excluding all other inputs (Lanfer & Girsai, 2008).

The results of this study demonstrate that students' errors in the essay were not just due to carelessness or forgetfulness as some of the subjects claimed during the interview. An examination of the performance of the subjects suggests that deficiency in their knowledge of grammar results in inaccurate composition writing and unsuccessful correction of errors. When asked to correct their errors, L2 learners with deficiency in conscious knowledge of grammar seem to rely on their "feelings" about the structures of the target language. However, since these "feelings" are based on incorrect knowledge, L2 learners tend to follow false assumptions and, in turn, their corrections of errors are unsuccessful. In addition, they appear to search for various ways to express the meanings of their erroneous sentences in new forms, but many of these contain new errors. Thus, it can be concluded that relying on "feelings and experience" (to use Subject (4)'s words), without having adequate conceptual knowledge of grammar rules leads to unsuccessful performance, even if students' attention is drawn to their errors. This conclusion is based on four pieces of evidence. First, many errors do not get corrected in the unfocused correction task. An examination of the performance of the subjects shows that none of the subjects was able to correct all higher errors in the unfocused correction task. For example, subject (1) failed to correct four of the eight errors he made in the essay. Subject (2) failed to correct eight of his twenty-seven errors in the essay. Subject (3) also failed to correct three of his nine errors in the essay. Subject (4) failed to correct seven of his eighteen errors previously made in the essay. Subject (5) made eight errors in the unfocused correction task; seven of them were previously made in the essay and never corrected. Subject (6) also failed to correct eleven of the seventeen errors he made in the essay. Likewise, Subject (8) made six errors in the unfocused correction task; all were made in the essay but never corrected. Subject (9), also, made nine morphosyntactic errors in the unfocused correction task; four of them were previously made in the essay and remained incorrect in this task too. Subject (11) made eight errors; all were previously made in the essay but never corrected. Subject (14) made five errors in the unfocused correction task; all were previously made in the essay but never corrected. Finally, Subject (15) made ten errors in the unfocused correction task; eight of them were previously made in the essay but never corrected. Secondly, even when the error is identified (as in the focused correction task), students often fail to correct it. Subject (6) made twelve errors in the unfocused correction task, eleven of which were previously made in the essay and never corrected, and only one of which was new. Although his attention was drawn to his errors, he was unable to correct them successfully. All he did was either leave the incorrect structures as they were or use new structures which were also incorrect. He made twelve morphosyntactic errors in the same structures he had

used incorrectly in the unfocused correction task. This clearly suggests that he lacks the necessary knowledge of grammar and, consequently, drawing his attention to his errors did not improve his performance. Likewise, Subject (1) was unable to see or correct the errors although they were underlined for her. That is, although her attention was drawn towards a specific grammar error, she could not correct it: instead, she tended to express the meaning of the sentence in a different form which sometimes happened to be correct. Moreover, because she appeared to be lacking accurate grammar knowledge, the new versions of her erroneous sentences contain yet more grammar errors. Likewise, Subject (11)'s performance demonstrates that even when the mistake is clearly identified, she still often fails to correct it. She made eight errors in the unfocused correction task and the same number of errors in the focused correction task. She made these errors because she did not know what was wrong. Although her attention was drawn to specific errors, she made the same number of errors in both correction tasks. Third, many new errors are introduced, even when the subjects are paying attention. Subject (1) for example, made three new errors in the unfocused correction task, and two new errors in the focused correction task. Subject (2) made five new errors in the unfocused correction task, and three new errors in the focused correction task. Subject (7) made six errors in the unfocused correction task; five of them were new. Five of the nine errors made by Subject (9) were new, and four of the five errors made by Subject (10) were also new in the unfocused correction task. Subject (13) made six errors in the unfocused correction task, four of which were new.

Finally, even when the subjects' errors are eliminated, it is often because students tend to write new sentences instead of correcting them. For example, Subject (1) tended to focus more on the semantic aspect of her sentences than on their grammatical accuracy. In other words, she did not use grammar knowledge to correct her erroneous sentences. Instead, she tended to use what one could call "stylistic variations" of those sentences, which happened to be correct. Likewise, Subject (2) managed to reduce the number of his errors from twenty-seven errors in the essay to thirteen in the unfocused correction task because his new sentences were correct. Subject (11) also managed to reduce the number of his errors from fifteen errors in the essay to eight in the unfocused correction task. She managed to correct some of her errors in the essay by coming up with new sentences that happened to be correct. An examination of Subject (12)'s performance also shows that the decrease in the number of errors in the unfocused and the focused correction tasks is due to the fact that she tended to change the whole sentence in such a way that avoided the structures she previously used in the essay. She made eleven errors in the essay, four in the unfocused correction task, and three in the focused correction task. Subject (8) clearly stated that she was relying on making new sentences rather than correcting the already written erroneous sentences:

S. 291 See...the sentence is not good...the meaning...I have to change it, all of it...it is not clear...so I changed the words. I didn't make attention for grammar...! want this sentence to mean anything.

In addition to the above analysis, another interpretation can be provided, which is based on cognitive psychology's perspective. That is, in addition to the deficiency in grammar knowledge as a reason for students' inaccurate composition writing, there is another

possible reason that makes these students commit many morphosyntactic errors in writing such as the many constraints that writing in a foreign language imposes on foreign language learners and deficiency in students' abilities to transfer their knowledge of grammar to complex tasks such as writing. It can be argued that composing in English as a second language is a multidimensional activity which requires L₂ learners to do more than one thing simultaneously. This argument is compatible with the principles of the attention theory. Two important features within the phenomenon of attention have been identified: 1) an individual can attend to only one thing at a time or think only one thought at a time; 2) attention appears to be serial, and we find it very difficult to mix certain activities, that is, the focus of attention is only on one place at one time. Our ability to attend to several sources of information simultaneously is severely restricted. Consequently, a human who must process information that exceeds his channel capacity will inevitably make errors (see Chan, 2010; Brown, 2009; Ellis et al., 2008).

Moreover, L₂ learners may appear to have the necessary knowledge to make correct responses; however, they are unable to transfer this knowledge while writing; listening to spoken English; reading written texts, and solving certain types of grammatical problems (El-Dali, 1999). In this regard, Gelman & Meck (1986): 30) rightly points out that knowledge of the correct principles does not guarantee correct performance. Principles specify characteristics that a correct performance must possess, but they do not provide recipes for generating a plan for correct performance. Nor do they guarantee correct execution of plan (see Hartshorn et al, 2010).

Analyzing the subjects' performance in the three tasks shows that their linguistic and cognitive abilities are not a unitary construct. That is, their performance varies from one language task to another. It all depends on three factors: (1) the nature of the language task; (2) the type of knowledge required by the task itself, and (3) the accessibility of such knowledge. These three factors will be, next, discussed.

The nature of the language tasks/ grammatical problems

A convenient means for dichotomizing language tasks is to consider their relative emphasis on code - related features of the language or communicative use of the language. This distinction has been expressed by the terms "Formal" and "Functional" language respectively (Bialystok, 1981). In this regard, Alien (1980) has included a third component which is intermediary to these. Thus, according to his interpretation, when a fluent speaker uses language he draws upon three aspects of language: a structural aspect, which is concerned with the formal features of language including pronunciation, grammatical rules and vocabulary; a rhetorical aspect, which is concerned with the development of generalized rules of spoken and written discourse; and an instrumental aspect, which involves the ability of the speaker to interpret or express the conceptual meaning which is appropriate to a given context. In this regard, Bialystok (1981: 33) rightly points out that

The application of this tricomponential model to the description of language tasks concerns the extent to which the purpose of the task is to focus the learner's attention on the formal, the rhetorical, or the instrumental aspects of language A grammar task, for

example, relies primarily on knowledge of the formal features of language, while a communication task can incorporate formal, rhetorical and instrumental aspects in various degrees.

With the above - discussion in mind, one can argue that the first task (Essay writing) is an example of communicative task, in which the subjects draw upon the structural, rhetorical and instrumental aspects, previously discussed. On the other hand, the second task (Error Recognition) relies primarily on knowledge of the formal features of language. As previously stated, the subjects of the study (both males and females) perform at a remarkably high level in the first task. This is why we can argue that these subjects are quite aware of the structural, rhetorical and instrumental aspects of English as a foreign language. Unfortunately, this argument turns out not to be necessarily true. Their performance in detecting the error; correcting it, and providing accurate rationalizations for their detection and correction of the error, was not at the same high level of excellency to put it simply, some grammatical problems were very easy for the subjects to solve correctly, and some other problems were extremely difficult to handle. In other words, some problems were easy because they require simple and straightforward application of certain rules. As Skemp (1978) points out, such problems require what he calls "instrumental understanding". Other grammatical problems require what he calls "relational understanding", because of its complexity; and therefore, students had to think strategically to solve the problem.

In addition to the nature of the grammatical problem (being simple or complex; requires instrumental or relational understanding) as a factor in shaping foreign language learners' metalinguistic ability, the type of the knowledge required by the task is another factor.

The type of knowledge required by the task;

In thinking about foreign language learners' performance as an object of study, the essence of the underlying knowledge that accounts for their performance must be examined. This examination of the learners underlying knowledge will in turn uncover the basis for the strategies they use in solving language problems. In this regard, Gass (1983) suggests that for foreign language learners the ability to think and talk about language might involve abstract analyses of a number of different types. It might include, for example, analyses of their own language, a comparison between their native language and the target language, a comparison between their native language and other languages previously learned, or even a comparison between the target language and other languages previously learned. And, as Johnson (1988) maintains, when learning a language is viewed as learning skills, the process appears to be usefully broken into two or three phases. The first is the development of declarative knowledge: however, "declarative linguistic knowledge cannot be employed immediately but only through procedures activating relevant parts of declarative knowledge in speech reception and production" (Farch and Kasper, 1986:51). In the second or associative phase, the skill is performed. In the third phase, the skill is continually practiced, and becomes automatic and faster.

With the above background in mind, one can argue that deficiency in the subjects' declarative knowledge may result in (1) failure to detect the erroneous item that must be corrected for the sentence to be correct; (2) failure to decide whether the sentence is correct or incorrect; and, in most cases, the sentence seems grammatically correct although it violates a certain "invisible" grammatical rule. In addition, because there was no link between declarative and procedural knowledge, many subjects failed to correct the item they identified as erroneous, or provide accurate rationalizations for their performance. Therefore, examining the relationships between declarative and procedural knowledge is a worthwhile pursuit since students often fail to recognize or construct these relationships, and, sometimes are able to reach correct answers for problems they do not really understand. In his discussion of this issue, Carpenter (1986) points out that three different models have been proposed to describe the relationship between conceptual and procedural knowledge. The first model hypothesizes that advances in procedural knowledge are driven by broad advances in conceptual knowledge. The second proposes that advances in conceptual knowledge are neither necessary nor sufficient to account for all advances in procedural knowledge. The third model concurs with the first that advances in procedural skills are linked to conceptual knowledge but proposes that the connections are more limited than those suggested by the first model.

It seems that the best way for effective classroom instruction and for improving our students' performance is to link conceptual with procedural. Hiebert and Lefevre (1986) maintain that linking conceptual and procedural knowledge has many advantages for acquiring and using procedural knowledge. These advantages are: (A) Enhancing problem representations and simplifying procedural demands. (B) Monitoring procedure selection and execution. (C) Promoting transfer and reducing the number of procedures required.

Moreover, linking conceptual knowledge and procedural knowledge has some benefits for conceptual knowledge. According to Anderson (1983), problems for which no routine procedures are available are solved initially by applying facts and concepts in an effortful and laborious way. As similar problems are solved repeatedly, conceptual knowledge is gradually transformed into set routines (condition-action pairs) (for solving the problem. The condition- action pairs constitute the basic elements of the procedural system. Thus knowledge that is initially conceptual can be converted to knowledge that is procedural. In addition, procedures can facilitate the application of conceptual knowledge because highly routinized procedures can reduce the mental effort required in solving a problem and thereby make possible the solution of complex tasks). Case (1985) explains this phenomenon by pointing out that efficient procedures require less of one's limited cognitive processing capacity.

Access to knowledge

The results of this study show that the existence of knowledge for a learner is not sufficient to distinguish skilled or fluent performance from less skilled. Through practice and experience the learner must gain easy access to that knowledge. Cognitive psychologists describe this difference in access as "automatic" or "not automatic" or

"controlled". In other words, foreign language learners may appear to have the necessary knowledge to make correct responses; however, they are unable to display this knowledge in multi-dimensional tasks such as writing. In such a task, learners are required to do more than one thing simultaneously. This argument is compatible with the principles of the attention theory (James, 1890). Two important features within the phenomenon of attention have been identified: 1) an individual can attend to only one thing at a time or think only one thought at a time; (2) attention appears to be serial, and we find it very difficult to mix certain activities. That is, the focus of attention is only on one place at one time. In this regard, James (1890) suggests that "[attention] is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought, focalization, concentrations, of consciousness are of its essence. It implies withdrawal from some things in order to deal efficiently with others" (p. 403 - 404). Relatedly, Broadbent (1971) pointed out that our ability to attend to several sources of information simultaneously is severely restricted. Consequently, a human who must process information that exceeds his channel capacity will inevitably make error. This implies that our students' failure to perform on language tasks may be due, sometimes, to cognitive deficiency; rather than linguistic one. And, in broad terms, language acquisition may not be fully understood without addressing the interaction between language and cognition. Therefore, further research is needed in this area, at least, to know how our students think and how to teach them to think strategically.

CONCLUDING REMARKS

Having reviewed the literature on the issues involved, and presented the results of the experiment, I can make the following remarks:

1. Although linguistics provides a useful perspective on L₁ learning and has led to stimulating ideas and research, it must be remembered that linguistics is only one of the disciplines that second language acquisition (SLA) research can draw on.
2. Relatedly, although it is perfectly proper for SLA research to postulate theories of its own to explain its own area, and to offer its discoveries to other disciplines to help them solve their problems, it is, also, appropriate for SLA research to take insights and methods from other disciplines when they are useful to it. The rationale, here, is that truth can never be known directly and in its totality; and multiple ways of seeing result in multiple truths.
3. Linguistic theories have often assumed that 1) language is represented and acquired by the human mind in ways that are different from any other knowledge. (2) language is learned separately from cognitive skills and operates according to principles that differ from most learned behaviors.
4. The claim made in the present study is that language can be accommodated in a broader framework of how people store and acquire knowledge in general rather than being seen as something unique and peculiar of its own. Accordingly, the present study spells out some alternatives to the linguistics-based approach to L₂ research, represented in the cognitive framework.

5. The claim behind this cognitive framework is that L₂ acquisition cannot be understood without addressing the interaction between language and cognition. In this sense, L₂ acquisition is best understood as a complex.
6. The cognitive framework sees L₂ acquisition as a mental process, leading through structured practice of various component subskills to automatization and integration of linguistic patterns. That is, rather than positing a hierarchical development of linguistic structures, as suggested by Interlanguage Theory, the cognitive framework posits a hierarchy of complexity of cognitive subskills which lead from controlled practice to automatic processing of language. And as the learner develops increasing degrees of mastery, he or she engages in a constant process of restructuring to integrate new structures with those previously learned.
7. According to the cognitive framework adopted in the present study, the changes that occur in L₂ learners' performance, when learning multidimensional activities, which require the individual to do more than one thing simultaneously, require time and effort. Accordingly, attention must be devoted to each component of the movement, and beginning attempts at the skill are often slow and error prone. Eventually, with practice, performance improves to the point where multidimensional tasks can be carried out quite rapidly and accurately.
8. In the experimental study conducted by the author, and reported in the present study, L₂ learners' performance in essay writing was examined from both linguistic and cognitive psychology perspectives. From a linguistic point of view, the results of this study demonstrate that deficiency in students' knowledge of grammar results in inaccurate composition writing and unsuccessful correction of errors. From a cognitive psychology perspective, there is another possible reason that makes the subjects of this study commit many morphosyntactic errors in writing such as the many constraints that writing in a foreign language imposes on foreign language learners, and the deficiency in students' abilities to transfer their knowledge of grammar to complex tasks such as writing. As Collins and Gentner (1980: 67) argue "much of the difficulty of writing stems from the large number of constraints that must be satisfied at the same time. In expressing an idea the writer must consider at least four structural levels: overall text structure, paragraph structure, sentence structure (syntax, and word structure... clearly the attempt to coordinate all these requirements is a staggering job".
9. Based on the above interpretation, it was argued that composing in English as a second language is a multidimensional activity which requires L₂ learners to do more than one thing simultaneously. This argument is compatible with the principles of the attention theory. In addition, it was argued that L₂ learners may appear to have the necessary knowledge to make correct responses; however, they are unable to transfer this knowledge while working on complex tasks. This argument is compatible with Gelman and Meck's view (1986: 30).

To sum up, this study shows that the students' unsuccessful performance in the essays was due to their fragmentary knowledge of grammar. No matter how attentive L2 learners are in performing language tasks, their performance in error correction tasks will be unsuccessful as long as their knowledge of grammar is fragmentary. It would be useful to replicate this study with advanced graduate students. What is needed is more systematic study of the relationship between conscious knowledge of grammar and the written production of advanced graduate students. Special attention should be devoted to the various aspects that constrain foreign students' written production. In addition to the deficiency in grammar, knowledge as a reason for student's inaccurate composition writing, there are other possible reasons that make foreign students commit many morphosyntactic errors in writing such as the many constraints that writing in a foreign language imposes on foreign language learners, deficiency in students' abilities to transfer their knowledge of grammar to complex tasks such as writing, and students' belief that grammar rules are not important. A better understanding of these factors and of how they interact with the students' (incomplete) knowledge may help teachers to assign more effective writing tasks and to give more appropriate feedback.

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APPENDIX 1

Name:

Country:

Sex: Male: _____

Female: _____

To: Students in the Advanced Level.

Please answer the following questions by placing an X on the line where indicated.

1. How old are you?

___ (A) Under 20

___ (B) Between 20 and 25

___ (C) Over 25

2. How long did you study English in your country?

___ (A) 6 Years

___ (B) 7 Years

___ (C) 8 Years

___ (D) More than 8 years

3. What did your previous English classes give most attention to (Please number in order of importance, #1 being most important etc.)

___ Listening

___ Reading

___ Writing

___ Grammar

___ Vocabulary

___ Speaking/Pronunciation

4. Had you ever been in an English speaking environment before coming to the United States?

___ (A) Yes

___ (B) No

5. If yes, for how long?

___ (A) Less than 6 months

___ (B) Between 6 months and 1 Year

___ (C) Between 1 and 2 Years

___ (D) More than 2 Years

6. How long have you been in the United States?

___ (A) Less than 1 Year

___ (B) 1-2 Years

___ (C) More than 2 Years

7. In your view, what areas of grammar trouble you most?

APPENDIX 2

FREE COMPOSITION

Please, write an essay of about 200 words on: "The Value of Learning English"

INSTRUCTIONS

- Please write in ink
- Pay attention to the grammar and meaning of your sentences
- You have forty minutes to write the essay
- Your name is: _____

Now, begin.

APPENDIX 3

Correction Task (1)

INSTRUCTIONS

The sentences used in this task are taken from your essays on "The Value of Learning English." Each sentence contains grammatical errors. Read each sentence carefully and correct what you think is wrong.

APPENDIX 4

Correction Task (2)

INSTRUCTIONS

The sentences used in this task are taken from your essays on "The Value of Learning English." Each sentence contains grammatical errors. These errors are underlined. Read each sentence carefully and correct what is underlined. You have 15 minutes to complete this task.