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PSYCHOLOGICAL CONSTRAINTS ON THE UTILITY OF METALINGUISTIC KNOWLEDGE IN SECOND LANGUAGE PRODUCTION

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This paper reports on a study designed to investigate psychological factors that affect access to metalinguistic knowledge in second language (L2) production. Based on previous cognitive and psycholinguistic research, it was hypothesized that real-time access to metalinguistic knowledge would be largely determined by three interacting factors: attention to form, processing automaticity, and linguistic prototypicality (i.e., whether a rule concerns a central or peripheral use of a target structure). The subjects were 64 adult Chinese learners of English. A verbalization task was used to assess their metalinguistic knowledge about 12 target uses, and a judgment test was administered to determine the relative prototypicality of these uses. Attention to form was operationalized by two consciousness-raising tasks and by time pressure. Analyses of the subjects' output on writing and error-correction tasks revealed significantly greater grammatical accuracy for more prototypical uses and on tasks that allowed more attention to form. There was also a significant interaction between prototypicality and attention to form, suggesting the influence of processing automaticity. These results are taken as evidence that there are major psychological constraints on the utility of metalinguistic knowledge in L2 performance.

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Over the past two decades, the literature on second language acquisition (SLA) has witnessed much theoretical controversy about the relationship between metalinguistic knowledge (i.e., explicit and verbalizable knowledge about L2 grammar) and L2 acquisition and performance. Some SLA theorists see little use for explicitly learned knowledge in performance, claiming that neither competence nor performance in an L2 can be affected in any nontrivial way by grammar teaching and the so-called pseudo grip of metalinguistic knowledge (Krashen, 1982; Paradis, 1994; Schwartz, 1986). Others posit that knowledge of an L2 develops from implicit to explicit states and that different types of knowledge are involved to different extents in different domains of language use (Bialystok & Ryan, 1985; Birdsong, 1989). Still others argue that L2 learning can begin with explicit rules (i.e., declarative knowledge) and that such knowledge can become increasingly available for rapid use in spontaneous performance through continual proceduralization and automatization (DeKeyser, 1997; Hulstijn, 1990; Johnson, 1996). Finally, there are also SLA theorists who contend that metalinguistic knowledge is not directly involved in communicative output but can facilitate the development of implicit knowledge (Ellis, 1994; Sharwood Smith, 1991).

In contrast to this theoretical pluralism, empirical research on the role of metalinguistic knowledge in L2 production is rather limited (see Sharwood Smith, 1994).[1] Moreover, as the literature review in the following section shows, empirical inconsistency is manifest in the small body of extant research. There is an apparent need for more empirical work that systematically investigates the effects of metalinguistic knowledge on L2 performance and factors that facilitate or inhibit L2 learners' access to their metalinguistic knowledge in real-time production (DeKeyser, 1997; Schmidt, 1994). Firm empirical evidence from this line of research can have important theoretical and pedagogical implications. The present study aims to contribute such evidence by investigating (a) whether instructed learners' metalinguistic knowledge about an L2 is involved in their performance in the language, and (b) what major psychological constraints there are on real-time access to such knowledge in L2 performance.

REVIEW

Metalinguistic Knowledge and L2 Performance

Seliger (1979) was an early study that explicitly tested intuitive claims about the functions of metalinguistic knowledge in performance. The researcher elicited, through a naming task, uses of the allomorphs of the indefinite article (*a*[*n*]) from monolingual and bilingual children as well as adult learners of English and then asked them to give the rule underlying their choice of the two forms. No relationship was found between the correct or anomalous rules verbalized by the subjects and their accuracy in using the allomorphs. Based on this result, Seliger speculated that explicit rules could not be involved in ac-

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tual output but might function as "acquisition facilitators" (p. 369). Similar results were obtained in another study (Grigg, 1986) that examined the effects of task, time pressure, and rule knowledge on English L2 learners' use of several morphological structures. Grigg compared the learners' production to their ability to state the rules for the structures but failed to find any significant effect of rule knowledge on use. In a more recent study, Renou (2000) asked advanced French L2 learners to correct grammatical errors and provide the rules that the corrections entailed. Little difference was found in L2 proficiency between those who could only correct the errors and those who could both correct the errors and provide the rules.

Bialystok (1979) examined adult French L2 learners' performance on a grammaticality judgment task under two time conditions (spontaneous vs. delay). Multilevel analyses revealed that time was not a significant factor when responses involved only judging the grammaticality of the test sentences. However, there was a significant interaction between time and response in favor of the delay situation when responses were scored for correctly identifying the error in a test sentence and selecting from a list of grammatical rules the exact rule violated by the identified error. Based on the assumption that performance drawing on implicit knowledge would remain stable under different time conditions, Bialystok contended that implicit knowledge was used to decide grammaticality, though more detailed analysis of errors involved explicit knowledge.

Several studies have come up with results different from, or even contrary to, those just discussed. Hulstijn and Hulstijn (1984) assessed adult L2 learners' explicit knowledge of two Dutch word-order rules and examined their output under four conditions set up by manipulating two variables: attention to information or grammar and presence or absence of time pressure. They found that learners with explicit knowledge used the target structures significantly more accurately across the four conditions than did those learners without such knowledge. However, "the learners lacking explicit knowledge did not profit less than the learners with explicit knowledge from the absence of time pressure and from a focus on grammar" (p. 39). Green and Hecht (1992) had 300 German learners of English correct 12 errors commonly committed by German learners and state the rules that they believed had been violated. The researchers found that the learners as a group nearly always produced the proper correction when they had a correct rule available, though 43% of the total proper corrections were made when incorrect rules or no rules were given. In a small-scale study involving beginning and intermediate learners, Sorace (1985) also investigated the relationship between metalinguistic knowledge and use of specific structures on different tasks and found a "highly significant correlation between knowledge and use in non-beginners" (p. 250). In a more recent study, Hu (1999) assessed the metalinguistic knowledge that L2 learners had about six target structures and examined the accuracy with which they used these structures on spontaneous and metalinguistic production tasks. The results indicated that the learners were consistently more accurate when they had explicit

knowledge of the target uses than when they had only some implicit knowledge. Furthermore, their accuracy rates in the presence of explicit knowledge varied significantly from task to task, and there was an interaction between types of knowledge and task demands.

Although the above studies attested to more accurate production in the presence of explicit knowledge, the results were interpreted differently. Whereas Green and Hecht (1992, p. 178) interpreted their results as suggesting that the learners operated "largely by implicit rules, which very possibly had been facilitated by explicit rules," Hulstijn and Hulstijn (1984) saw their findings as evidence for the independence of executive control and metalinguistic awareness and concluded that grammatical errors were "a function of processing constraints and explicit knowledge" (p. 39). Both Hu (1999) and Sorace (1985), on the other hand, interpreted their respective data as suggesting that metalinguistic knowledge could be applied in L2 production and that its function was more than limited monitoring. A notion frequently invoked in discussing and explaining the inconsistent results of research on metalinguistic knowledge is that different tasks may tap different types of knowledge (Bialystok, 1982; Krashen, 1982). Its intuitive plausibility notwithstanding, this notion, as will become clear in the following section, cannot fully resolve certain empirical inconsistencies.

Mixed Task Effects

In recent years, much theoretical and empirical work has been done on task-induced L2 variation (Skehan, 1998; Tarone, 1988). There is some evidence that variation in formal accuracy is correlated with a broad distinction between communicative and form-focused tasks (Krashen, 1982; Tarone, 1988). This phenomenon is frequently explained with reference to the deployment of different types of knowledge on different tasks (Bialystok, 1979). A widely held view is that form-focused tasks reflect explicit, analyzed knowledge, whereas more spontaneous, communicative tasks involve only implicit knowledge (Krashen; Paradis, 1994). The involvement of explicit versus implicit knowledge on different tasks then brings about different levels of accuracy because the two types of knowledge comply with the target grammar to different degrees.[2] Although this seems to be a plausible explanation for L2 learners' better performance on metalinguistic tasks in some studies (e.g., Gass, 1983, and research cited by Krashen), it cannot account for the results of other studies (e.g., Muranoi, 2000; Tarone, 1985) that witnessed more accurate production on communicative tasks than on metalinguistic tasks. Nor could it square with the results of studies (e.g., Hu, 1999; Hulstijn & Hulstijn, 1984; Sorace, 1985) that attested to more accurate production on meaning-focused tasks when metalinguistic knowledge was available than when such knowledge was absent.

An alternative approach to accounting for variable L2 accuracy on different tasks is based on the notion of attentional focus. A number of researchers

(Crookes, 1989; Mehnert, 1998; Ortega, 1999; Skehan, 1998) posit that three performance goals in L2 production—communicative fluency, grammatical accuracy, and linguistic complexity—enter into competition with one another for attentional resources. Given the limited capacity of L2 learners' attentional resources, this means that they must allocate their processing resources strategically to achieve their priority goal in production. When L2 learners perceive accuracy as their priority goal on a task, they will focus their attention on form, which then can facilitate access to their rule-based knowledge system, including metalinguistic knowledge, and give rise to greater grammatical accuracy. However, accuracy will decrease on tasks in which attentional resources are channeled to achieve priority goals other than accuracy. These predictions are largely supported by several studies that have investigated the effects of pretask planning and task structure on L2 performance (Crookes; Ellis, 1987; Foster & Skehan, 1996; Mehnert; Ortega; Skehan & Foster, 1997, 1999).

Attention to form, however, fails to account for variable accuracy evidenced in other studies. Adopting an assumption similar to the one outlined above, Tarone (1985) hypothesized that "there is a direct relationship between attention to form required by a task and grammatical accuracy on that task" (p. 375). This hypothesis was not borne out in her study of English L2 learners' use of several structures on tasks that were perceived to vary along a dimension of attention to form. Of the target structures examined, some followed the expected pattern, others showed the opposite pattern, and still others did not change across the tasks. Analogous results came up in a study by Stokes (1985), who found that the target structures under investigation were differentially amenable to induced attention to form on a written task, with some positively influenced, some largely unaffected, and some negatively affected. These empirical results, together with inconsistent findings concerning other task conditions such as time pressure (cf. de Graaff, 1997; Hu, 1999; Hulstijn & Hulstijn, 1984), suggest that attention is not the sole cause of variable accuracy in L2 production.

The foregoing discussion clearly shows that neither the explanation focusing on the involvement of explicit versus implicit knowledge nor the one focusing on different degrees of attention to form alone can adequately account for the observed mixed task effects. This suggests that there are other factors at work in the process of L2 production. One possibility is that metalinguistic knowledge can be involved in communicative use as well as in form-focused output. The extent to which such knowledge is involved, however, depends on its real-time accessibility. The accessibility of metalinguistic knowledge is, in turn, predicated on the interaction between the level of automaticity reached in processing it and the attentional allocation typically required by a production task. Thus, variation, or lack of it, is likely to be a consequence of the complex interplay among knowledge sources, on-line attentional configurations, and levels of executive control over different knowledge sources (Bialystok & Ryan, 1985). This conjecture is compatible with findings from re-

search that investigates the effects of different processing modes on L2 performance.

Processing Automaticity

Cognitive psychology in the last three decades has seen much theoretical discussion and empirical research on modes of information processing and their relation to skill acquisition (see Schmidt, 1992, for a useful review). Various theories and research paradigms in cognitive psychology have attracted a great deal of attention from SLA researchers and have motivated empirical investigations into the development and effects of automatic L2 processes. Given the constraint of space, only a few studies of more direct relevance can be reviewed here (see McLaughlin, 1987, for a review of early studies).

Segalowitz and Segalowitz (1993) investigated qualitative processing differences between fast- and slow-responding L2 learners on a speeded lexical-decision task with L2 words and nonce words. To detect such differences, they examined coefficients of variability (CVs) derived by dividing the standard deviations of response time by the mean response time. They convincingly demonstrated that, although reduced response time and standard deviations might result from only quantitative changes (speedup effects on controlled processes), reductions in CVs were more sensitive to qualitative changes (i.e., gains in automaticity). Analyses showed that faster subjects had much smaller CVs for reaction time than slower subjects and that gains in response speed were associated with larger decreases in CVs. Moreover, all subjects improved their word-recognition performance as a function of practice. These results were interpreted as reflecting qualitative processing differences between and within subjects that could be attributed to differential reliance on controlled and automatic processes.

Towell, Hawkins, and Bazergui (1996) investigated the development of fluency in L2 production over time. The researchers asked advanced French L2 learners to perform the same task (retelling the story of a short film) before and after they spent 6 months in a French-speaking country. Analyses showed that narratives at time 2 were significantly more fluent than narratives at time 1 in terms of speaking rate, articulation rate, mean length of run, and phonation-to-time ratio. The CVs for all these temporal measures were also consistently smaller at time 2 than at time 1, which suggests qualitative processing differences between times 1 and 2. In line with Anderson's (1983) Adaptive Control of Thought (ACT) theory, Towell et al. argued that the qualitative changes between times 1 and 2 were brought about by the proceduralization of declarative knowledge into more accessible productions. This argument was largely supported by a qualitative analysis of a sample of the narratives.

Robinson (1997) explicitly tested predictions generated by Logan's (1988) instance theory of automaticity in the context of L2 learning. L2 learners were exposed to grammatical examples of a morphosyntactic rule for the dative alternation under implicit, incidental, enhanced, and instructed conditions.

Analyses of performance on a grammaticality judgment test revealed that reaction time to old grammatical sentences (i.e., those used in the training session) showed no effect for condition but was significantly faster for learners in all conditions than reaction time to new grammatical and ungrammatical sentences. The same patterns were obtained for accuracy of judgments. These results were consistent with two hypotheses: (a) that decision making concerning previously encountered instances would be memory based, and (b) that direct retrieval of instances from memory would yield automatic performance.[3] The results, however, did not constitute evidence for the claim that rule-based knowledge could not be involved in automatic performance. To produce evidence for the claim, one needs to show that applying a rule to new contexts could not become more automatic with practice.

The issue of automatization of explicit knowledge was taken up squarely in a study by DeKeyser (1997). The study investigated, among other things, whether explicitly learned rules of morphosyntax in an L2 could be automatized through extensive systematic practice. A major finding of the study was that access to explicit rules in comprehension and production did become more automatic through practice, in that there was a clear and gradual drop-off in reaction time and error rate. The shape of this drop-off showed a very good fit to the power function learning curve predicted by cognitive theories of skill acquisition, such as the latest version of the ACT theory (Anderson, 1993), which assign an important role to rule-based knowledge in automatic performance. This finding is convincing evidence that automaticity of explicit rule knowledge of an L2 develops in the same way as rule-based knowledge underlying other cognitive skills, such as the learning of algebra, geometry, and computer programming.

In summary, research on automaticity, especially DeKeyser's (1997) study and Anderson's (1983) rule-based theory of automaticity, strongly suggests that processing automaticity is an important variable to consider in examining the role of metalinguistic knowledge in L2 performance. This issue will be discussed in greater detail in the next section, where the framework for this study is presented. For the moment, though, it is useful to look at cognitive and psycholinguistic research on human categorization, from which important implications can be derived for research on metalinguistic knowledge.

Prototype Theory

Rosch (1975b, 1977, 1978) and Rosch and Mervis (1975) developed a theory of human categorization—prototype theory—to account for how categories are cognitively represented and processed. The theory pits itself against the tenets of the classical theory of categories (i.e., that a category is defined by a necessary and sufficient set of features and that all members of a category have full or equal status as category members). Instead, prototype theory posits that there are "asymmetries among category members and asymmetric structures within categories" (Lakoff, 1987, p. 40). That is, a category is a pro-

totype structure, with some members being more prototypical (better examples) of the category than others. Rosch (1978) proposes that prototypes develop through two psychological principles of categorization: maximization of cue validity (distinctiveness from contrasting categories) and maximization of category resemblance (representativeness within a category). In other words, members of a category that share the most features with other members of the same category but the least features with members of contrasting categories emerge as prototypes. As a result, prototypical members can serve as reference points within categories and are cognitively more salient and important than peripheral ones (Rosch, 1977).

In a series of experiments, Rosch (1973, 1975b) and Rosch and Mervis (1975) demonstrated that subjects reliably rated the extent to which members of a category represented their idea or image of the category, even for categories about whose boundaries they disagreed. Moreover, prototypicality ratings thus obtained were highly correlated with family resemblance measures based on a member's similarity to other category members and its dissimilarity to members of contrasting categories. These results were replicated across both natural and artificial categories. Importantly, prototypicality effects (i.e., prototypicality-related asymmetries in performance) have been found on a large variety of category learning, expansion, recognition, and verification tasks (Rosch, 1973; Rosch, Simpson, & Miller, 1976). Such effects have been detected on almost all of the major dependent variables used to measure psychological processes: ease and speed of processing and learning, order of development in children, order and probability of item output, effects of advance information on performance, and the logic of natural language use of category terms (see Rosch, 1978, for a comprehensive review).

Prototype theory has been applied in theoretical discussions of cognitive patterns underlying linguistic categorization (Lakoff, 1987; Langacker, 1987; Taylor, 1995, 1998). Its tenets have also been used to construct plausible accounts of data on L1 acquisition of various grammatical constructions (e.g., Bates & MacWhinney, 1982; Bybee & Slobin, 1982; de Villiers, 1980; Shirai & Andersen, 1995). Although only a few studies have tried to explore applications of prototype theory to L2 learning and performance, they have produced results suggesting that linguistic prototypicality exerts an influence on L2 learners' acquisition and use of grammatical structures. Gass (1987) provided evidence that L2 learners had a prototype-based schema guiding their interpretation of the logical subject of various sentences. Bardovi-Harlig (2000) and Andersen and Shirai (1994) showed that the prototypicality of lexical aspect inherent in verbs could account for the patterns of distribution of tense-aspect morphology in L2 production. Similarly, Yamaoka (1988) found that L2 learners' acquisition of the *be easy to* + V structure progressed on a cline from its prototypical types to peripheral ones.

Of more relevance to the present concern is a study by DeKeyser (1995) that examined the learning and use of morphological rules by two groups of learners trained, respectively, in explicit-deductive and implicit-inductive

learning conditions. Some of the morphological rules were prototypical in the sense that noun and verb stems had a 100%, 80%, 60%, or 0% likelihood of receiving a particular allomorph, depending on how far they were removed from the prototype stem. Both groups displayed prototypicality patterns in their marking of new words on a production task. That is, for different stems the relative frequency of the allomorph expected for the prototype stem varied in accordance with how far removed the stems were from that prototype stem. The implicit-inductive learners came closer to the expected variation pattern than the explicit-deductive group did at the 100% and 0% frequency levels. The latter, however, outperformed the former at the 80% and 60% levels.

The studies just reviewed indicate that linguistic constructions, like other categories and schemas of human cognition, are prototype structures. There is also substantial evidence that prototypicality effects occur in language learning and use. The notion of linguistic categories as prototype structures has important implications for research on the role of metalinguistic knowledge in L2 production. Because metalinguistic knowledge is explicit knowledge of linguistic categories and form-meaning relations within categories, it is reasonable to hypothesize that acquisition and use of such knowledge can be influenced by the inner structure of these categories. Additionally, pervasive prototypicality effects, such as ease of learning, order of acquisition, and frequency of item output, may have further impacts on both the content of metalinguistic knowledge acquired and the development of executive control over such knowledge.

FRAMEWORK AND HYPOTHESES

The review of cognitive and psycholinguistic research indicates that several psychological factors may affect access to metalinguistic knowledge in L2 production. This suggests that the utility of metalinguistic knowledge should be examined within a framework that can incorporate these factors and allow for their interactions. In this section, a framework of this nature is proposed. It should be noted that a fundamental assumption of such a framework is that, among other things, a system of linguistic knowledge (i.e., linguistic competence) underlies performance (Bachman, 1990; Canale & Swain, 1980). This linguistic competence consists of both abstract rules and memorized exemplars (Carr & Curran, 1994; Skehan, 1998). The rule-based system itself comprises both implicit and explicit knowledge (Bialystok, 1994; Ellis, 1994). Importantly, no straightforward relationship exists between linguistic competence and performance. There are important processing factors that come between them (Birdsong, 1989; Skehan). The framework proposed here is intended to capture some major cognitive influences and their interactions.

As schematically represented in Figure 1, this framework incorporates three interacting factors that are perceived as affecting real-time access to metalinguistic knowledge. Attentional focus refers to the allocation of atten-

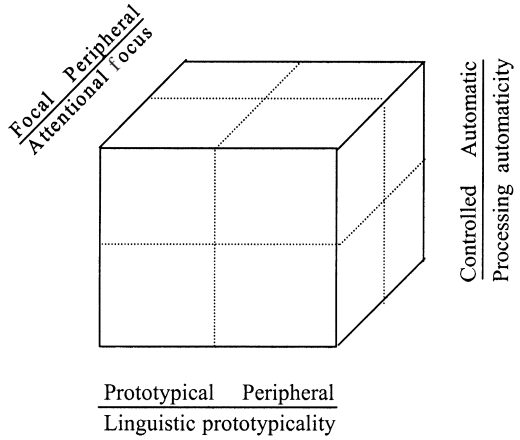

Figure 1. Psychological factors affecting access to metalinguistic knowledge.

tional resources to specific components of production in L2 performance. A given component—say, formal processing—may receive a particular degree of attention (ranging from highly focal to highly peripheral attention) in accordance with task demands. Processing automaticity refers to the relative ease and efficiency with which information is processed. It forms a continuum of information-processing modes that varies from highly controlled to highly automatic processing. Finally, linguistic prototypicality is a psychological dimension that characterizes the central tendency of different uses or contexts of a linguistic structure described by metalinguistic knowledge.[4] It differentiates metalinguistic knowledge in terms of whether it describes a relatively central or peripheral use or context of the structure concerned.

To see how these factors may affect access to metalinguistic knowledge in real time, it is necessary to consider some empirically grounded assumptions underlying each of them. A basic assumption concerning attention is that it is limited in capacity (Baddeley, 1986; Massaro & Cowan, 1993; Posner & Petersen, 1990). Although psychologists disagree about whether there is only a single attentional resource (Shiffrin, 1976) or whether there exist multiple attentional resources (Wickens, 1984), it is generally accepted that an attentional pool has its capacity limitations (Schmidt, 1998). As this limited-capacity system is deployed to reduce and regulate the overwhelming influx of information, attention has to be selective (i.e., strategically allocated) to avoid being overstretched and paralyzed (Kahneman & Treisman, 1984; Tomlin & Villa, 1994). Thus, attentional allocation is subject to cognitive control. Many psychologists also agree that attention is essential for acquiring complex cognitive skills (Carlson & Dulany, 1985; Logan & Etherton, 1994; Shanks & St. John, 1994) and for applying novice skills (Anderson, 1983;

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Schneider, Dumais, & Shiffrin, 1984). These assumptions have been explored by L2 researchers (Carr & Curran, 1994; Johnson, 1996; Schmidt, 1990, 1998; Tomlin & Villa) and are consistent with some convergent findings. Specifically, L2 learners are found to operate under high attentional pressure (Gass, Mackey, Alvarez-Torres, & Fernández-García, 1999; Skehan, 1998; Towell et al., 1996). For less-than-advanced L2 learners, form and meaning are in strong competition for attention, with the latter normally being prioritized in attentional allocation (VanPatten, 1990; VanPatten & Cadierno, 1993; Williams, 1999). Attention is an important constraint on learning and production (Leow, 1997; Ortega, 1999; Skehan & Foster, 1997). Finally, by manipulating task conditions, it is possible to influence L2 learners' priorities in attentional allocation (Skehan).

Closely related to the notion of attention as a limited-capacity system is the robust finding that information can be processed in different degrees of automaticity (Logan, 1988; Newell & Rosenbloom, 1981; Shiffrin & Schneider, 1977). More controlled processing is flexible, slow, variable, heavy on attentional resources, and subject to interference from other capacity-taxing processes (LaBerge, 1981; Schmidt, 1992). By contrast, more automatic processing is specialized, fast, stable, effortless, and little affected by other simultaneous processes (Kahneman & Treisman, 1984; Schneider et al., 1984). Although it is generally agreed that processing automaticity develops with practice as a function of a power law (Logan & Etherton, 1994; Newell & Rosenbloom; VanLehn, 1996), there are disagreements about whether automaticity is a consequence of rule-based knowledge or instance-based knowledge. Anderson's (1983, 1993) influential ACT theory assumes that skill development is a result of declarative rule knowledge being converted to proceduralized knowledge, whereas Logan's and Logan and Etherton's instance theory proposes that automaticity arises from memory-based processing. More recent studies (Anderson & Fincham, 1994; Anderson, Fincham, & Douglass, 1997) have produced evidence that increasing automaticity reflects a mixture of processes based on use of proceduralized rules and retrieval of memorized examples. This reconciles apparently conflicting results of studies that investigated mechanisms underlying automatic L2 performance.

With regard to the ubiquitous phenomenon of prototypicality, a fundamental assumption is that information concerning a category is represented in such a way that some of its instantiations have a more important cognitive status than others (Rosch, 1973; Rosch & Mervis, 1975; Smith & Medin, 1981). Empirical research suggests that several factors may contribute to cognitive prototypicality. Some members of a category come to be considered prototypical because they bear a greater family resemblance to (i.e., have a greater overlap in features with) other members of the same category (Rosch & Mervis). Furthermore, there seems to be a central tendency among members of a category (Rosch, 1978; Rosch et al., 1976)—that is, some members become more prototypical of their category because they are at a minimum distance from members of the same category but at a maximum distance from mem-

bers of a contrasting category. Additionally, there is evidence that the relative frequency of members of a category is also an important determinant of their prototypicality (Barsalou, 1985). Members that are frequently encountered tend to be viewed as more prototypical of their category (de Villiers, 1980; Smith & Medin). Because prototypical members have a stronger connection with their category, they may become organizers of experience and serve as cognitive reference points (Lakoff, 1987; Rosch, 1975a, 1977). A number of other prototypicality effects have also been empirically established: Prototypical members tend to be acquired earlier than peripheral members, learned with greater ease, given more frequently as exemplars of a category, and processed more quickly and accurately. Most of these prototypicality effects have also been found in language learning and use (de Villiers; Lakoff; Taylor, 1998). This constitutes evidence that linguistic structures are prototype categories.

Given the above assumptions and research findings, the framework proposed here motivates three hypotheses about the accessibility of metalinguistic knowledge in L2 production.

Hypothesis 1

The power function for practice effects on skill development suggests that the automatization of underlying knowledge is a gradual, lengthy process involving a great deal of practice (Anderson, 1993; Anderson & Fincham, 1994; DeKeyser, 1997). Given the limited time and opportunity that typical instructed learners have to use their explicit L2 rules, it is reasonable to expect them to process their metalinguistic knowledge in a relatively controlled mode. Because controlled processing requires much attention, more attention to form should facilitate access to their metalinguistic knowledge. The first hypothesis, then, is as follows: When instructed L2 learners have correct metalinguistic knowledge about a target structure, their accuracy for the structure increases in proportion to the degree of attention to form allowed by production tasks.[5]

Hypothesis 2

Based on the aforementioned assumptions and findings about prototype categories, asymmetric processing is expected for prototypical and peripheral uses of a linguistic structure. Metalinguistic knowledge about prototypical uses of a linguistic structure should be better established, cognitively more salient, and more closely connected with the structure than metalinguistic knowledge about its peripheral uses. Other things being equal, the former should be more readily accessible in L2 performance than the latter (Odlin, 1986). Hence, the second hypothesis is that, given correct metalinguistic knowledge about different uses of a target structure, instructed L2 learners are more accurate with prototypical uses than with markedly peripheral ones.

Hypothesis 3

Prototype-based research on language acquisition has found that prototypical uses of a linguistic structure generally are learned earlier than peripheral uses, encountered more frequently, and used to organize knowledge about the structure. In the context of L2 instruction, this would translate into more opportunity to activate the knowledge underlying these uses. Because processing automaticity develops as a function of practice, more practice would give rise to greater automaticity. Thus, there are grounds for assuming that metalinguistic knowledge about prototypical uses are automatized to a greater extent than metalinguistic knowledge about peripheral uses. Because processing of less automatized knowledge depends more on attentional resources, access to metalinguistic knowledge about peripheral uses should be more susceptible to differences in attention to form. Thus, the third hypothesis is that, given correct metalinguistic knowledge about different uses of a target structure, instructed L2 learners' accuracy for peripheral uses is more affected by attention to form than their accuracy for more prototypical uses.

METHOD

Participants

This study involved 64 Chinese learners of English from a 6-month intensive English program at a university in Singapore. The program was conducted to prepare newly arrived freshmen from the People's Republic of China for their undergraduate studies in local universities. The participants (44 males, 20 females) were randomly selected from a cohort of 150 students. Their ages ranged from 18 to 21 years. Based on their scores on the Secondary Level English Proficiency Test (Educational Testing Service, 1991), they were classified as upper intermediate learners. All the participants had received about 1,000 hours of formal instruction in English (about 930 hours at secondary school and 60 hours at university) in China. According to their responses to a background questionnaire, some of the most often used instructional and learning strategies in their previous L2 learning experiences had been explicit teaching and learning of grammar rules, syntactic parsing, contrastive analysis, pattern practice, error correction, translation, memorization of vocabulary items, and recitation of textbook passages. It should be clear from this brief description that the participants had been exposed to much metalinguistic information and had studied English mainly in an acquisition-poor environment.

Elicitation of Metalinguistic Knowledge

Target Structures. Three criteria were used in selecting target structures for investigation. First, the target structures should be those that the participants had been repeatedly exposed to and explicitly instructed on, so that they would be reasonably expected to have developed relevant metalinguistic knowledge.

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Second, each of the target structures should be complex enough to require a number of rules to describe its various uses. Third, the target uses should represent both prototypical and peripheral usage of the target structures.

Based on the above criteria, six English structures—*the*, *a*[*n*], Ø, the simple present, the simple past, and the present perfect—were chosen for investigation. These structures were selected by checking several sources of information. The national syllabus for secondary English instruction (State Education Commission of China, 1990) was checked to ensure that the participants had received instruction in these structures. According to the syllabus, all of the target structures would have been covered in the junior secondary English course. The syllabus also requires that knowledge of the same structures be consolidated throughout the senior secondary English course, with old uses being constantly reviewed and new uses introduced where feasible. A careful examination of some nationwide secondary English textbooks (Chen & Liu, 1990; Dong & Liu, 1984; Grant & Liu, 1992, 1993, 1996; Hu & Liu, 1986) indicated that the syllabus requirements are followed closely in these textbooks.[6] Given the prevalent instructional practices adopted in the secondary-level classroom in China (see Cortazzi & Jin, 1996), it would be safe to assume that the participants had received much explicit instruction on the target structures. As a matter of fact, the textbooks abound with explicit rules for various uses of the six structures. Clearly, the first criterion was met. As regards the criterion of complexity, reference and pedagogical grammars (e.g., Celce-Murcia & Larsen-Freeman, 1999; Quirk, Greenbaum, Leech, & Svartvik, 1985) as well as pedagogical proposals (e.g., DeCarrico, 1986; Master, 1988a, 1988b, 1990) clearly show that each of the target structures has a number of different uses. To implement the last criterion, an inventory was made that listed all the prescriptive rules and uses of the six structures found in the aforementioned textbooks. Based on the expert opinions discussed in a later section, two uses of each target structure were selected to represent the prototypical and the peripheral use. This yielded a total of 12 use-related rules.[7] They appear in Appendix A.[8]

Instrument. In the SLA literature, there is general support for verbal reporting as a test of explicit knowledge (Bialystok & Ryan, 1985; Cromdal, 1999; Ellis, 1991). Thus, metalinguistic knowledge is frequently elicited with tasks that require L2 learners to explain certain grammatical features (e.g., Green & Hecht, 1992; Hulstijn & Hulstijn, 1984; Sorace, 1985). Although cognitive psychologists argue that a verbal-report test may not be a sensitive or exhaustive measure of explicit information, it is generally agreed that what is elicited by such a test is explicit information (see Anderson, 1993; Dulany, Carlson, & Dewey, 1984; Shanks & St. John, 1994). Therefore, an explanation task was used in this study to assess the participants' metalinguistic knowledge about the 12 use-related rules.[9] A written instrument was developed that consisted of sentences exemplifying the target uses (see Appendix A). Examples of these sentences are: *The aeroplane has revolutionized travel* and *Who has broken the window?* The participants were asked to explain the grammar rules underlying

the uses of the underlined structures. They were required to respond only in Chinese so that no failure to verbalize a rule or ambiguity in a verbalization could be attributed to a poor command of the medium language.[10] There was no time limit for the task.

Scoring Procedure. The verbalizations were marked independently by the author and an experienced secondary-school teacher of English from China. In view of Schmidt's (1990, p. 152) insightful comments, a somewhat relaxed view of what constituted a correct rule was adopted so as to avoid an overly restrictive definition of correct metalinguistic knowledge and to allow scope for the participants to express their understanding. A verbalization was accepted as correct if it expressed the essential information. Thus, a correct rule might be given in nontechnical language, couched as a rule of thumb known to Chinese teachers and learners, or cover a somewhat broader or narrower scope than the preset rule statement (cf. Green & Hecht, 1992). For example, a verbalization like "You use *a* when you mention a person or a thing for the first time" was considered just as good as the more precise statement "The indefinite article is used before a singular count noun to indicate that the referent is not identifiable in the shared knowledge of the speaker and the hearer."

The interrater agreement was good (96%), and the disagreements were resolved through discussion. An analysis of the marking results revealed that the participants had correct metalinguistic knowledge about the 12 use-related rules in most cases. There were 667 acceptable verbalizations out of a maximum of 768 (64 × 12), 94 irrelevant or idiosyncratic formulations, and 7 cases in which no verbalization was produced. That is, in about 87% of the cases, the participants had correct metalinguistic knowledge about the target uses. The most and the least successful participants gave 12 and 8 correct rules, respectively, and the group mean was slightly above 10.

Elicitation of Prototypicality Judgments

Preset Classifications. To test the hypotheses it was necessary to select candidates for prototypical and peripheral uses of the target structures. The selection was made with reference to expert opinions, textbook presentations, and data collected in a pilot study.

According to Celce-Murcia and Larsen-Freeman (1999), Quirk et al. (1985), and Whitman (1974), the generic use of articles is far less common than specific reference. Furthermore, *the*, *a*(*n*), and Ø "can often be used without appreciable difference of meaning in generic contexts" (Quirk et al., p. 265). That is, basic distinctions among the three articles tend to become neutralized in generic contexts.[11] Consequently, it would be reasonable to choose generic reference (rules 2, 4, and 6 in Appendix A) as candidates for peripheral article usage.

Quirk et al. (1985) observed that *the* is used mainly to refer to "something which can be identified uniquely in the contextual or general knowledge

shared by speaker or hearer" (p. 265) and that "*a*/*an* is typically used when the referent has not been mentioned before, and is assumed to be unfamiliar to the speaker or hearer" (p. 272). They also pointed out that Ø is more frequently used for indefinite reference (p. 275). Similarly, Master (1990) argued that, whereas *the* is typically used for identification as exemplified by second mention usage, *a*(*n*) and Ø are used chiefly for classification as represented by first-mention usage.[12] Celce-Murcia and Larsen-Freeman (1999) also demonstrated that second-mention usage of the definite article and first-mention usage of the indefinite or zero article represent "'canonical' use of articles in written discourse" (p. 283). Given these observations, anaphoric reference (rule 1 in Appendix A) and indefinite specific reference (rules 3 and 5) would seem to be good candidates for prototypical uses of *the, a*(*n*), and Ø, respectively.

As for the three tense-aspect structures, Comrie (1985) observed that "in particular, the present tense is used to speak of states and processes which hold at the present moment, but which began before the present moment and may well continue beyond the present moment" (p. 37). According to Comrie (1976), reference to a definite event in past time is the basic meaning of the simple past, and the present perfect "more generally . . . indicates the continuing present relevance of a past situation" (p. 52). Similarly, Huddleston (1988) characterized the primary use of the simple present as the location of a situation in present time, in contrast to the simple past, which "serves straightforwardly to locate the situation in past time" (p. 71), and the present perfect, which locates the situation in past time but implies relevance to the present. Bardovi-Harlig (1997, p. 798) also observed that "the most commonly cited meaning of the present perfect, and that which distinguishes it from the simple past, is the notion of *current relevance*" (emphasis in original). In view of these observations, references to a present state (rule 7 in Appendix A), to a definite past event (rule 9), and to an indefinite past event with present relevance (rule 11) were selected as prototypical uses of the three tense-aspect structures, respectively. In the same discussions cited above, future time reference of the simple present (rule 8), present reference of the simple past (rule 10), and reference to an event or state leading up to the present (rule 12) are treated either as apparent exceptions or as secondary or derivative meanings of the three tense-aspect structures. Accordingly, these meanings were selected as peripheral uses.[13]

The secondary English textbooks mentioned previously were checked to see whether the candidate prototypical rules had been presented earlier to the participants than the candidate peripheral rules. All the prototypical rules were found to be introduced before their corresponding peripheral uses in these textbooks. To determine whether the prototypical uses would indeed occur more frequently than the peripheral uses in production, 80 compositions were collected in a pilot study on 20 Chinese learners from a previous batch of participants in the same intensive English program. A frequency count was made of the obligatory contexts for these uses in the data. It was

found that there were nearly five times as many obligatory contexts for the prototypical uses as those for the peripheral uses. Thus, the preset classifications were supported by the frequency data.

The expert opinions and the frequency data notwithstanding, the validity of the preset classifications needed to be verified by the individual participants. Although it is reasonable to assume enough interpersonal and cross-cultural overlap as a function of universals in human cognitive processing (Rosch, 1974), each individual may, as Entwistle (1981) argued, have a unique conceptual structure or system of schemas. Furthermore, instructed L2 learners' knowledge of the target grammar may be affected by distortions found in their textbooks (Pica, 1983). Consequently, what is a prototypical use to grammarians may not be perceived to be so by an L2 learner. It would not make sense to investigate the effect of prototypicality without first establishing whether the classifications were valid to the individual participants.

Instrument. In the cognitive literature, intuitions about the relative prototypicality of exemplars of a category are frequently assessed through a judgment task. On such a task, subjects are required to rate the extent to which each exemplar of a category represents their idea or image of the meaning of the category. Rosch's (1973, 1975b) research showed that prototypicality judgments elicited in this manner are meaningful, consistent, and reliable. In view of this research, a prototypicality judgment test was designed for this study. It comprised 12 use-based rules and sentences exemplifying them (see Appendix B). The rules and examples were paired by structure. The participants were required to indicate which rule in each pair they considered the more typical use of the target structure. No time limit was imposed on the test. All the participants found the task quite easy, and there were rare cases in which the original judgment was changed.

Scoring Procedure. The scoring procedure was rather straightforward. Although there was high agreement (above 90%) between the preset classifications and the participants' actual judgments, it was the latter that dictated the categorization of the target uses as prototypical or peripheral. Furthermore, the categorization was made strictly on an individual basis. Thus, a target use might be classified as prototypical for some participants but peripheral for others, depending on their actual judgments. Each participant's judgments were entered separately. Only those judgments in cases in which the individual participants had correct metalinguistic knowledge were recorded. Each participant's recorded judgments were then used to group obligatory contexts for the target uses in his or her production data into prototypical and peripheral ones.

Production Tasks

Spontaneous Writing Tasks. The participants completed four spontaneous writing tasks: two narratives on the topics "An important event in my life" and

"An unforgettable pleasant experience" as well as two argumentative essays on the topics "Knowledge is power" and "Money cannot buy happiness."[14] Two discourse types were used in anticipation of a possible bias in the proportion of some target uses elicited by only one discourse type (Tarone & Parrish, 1988). To focus the participants' attention on meaning rather than on form, they were required to write as fast as possible (to finish their writing within an hour) and as much as possible (at least 400 words for each essay). To prevent off-line monitoring, they were instructed to write only one draft and not to revise it after they finished composing. Additionally, they were not allowed to consult any reference materials during their writing so as to make sure that all the target uses were generated by the participants themselves. On average, it took them 46 minutes to finish each writing task and the mean length of the essays was 479 words.

Error-Correction Tasks. Two error-correction tasks were used to provide a contrast with the spontaneous writing tasks and to test the effect of attention, as reflected in time pressure, on the use of metalinguistic knowledge. Two similar sentences (or short passages) of comparable difficulty and length were constructed, each containing an error (sometimes more than one) involving one of the target uses. As an example, one pair consisted of *I'll let you know if I'll hear from her* and *We'll start as soon as you will be ready*. There were a total of 49 pairs of targeted erroneous sentences (see note 8). One sentence was randomly selected from each pair to form the first version of the error-correction instrument, and the remaining ones formed the second (see Appendix C). Incorporated into each version as distracters were 11 sentences that contained erroneous uses of other structures. The 60 sentences were presented in scrambled order. As a check on the difficulty levels of the two versions, they were piloted on the 20 learners mentioned earlier. Half of the learners took one version, and half took the other. A *t*-test run on the mean percentages of suppliance of the target structures in obligatory contexts did not detect any significant difference, $t = .84$, $df = 19$, $p = .40$, 2-tailed. Thus, it was reasonable to treat the two versions of the instrument as highly comparable.

The first error-correction task was administered without time pressure, and the second one with time pressure. The participants were instructed to take as much time as they needed to correct and rewrite the 60 erroneous sentences on the untimed task but to finish the timed one within 35 minutes.[15] On average, it took them 54 minutes to complete the first task and 34 minutes to finish the second one. A careful examination of the error-correction data revealed that the participants rewrote a majority of the test sentences extensively, making changes to both errors and error-free structures.

Scoring Procedure. To establish marking reliability, eight compositions—two on each of the writing topics—were randomly selected from the samples collected in the pilot study and marked by the author and two native-speaker lecturers in applied linguistics. They were guided in their marking by a de-

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Table 1. Counterbalancing procedures for data collection

Order of administration	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8
Order A	AT1	NT1	UC1	RV	AT2	NT2	TC2	PJ + Q
Order B	NT1	AT2			NT2	AT1		
Order C	AT2	NT2	UC2		AT1	NT1	TC1	
Order D	NT2	AT1			NT1	AT2		

Note. AT1 = argumentative topic 1; AT2 = argumentative topic 2; NT1 = narrative topic 1; NT2 = narrative topic 2; PJ = prototypicality judgment; Q = questionnaire; RV = rule verbalization; TC1 = timed correction version 1; TC2 = timed correction version 2; UC1 = untimed correction version 1; UC2 = untimed correction version 2.

tailed scheme, which required them to identify all the instances of suppliance and nonsuppliance of the target uses in obligatory contexts. For articles, all prenominal positions were marked except: (a) those occupied by determiners (e.g., *my*, *any*, and *each*) that do not allow the simultaneous presence of any article (see Quirk et al., 1985, pp. 254–257); (b) those in common phrases that may have been learned as formulas (e.g., *a little*, *a few*, and *a number of*); (c) those following measure partitives (e.g., *a piece of* __ *advice*); and (d) those in the second position of conjoined noun phrases (e.g., *the boys and* __ *girls*).[16] For the tense-aspect structures, only finite verbs were marked. Modal verbs and semiauxiliary verbs (e.g., *could*, *have to*, *used to*) were excluded. Obligatory contexts for the simple past were excluded in cases in which the verb in question had an identical base and past form. Surface errors such as morphological, lexical, collocational, and spelling anomalies were not marked as errors if the correct target structures had been chosen. However, where it was not clear whether an article or some other structure (e.g., a quantifier or a demonstrative) had been omitted, the omission was marked as one of an article (cf. Tarone & Parrish, 1988, p. 37).

An examination of the sample marking results showed that the initial interrater agreement was 96% for error identification and 93% for usage classification. A great majority of the disagreements were subsequently resolved through discussion. Given these results, there was acceptable interrater reliability. All the writing and error-correction data were then marked by the author according to the marking scheme. Instances of the target uses in obligatory contexts were tallied according to the independent variables, and percentages of suppliance in obligatory contexts were computed for each participant.

Research Design

Data Collection. The experimental design used to test the hypotheses is summed up in Table 1. The spontaneous writing tasks were administered in

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two rounds, with each round consisting of a narrative and an argumentative task. Between the two rounds were the untimed error-correction task and the rule-verbalization task, which served as two consciousness-raising tasks at the same time.[17] In terms of Sharwood Smith's (1991) classification of consciousness-raising activities, both tasks were elaborate and explicit. The timed error-correction task was administered after the second round of spontaneous compositions and was followed by the prototypicality judgment task. Counterbalancing procedures were used to minimize instrument and order effects. The writing tasks were administered in four different orders, such that on each writing task half of the participants wrote an argumentative essay, and the other half a narrative. Of those working on the same mode of writing, half wrote on one topic, and half wrote on the other topic. Similarly, half of the participants took the first version of the error-correction instrument, and half took the second version, on both the timed and untimed error-correction tasks. All the data were collected within two consecutive weeks shortly after the intensive English program started. The data collection took place in ordinary classrooms and during the participants' free timeslots between normal classtime.

Analysis. To test the effects of attention, prototypicality, and automaticity on access to metalinguistic knowledge, two ANOVAs were run, respectively, on the writing and error-correction data. Both adopted a 2×2 factorial design with repeated measures on the independent variables. Whereas the variable of attention was manipulated through the consciousness-raising tasks for the writing tasks, it was operationalized in terms of time pressure for the error-correction tasks. For both ANOVAs, prototypicality was operationalized on the basis of individual participants' judgments. Although automaticity did not figure as an independent variable, its effect would come through if an interaction were found between prototypicality and attention (see the motivation for hypothesis 3). To summarize, the statistical analyses involved the following independent variables:

1. Prototypicality: a two-level variable, distinguishing those target uses judged by the individual participants to be prototypical of the six structures from those judged to be peripheral;
2. Attention to form: a two-level variable, distinguishing between the spontaneous writing tasks administered before and after the consciousness-raising tasks;
3. Time pressure: a two-level variable, distinguishing between the timed and untimed error-correction tasks.

The dependent variables were percentages of suppliance of target uses in obligatory contexts elicited by the production tasks.[18] The p value was set at .05 for both ANOVAs.

RESULTS

Table 2 sums up descriptive statistics for the variables involved in testing the hypotheses.[19] Before the main statistical analyses could be run, it was neces-

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Table 2. Descriptive statistics for variables involved in hypothesis-testing

Independent variables	*n*	*M*	*SD*
Prototypicality × Attention to Form			
Prototypical – Pre-consciousness-raising (A1 + N1)	64	91.50	4.04
Prototypical – Post-consciousness-raising (A2 + N2)	64	92.47	2.79
Peripheral – Pre-consciousness-raising (A1 + N1)	64	69.59	13.61
Peripheral – Post-consciousness-raising (A2 + N2)	64	78.25	11.64
Prototypicality × Time Pressure			
Prototypical – Untimed Correction	64	97.61	2.29
Prototypical – Timed Correction	64	95.08	3.28
Peripheral – Untimed correction	64	90.65	8.87
Peripheral – Timed Correction	64	82.42	12.71

Note. A1 = first argumentative task; A2 = second argumentative task; N1 = first narrative task; N2 = second narrative task. Where two tasks are joined by a plus sign, the dependent variable in question was based on data collapsed across the designated tasks.

sary to conduct some preliminary analyses. First, it was important to check whether the variables used for purposes of counterbalancing (i.e., the order of administration, the two topics for each discourse type, and the two versions of the error-correction instrument) made any difference to the results of the experiment. Four one-way ANOVAs were run respectively on the first narrative task, the first argumentative task, the second narrative task, and the second argumentative task (see Table 1). Two *t*-tests were carried out separately for the timed and untimed correction tasks. The dependent variables were percentages of suppliance of all the target uses in obligatory contexts. No significant difference was found for any of the independent variables: $F(3, 60) = .29$, $p = .83$ for the first narrative task; $F(3, 60) = .79$, $p = .51$ for the first argumentative task; $F(3, 60) = .36$, $p = .78$ for the second narrative task; $F(3, 60) = .52$, $p = .67$ for the second argumentative task; $t = .72$, $df = 62$, $p = .48$ for the timed correction task; and $t = .55$, $df = 62$, $p = .58$ for the untimed correction task. Although there were obvious differences in accuracy between the narrative and argumentative tasks, no preliminary ANOVA was run to compare performances between the two discourse types, and the differences were ignored in the main ANOVA because the planned comparison was between symmetrical combinations of narrative and argumentative tasks.

Second, it was important to check whether the consciousness-raising tasks (i.e., the verbalization task and the untimed correction task) had been effective. The number of accuracy-oriented corrections per 100 words was used as a dependent measure. This measure was chosen because previous research often associated accuracy-oriented self-repair with attention to form (Krashen, 1982; Sindermann & Horsella, 1989). It was reasoned that if the consciousness-raising tasks had been effective, the participants should have given more attention to formal aspects of their output, making more accuracy-oriented corrections on the post-consciousness-raising writing tasks. The corrections that were coded included all the false starts, cross-outs, insertions, visual symbols,

Table 3. Results of repeated-measures ANOVA for prototypicality and attention to form

Source	*SS*	*df*	*MS*	*F*
Prototypicality (P)	20883.321	1	20883.321	319.732*
Error (prototypicality)	4114.851	63	65.315	
Attention to form (A)	1482.779	1	1482.779	15.528*
Error (attention to form)	6015.962	63	95.491	
P × A	946.139	1	946.139	9.413*
Error (P × A)	6332.484	63	100.516	

*$p < .05$.

and reformulations that were overtly made to improve grammatical accuracy. A one-way ANOVA with repeated measures found a significant main effect; $F(3, 189) = 94.07$, $p < .001$. Post hoc comparisons (the Scheffé method) revealed that the two post-consciousness-raising writing tasks each contained significantly more accuracy-oriented corrections than either of the pre-consciousness-raising tasks, whereas no other comparisons reached statistical significance at the .05 level. These results were further checked against the participants' responses to a postexperimental questionnaire. A great majority of them (87.5%) reported that they had noticed, through the verbalization and error-correction tasks, that the study had to do with certain structures, though not necessarily the six structures under investigation. They also reported that they had tried to use the noticed structures more carefully on the subsequent writing tasks. Given these results, it can be concluded that the experimental conditions were valid.

The Prototypicality × Attention to Form ANOVA found a main effect for both independent variables. As shown in Table 3 and Figure 2, when correct metalinguistic knowledge was available, the participants were far more accurate with the prototypical uses than with the peripheral ones. The differences were significant regardless of differences in attention to form between the pre- and post-consciousness-raising writing tasks. The participants' overall accuracy also increased substantially from the pre-consciousness-raising tasks, where less attention to form was available, to the post-consciousness-raising ones, which allowed a greater focus on form. These differences were significant across the two levels of prototypicality. Given these results, both hypothesis 1 and hypothesis 2 were supported statistically by the writing data.

There was, as expected, a significant interaction between prototypicality and attention to form. As Figure 2 shows, the difference between the mean accuracy rates of the prototypical and peripheral uses was much greater on the pre-consciousness-raising tasks than on the post-consciousness-raising ones. The interaction effect warrants further examination because it might be an artifact resulting from a ceiling effect that affected the prototypical uses but was absent for the peripheral uses.[20] This issue will be addressed after the results of the second two-way ANOVA are presented.

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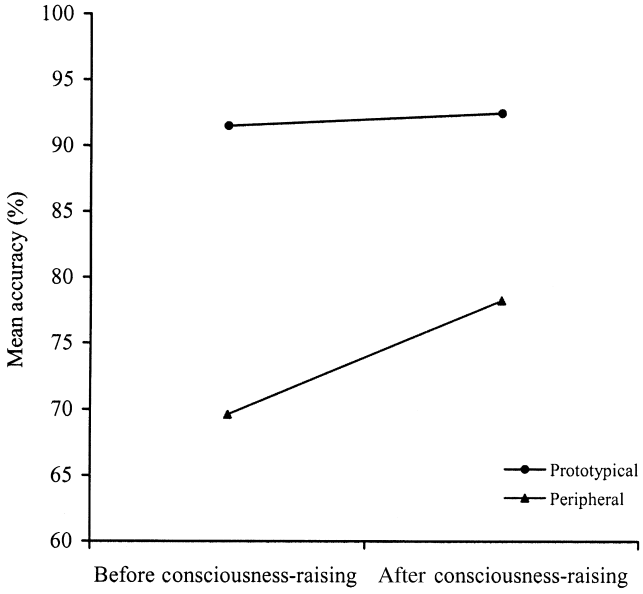

Figure 2. Mean accuracy rates by prototypicality and attention to form.

Table 4. Results of repeated-measures ANOVA for prototypicality and time pressure

Source	*SS*	*df*	*MS*	*F*
Prototypicality (P)	6162.937	1	6162.937	75.458*
Error (prototypicality)	5145.428	63	81.673	
Time pressure (T)	1853.572	1	1853.572	43.699*
Error (time pressure)	2672.232	63	42.416	
P × T	521.066	1	521.066	13.406*
Error (P × T)	2448.639	63	38.867	

*$p < .05$.

The Prototypicality × Time Pressure ANOVA was run to test the same three hypotheses on the error-correction data. It was similar to the first two-way ANOVA except that time pressure was used instead of attention to form. Both time pressure and attention to form, however, had to do with the amount of attention available for linguistic processing. Table 4 sums up the results of the ANOVA, and Figure 3 plots the means. For ease of comparison with Figure 2, the timed error-correction task is listed before the untimed one in Figure 3, contrary to their order of administration. Like the first two-way ANOVA, this ANOVA also identified a main effect for prototypicality. Furthermore, there

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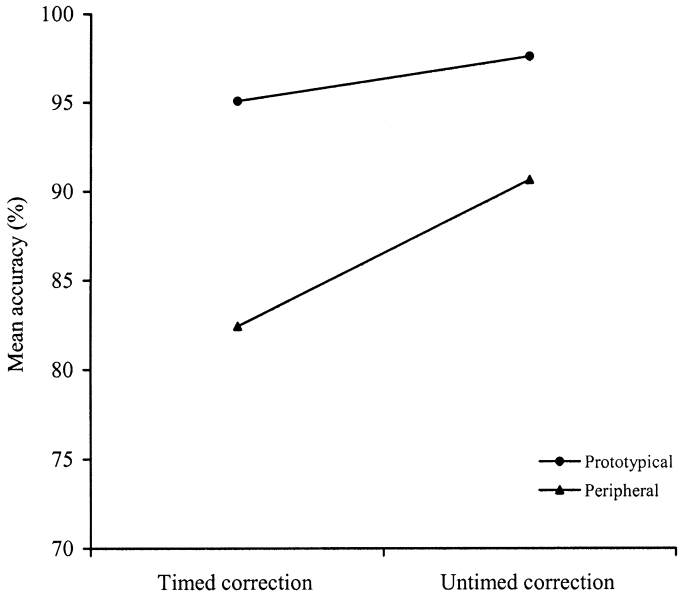

Figure 3. Mean accuracy rates by prototypicality and time pressure.

was a main effect for time pressure. In other words, the prototypical uses were supplied far more accurately than the peripheral ones on both error-correction tasks, and greater accuracy was achieved for both prototypical and peripheral uses in the absence of time pressure. These results corroborated those obtained in the Prototypicality × Attention to Form ANOVA and hence provided further support for hypotheses 1 and 2.

The Prototypicality × Time Pressure ANOVA also yielded a significant interaction effect in the hypothesized direction. That is, the accuracy for the prototypical uses was less affected by the presence of time pressure than the accuracy for the peripheral ones. Given the high accuracy levels of the prototypical uses (95.08% and 97.61%), it was possible for the interaction to be an artifact of a ceiling effect for the prototypical uses. Although this possibility could not be eliminated for the error-correction data, a close look at the mean accuracy rates for the writing tasks indicated that the interaction for the writing data was a genuine one. Notice that the accuracy for the prototypical uses on the post-consciousness-raising tasks was only 92.47%. There was still enough room for further increases. As a matter of fact, the participants did attain a much higher accuracy level under more favorable conditions—that is, on the untimed error-correction task. If only a ceiling effect and no other factors had been at work, their accuracy for the prototypical uses on the post-consciousness-raising tasks should have been comparable to their accuracy for the un-

timed error-correction task (i.e., 97.61%). At such an accuracy level, the significant interaction would simply disappear. This was confirmed by an additional two-way ANOVA in which the accuracy scores for the prototypical uses on the post-consciousness-raising tasks was replaced by those on the untimed correction task, $F(1, 63) = 1.06$, $p = .30$. These results ruled out the possibility of a ceiling effect on the interaction between prototypicality and attention to form. Consequently, the interaction could be interpreted as showing that differences in attention to form had a greater effect on the peripheral uses than on the prototypical ones. Thus, hypothesis 3 was largely confirmed.

DISCUSSION

In the previous section, the analyses of the data showed that when correct metalinguistic knowledge was available, formal accuracy varied significantly in proportion to the degree of attention to form and time pressure. There also existed distinct patterns of accuracy for the prototypical and peripheral uses of the same target structures, with significantly greater accuracy consistently associated with the former across the tasks. Furthermore, there was a significant interaction between linguistic prototypicality and attentional differences, as operationalized by different experimental conditions. Of course, it would be oversimplistic to conclude, solely on the basis of the presence of metalinguistic knowledge, that such knowledge is involved in L2 output, especially in more spontaneous production. The results obtained in this study, however, do not lend themselves to an interpretation that rules out the involvement of metalinguistic knowledge in L2 output (e.g., Green & Hecht, 1992; Seliger, 1979). Krashen's (1982) Monitor Hypothesis seems, at first glance, to be capable of explaining the notable increases in accuracy across the tasks. However, it does not predict that the so-called three necessary conditions for monitoring (i.e., focus on form, sufficient time, and knowing the rule) have systematically differential effects on different target uses for the same learner both under the same task conditions and across different task conditions. Consequently, it cannot easily account for the differences in accuracy between the prototypical uses and the peripheral ones, nor can it adequately explain the interaction between prototypicality and attention to form.

The observed patterns of accuracy could not have been caused by implicit knowledge or memorized instances of the target uses either. Implicit knowledge is, by nature, immune to influences of processing conditions (Johnson, 1996; Krashen, 1982; Paradis, 1994; Zobl, 1992). The retrieval of such knowledge in performance is stable because it is embedded in procedures for action, is highly automatized, and is, consequently, largely unaffected by attentional pressure. Similarly, retrieval of memorized instances in performance is little affected by simultaneous capacity-taxing processes because it is direct, quickly automatized, and light on attentional capacity (Anderson et al., 1997; Logan & Etherton, 1994; Robinson, 1997; Skehan, 1998). In the present study, however, the mean accuracy rate of the peripheral uses underwent

a 12% increase from the pre-consciousness-raising writing tasks to the post-consciousness-raising ones, and a 10% increase from the timed correction task to the untimed one (see Table 2). Although differences in accuracy between the tasks were notably smaller in the case of the prototypical uses, a paired-samples *t*-test revealed that they were statistically significant at the .05 level. Given the relative insusceptibility of implicit knowledge and memorized instances to differences in processing conditions, such significant fluctuations would not be expected. There is another good reason for ruling out implicit knowledge and memorized instances as determinants of the observed patterns. The SLA literature documents ample empirical evidence that metalinguistic tasks such as error correction mainly tap explicit, analyzed knowledge (Bialystok, 1979, 1982; Cromdal, 1999; Gass, 1983; Norris & Ortega, 2000). Therefore, there is solid ground for suggesting that metalinguistic knowledge contributed substantially to the pattern of accuracy observed on the two error-correction tasks. The striking similarity between the patterns of accuracy observed on the error-correction tasks and the more spontaneous writing tasks, then, indicates that both patterns were essentially a function of the same type of knowledge.

The results of this study lend themselves more readily to an interpretation that acknowledges the involvement of metalinguistic knowledge in L2 performance but sees its mobilization as operating within some psychological constraints. One such constraint is the amount of attention to linguistic processing available at the time of production. As far as processing demands are concerned, the major difference between the pre- and post-consciousness-raising writing tasks did not arise from drastically different attentional foci but lay in the relative allocations of attention to form. All of the writing tasks were meaning focused. However, the consciousness-raising tasks induced the participants to allocate more attention to form on the post-consciousness-raising tasks than they did on the pre-consciousness-raising ones. The attentional difference between the two correction tasks presented a slightly different picture because the focus of attention in both was on form. Nonetheless, it was still a difference in the relative amount of attention available for linguistic processing in that the untimed correction task imposed less attentional pressure than the timed one. It would seem that the greater focus on form induced by the consciousness-raising tasks and the greater amount of attention allowed by the absence of time pressure facilitated the participants' access to their correct metalinguistic knowledge, which was not fully automatized, and hence resulted in greater accuracy in their production of the target uses.

The hypothesis about a close relationship between access to metalinguistic knowledge and attention to linguistic processing was supported by the values of eta squared (η^2) obtained for the independent variables of interest in the main ANOVAs. Eta squared is a measure of strength of association between an independent variable and the overall variability in the data. Generally speaking, $\eta^2 > .10$ indicates a reasonable association, and $\eta^2 > .40$ shows a strong association (Hatch & Lazaraton, 1991). The η^2 was .20 for Attention to Form

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and .41 for Time Pressure. In other words, the two independent variables accounted for 20% and 41% of the overall variance in each case. Both were healthy associations. The reliable associations notwithstanding, it should be noted that the η^2 for Attention to Form was considerably smaller than the η^2 for Time Pressure. This difference might be due to the scope and strength of the consciousness-raising tasks in manipulating attentional allocations. The tasks may not have affected every participant as the imposed time pressure did. Additionally, the strength of the consciousness-raising tasks might have been considerably weakened by the competition for attentional resources from other components (e.g., pragmatic and textual aspects) of the writing tasks.

Although attention appears to be an important psychological constraint on the utility of metalinguistic knowledge in real-time performance, it is not the only mediating factor. The results of the two-way ANOVAs suggest that the relative prototypicality of the target uses in question also affected the accuracy with which the participants produced them. The consistently greater accuracy for the prototypical uses can be explained with reference to their greater central tendency and cognitive salience. Prototypical uses generally share more features with other uses of the same target structures than peripheral uses. Take, for example, the use of the simple past to refer to a definite past event and the second-mention use of the definite article. Both were unanimously judged by the participants to be more prototypical of the target structures. Reference to a definite past event shares past reference, remoteness, dynamic action, and completeness, respectively, with the use of the simple past to describe a past state, a hypothetical situation, a past habitual event, and a past activity (Andersen & Shirai, 1994; Comrie, 1985; Lewis, 1986; Quirk et al., 1985). Similarly, the second-mention use of the definite article overlaps in features with other types of reference expressed by the structure: it shares context-dependent recoverability with cataphoric reference; assumed general knowledge with generic and sporadic reference; and specificity with situational and unique reference (Celce-Murcia & Larsen-Freeman, 1999; Master, 1988a; Quirk et al.; Tarone & Parrish, 1988). Such a strong central tendency, coupled with L2 learners' earlier and more frequent exposure to prototypical uses, could make such uses cognitively more prominent and give rise to a stronger connection between them and the structures in question. In other words, prototypical uses tend to have greater cue validity for the target structures than peripheral ones. Thus, it would be more likely for metalinguistic knowledge about prototypical uses to be activated and processed under attentional pressure.

The η^2 values associated with prototypicality were rather high (.84 and .55 for the writing and error-correction tasks, respectively). There is reason, however, to argue that the large magnitude of these values might have resulted from the convergent effects of linguistic prototypicality and processing automaticity. Although the existence of a main effect for prototypicality is largely consistent with findings from Rosch's (1975b) research, it should be noted that there is an important difference between Rosch's results and the results

reported here. Rosch found either constant differences in performance between prototypical and peripheral instances across different experimental conditions or a stronger task effect on prototypical instances in the case of an interaction. By contrast, this study has found varying differences in accuracy between the prototypical and peripheral uses across the task levels and a markedly weaker task effect (in terms of attentional differences) on the prototypical uses. This discrepancy suggests that some other factor was working in conjunction with prototypicality and that its effect was strong enough to affect the interaction pattern.

Given the relative frequency and salience of more prototypical target uses, it is reasonable to argue that that factor was processing automaticity. Although Rosch et al. (1976, p. 501) demonstrated that prototypicality effects "could well arise from category structure alone without implementation from frequency," it does not follow that frequency cannot contribute to greater automaticity in processing knowledge of more prototypical members of a category when learning is not complete (see Barsalou, 1985). There is considerable evidence that processing automaticity arises from constant activation of relevant informational elements in memory (Anderson, 1983; Shiffrin & Schneider, 1977; Schneider et al., 1984). The markedly greater frequency of more prototypical target uses in the input to and output by L2 learners (e.g., the prototypical uses elicited by the writing tasks were more than four times as many as the peripheral ones) may well result in greater automaticity in processing explicit knowledge of such uses. Furthermore, because of the special role of prototypes in cognitive processing, prototypical members of a category tend to be learned earlier, stored as the base for subsequent conceptual organization, and constantly referred to when new or ambiguous cases are in question (Rosch, 1978). All these should contribute to more frequent activation of prototypical rules. Thus, there are grounds for believing that the participants' processing of the prototypical rules was automatized to a much greater extent than their processing of the peripheral ones. This greater automaticity rendered access to the prototypical rules less susceptible to the influence of attentional pressure than access to the peripheral rules. As a result, the range of variation in accuracy for the prototypical uses was much narrower than that of the peripheral uses.

CONCLUSION

This study has produced some positive evidence for the contention that metalinguistic knowledge can be mobilized in L2 performance. The results also suggest that real-time access to such knowledge is subject to the influences of three interacting psychological factors: the amount of attention to form allowed by a task, the relative prototypicality of the target uses involved, and the level of automaticity attained in processing the relevant knowledge. High attentional pressure, lack of prototypicality, and low automaticity seem to constrain access to such knowledge. Furthermore, the effect of one factor can

be mediated by the other two factors. Thus, the extent to which attention affects access to metalinguistic knowledge may depend on whether it concerns a prototypical use, how automatically it can be processed, or both. Likewise, the effects of prototypicality and automaticity may become weaker on tasks that allow focal attention to form. These findings contribute some empirical support to theoretical work positing that explicit, analyzed knowledge about an L2 has an important role to play in L2 performance (see Bialystok, 1994; Odlin, 1986; Preston, 1989). In line with this position, this study raises doubts about the widespread claim that only implicit knowledge is responsible for communicative output. If any two communicative tasks are not dichotomous but can be located relative to each other on one or more continua (Johnson, 1996; Skehan, 1996), then the usefulness of metalinguistic knowledge in spontaneous communication is not an either-or phenomenon but only a matter of degree.

These findings point to the conclusion that research on the role of metalinguistic knowledge in L2 production needs to take into account the effects of selective attention, executive control, and linguistic prototypicality. These factors may interact with a full array of instructional, learner, linguistic, and contextual variables. Future research needs to explore how various experiential, cognitive, and contextual factors may impinge on L2 learners' development and use of metalinguistic knowledge. It is also useful to investigate the development of automatic access to explicit knowledge and effective means of enhancing processing automaticity. Additionally, further research is needed to study possible influences of individual learner differences, especially learning style, on the development of metalinguistic awareness and the use of explicit knowledge in L2 production. The framework adopted in this study may serve as a useful point of departure for posing and addressing research questions along these lines of further experimentation.

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Notes

1. The SLA literature over the last two decades has seen a growing number of investigations into metalinguistic performance (see Birdsong, 1989) and a proliferation of studies examining the issue of focus on form (see Doughty & Williams, 1998, for a collection of such studies; Spada, 1997, for a recent review; and Norris & Ortega, 2000, for a meta-analysis). Most of these studies, however, are not directly related to the issue of concern here. First, they do not address the relationship between metalinguistic knowledge and L2 production. Instead, they are aimed at inferring the internalized L2 grammar on the basis of metalinguistic performance or assessing the relative effectiveness of various instructional treatments in fostering L2 acquisition. Second, because learning and use are distinct processes, findings from research into various form-focused instructional treatments cannot be interpreted as evidence for effects, or lack thereof, of metalinguistic knowledge on L2 production (de Graaff, 1997; Hulstijn & de Graaff, 1994).

2. In the context of instructed L2 learning in an acquisition-poor environment, it is reasonable to expect learners' explicit, metalinguistic knowledge in general to be more compliant with the target code than their implicit, intuitive knowledge is. This is because these two types of knowledge typically result from different sources of information and learning processes. Whereas classroom learners develop their explicit knowledge largely as a result of the pedagogical rules presented to them (Sajavaara, 1986; Sorace, 1985), their implicit knowledge is derived mainly from hypotheses con-

structed on the basis of noticed target features in the input (Ellis, 1994; Schmidt, 1990). Although pedagogical grammars in general are descriptively less accurate and less sophisticated than linguistic grammars (Odlin, 1986), there is still a high level of consistency between a pedagogical grammar and the target code (Allen, 1974). Learners' self-generated hypotheses, on the other hand, are constrained by the input they are exposed to and are likely to be inadequate or only partially correct. Furthermore, because implicit knowledge is embedded in procedures (Johnson, 1996), it can be difficult for learners to modify their implicit knowledge in accordance with teacher feedback.

3. As one SSLA reviewer has pointed out, some of Robinson's (1997) findings were not fully in line with the specifics of Logan's (1988) instance theory of automaticity. The theory predicts that more exposure to an instance would give rise to more accurate and faster memory retrieval. However, Robinson found that responses to test sentences occurring many times during training did not differ in accuracy from responses to those occurring only a few times for subjects in any learning condition. Moreover, no comparison of reaction time between test sentences presented many times and those presented a few times during training was significant for implicit, incidental, or enhanced learners. Only one of three planned comparisons involving instructed learners reached statistical significance.

4. Linguistic prototypicality characterizes not only explicit rule knowledge but also implicit abstract knowledge and exemplar-based knowledge. There is evidence that linguistic prototypicality affects L1 acquisition in very young children whose knowledge of the language can be most appropriately described as implicit and exemplar-based (see Bates & MacWhinney, 1982; Bybee & Slobin, 1982; de Villiers, 1980; Shirai & Andersen, 1995).

5. The hypotheses concern instructed rather than naturalistic learners for two related reasons. Given the different types of input that the two types of learners are typically exposed to, it is reasonable to expect instructed learners to have much more metalinguistic knowledge about their target language than naturalistic learners. More importantly, because of their constant exposure to grammar instruction, instructed learners tend to experience grammar categories and explicit rules as psychologically real and make an earnest effort to apply such rules whenever possible (Sajavaara, 1986). In other words, instructed learners may depend, to a much greater extent, on metalinguistic knowledge in their learning and use of an L2 than naturalistic learners do. Thus, it is justifiable to restrict the hypotheses to instructed learners.

6. According to the participants' self-reports, a great majority of them (92%) used the same textbooks as their main course books in their secondary English classes.

7. These prescriptive use-based rules may not adequately reflect current article and tense-aspect usage as discussed by, among others, Celce-Murcia and Larsen-Freeman (1999), Quirk et al. (1985), and Master (1988a, 1988b). However, they closely reflect the input the participants were exposed to and, arguably, their metalinguistic knowledge about the target structures. Given the research questions addressed in this study, it was necessary to opt for such rules.

8. The data for this study were collected in a larger research project that involved not only the 12 uses investigated here but also 37 other uses of the same target structures. For the sake of space and clarity, wherever possible the discussion of instrument construction, scoring procedures, and reliability-related matters concerns only those sections of the instruments involving the 12 uses of interest. This is true of all the instruments except two correction tasks used to operationalize time pressure. Because of the way the tasks were constructed, validated, and administered, it is impossible to describe them without referring to all of the 49 target uses.

9. This study examines factors affecting access to metalinguistic knowledge that can be clearly determined. Because it does not compare L2 production in the presence of verbalizable knowledge with performance in the absence of such knowledge, the potential insensitivity of a verbal-report test is not a major concern.

10. It has been a common practice for secondary-school teachers of English in China to present and explain rules of English grammar in Chinese. Therefore, it was reasonable to expect that the participants had L1 rather than L2 metalanguage available for talking about English grammar rules. This was confirmed in a pilot study in which several participants first attempted, without success, to verbalize their knowledge in English and then switched to Chinese.

11. In his discussion of generic usage, Master (1988b) made a distinction between concrete generic reference (realized by *the*, *a*[*n*], or Ø) and abstract generic reference (realized by *the*). The concrete generic refers to the representative(s) of a class, but the abstract generic refers to the class itself. Although it is a useful distinction for teaching article usage, it does not conflict with the consensual opinion that generic reference is relatively peripheral to the core meaning of the three articles.

12. Pica (1983) observed that most grammars and textbooks tend to exaggerate first- and second-

mention usage as a common pattern. Conceivably, this tendency makes it likely for instructed L2 learners to perceive this pattern as reflecting primary uses of *the*, *a*(*n*), and Ø.

13. One may disagree with the preset classification concerning the two rules for the present perfect. As one SSLA reviewer noticed, rule 12 may seem more prototypical to some people than rule 11. For one thing, typical adverbial phrases associated with rule 12 (e.g., *since . . .*), as a rule of thumb, prohibit the use of the simple past. For another, the simple past can be used where rule 11 presumably applies if the notion of current relevance is not particularly emphasized. However, this problem did not affect the validity of the analyses to be reported because they were based on the subjects' actual judgments rather than the preset classifications.

14. The writing topics were given in Chinese. If they had been given in English, it would have been impossible to tell whether some correct realizations of the target uses (e.g., Ø before *money*, *knowledge*, and *power*) were independently arrived at by the individual participants or were influenced by the clues that they might have picked up in the wording of the writing topics.

15. The time allowance was based on the results of a pilot test run, in which the participants were instructed to complete the second correction task as fast as possible. It was found that it took them, on average, 39 minutes (with a range of 37–41 minutes) to finish the task. To create more stringent time pressure, it was decided that the participants in this study would be allowed only 35 minutes. The time pressure was indeed stringent enough because, in spite of their best effort, nine participants still had 2–5 sentences to correct when time was up. None of the unfinished sentences, however, involved the target uses investigated here.

16. Prenominal positions following measure partitives were excluded because they almost invariably take Ø. Furthermore, it is likely that L2 learners acquire the usage in a formulaic manner. With regard to conjoined noun phrases, it was impossible to tell whether Ø before the second noun phrase was the result of failing to access a rule for *the*, *a*(*n*), or Ø, applying an ellipsis rule, or realizing a correct rule for Ø.

17. If the timed correction task had been administered before the untimed one, its impact as a consciousness-raising task would have been relatively weak because of the time pressure, and it would have been risky to attribute better performance on the untimed task to the absence of time pressure because of a possible practice effect. Given the likelihood of such an effect, however, the actual order of administration contributed to the robustness of the results reported in this study.

18. As the absolute number of obligatory contexts for the target uses varied from task to task for individual participants, a norming operation was needed to reduce the raw scores to a standard numerical base so that meaningful comparisons could be made (see Mueller, Schuessler, & Costner, 1970). Percentages of correct suppliance, which are customarily used to measure performance accuracy in psychological and SLA research, were chosen for this purpose. Percentages, however, can be misleading if they are calculated from small absolute figures. This posed a problem for the peripheral uses of the target structures because some participants produced few of them on the tasks. To address this problem, data from only 64 participants were included for analysis, although originally 76 learners had participated in the experiment. Twelve learners were excluded because they had produced fewer than 10 obligatory contexts for the target uses on at least one level of the independent variables. The ranges of obligatory contexts produced by the 64 participants for all the prototypical uses combined were 36–164 (M = 89.13) for the pre-consciousness-raising writing tasks, 44–186 (M = 88.64) for the post-consciousness-raising writing tasks, 41–67 (M = 55.58) for the timed correction task, and 44–68 (M = 55.60) for the untimed correction task. The ranges of obligatory contexts for all the peripheral uses combined were 10–48 (M = 20.94) for the pre-consciousness-raising tasks, 11–45 (M = 20.05) for the post-consciousness-raising tasks, 10–21 (M = 12.27) for the timed correction task, and 10–23 (M = 12.97) for the untimed correction task.

19. The mean percentages reported in Table 2 were computed from composite scores derived by summing each participant's performance over all the prototypical and peripheral uses, respectively, on the tasks in question. The decision to use composite scores was motivated by two considerations. First, because of the low frequency of the peripheral uses in the data, a separate score for each of them would be unreliable in most cases (see note 18). Second, the study was aimed at identifying general patterns of changes in performance, rather than performance with regard to a particular target use. Although for a very small minority of participants an increase or decrease in accuracy for one target use was obscured by an increase or decrease for another on some tasks, the overall patterns of changes for all the prototypical uses were highly similar; so were the patterns for all the peripheral uses. Arguably, these consistent patterns justified the use of composite scores.

20. I thank an SSLA reviewer for pointing this out to me.

References

Allen, J. P. B. (1974). Pedagogic grammar. In J. P. B. Allen & S. P. Corder (Eds.), *The Edinburgh course in applied linguistics: Techniques in applied linguistics* (pp. 59–92). Oxford: Oxford University Press.

Andersen, R. W., & Shirai, Y. (1994). Discourse motivations for some cognitive acquisition principles. *Studies in Second Language Acquisition*, *16*, 133–156.

Anderson, J. R. (1983). *The architecture of cognition*. Cambridge, MA: Harvard University Press.

Anderson, J. R. (1993). *Rules of the mind*. Mahwah, NJ: Erlbaum.

Anderson, J. R., & Fincham, J. M. (1994). Acquisition of procedural skills from examples. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *20*, 1322–1340.

Anderson, J. R., Fincham, J. M., & Douglass, S. (1997). The role of examples and rules in the acquisition of a cognitive skill. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 932–945.

Bachman, L. F. (1990). *Fundamental considerations in language testing*. Oxford: Oxford University Press.

Baddeley, A. D. (1986). *Working memory*. Oxford: Oxford University Press.

Bardovi-Harlig, K. (1997). Assessing grammatical development in interactional contexts. *TESOL Quarterly*, *31*, 797–806.

Bardovi-Harlig, K. (2000). *Tense and aspect in second language acquisition: Form, meaning, and use*. Oxford: Blackwell.

Barsalou, L. W. (1985). Ideals, central tendency, and frequency of instantiation as determinants of graded structure in categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *11*, 629–654.

Bates, E., & MacWhinney, B. (1982). Functionalist approaches to grammar. In E. Wanner & L. R. Gleitman (Eds.), *Language acquisition: The state of the art* (pp. 173–218). New York: Cambridge University Press.

Bialystok, E. (1979). Explicit and implicit judgements of L2 grammaticality. *Language Learning*, *29*, 81–103.

Bialystok, E. (1982). On the relationship between knowing and using linguistic forms. *Applied Linguistics*, *3*, 181–206.

Bialystok, E. (1994). Analysis and control in the development of second language proficiency. *Studies in Second Language Acquisition*, *16*, 157–168.

Bialystok, E., & Ryan, E. B. (1985). A metacognitive framework for the development of first and second language skills. In D. L. Forrest-Pressley, G. E. Mackinnon, & T. G. Waller (Eds.), *Metacognition, cognition, and human performance: Vol. 1. Theoretical perspectives* (pp. 207–252). San Diego, CA: Academic Press.

Birdsong, D. (1989). *Metalinguistic performance and interlinguistic competence*. Berlin: Springer-Verlag.

Bybee, J. L., & Slobin, D. I. (1982). Rules and schemas in the development and use of the English past tense. *Language*, *58*, 265–289.

Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*, *1*, 1–47.

Carlson, R. A., & Dulany, D. E. (1985). Conscious attention and abstraction in concept learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *11*, 45–58.

Carr, T. H., & Curran, T. (1994). Cognitive factors in learning about structured sequences. *Studies in Second Language Acquisition*, *16*, 205–230.

Celce-Murcia, D., & Larsen-Freeman, D. (1999). *The grammar book: An ESL/EFL teacher's course*. Boston: Heinle & Heinle.

Chen, G., & Liu, Y. (1990). *English: Senior 2*. Beijing: People's Education Press.

Comrie, B. (1976). *Aspect*. New York: Cambridge University Press.

Comrie, B. (1985). *Tense*. New York: Cambridge University Press.

Cortazzi, M., & Jin, L. (1996). English teaching and learning in China. *Language Teaching*, *29*, 61–80.

Cromdal, J. (1999). Childhood bilingualism and metalinguistic skills: Analysis and control in young Swedish-English bilinguals. *Applied Psycholinguistics*, *20*, 1–20.

Crookes, G. (1989). Planning and interlanguage variation. *Studies in Second Language Acquisition*, *11*, 367–383.

DeCarrico, J. S. (1986). Tense, aspect, and time in the English modality system. *TESOL Quarterly*, *20*, 665–682.

de Graaff, R. (1997). The *eXperanto* experiment: Effects of explicit instruction on second language acquisition. *Studies in Second Language Acquisition*, *19*, 249–276.

DeKeyser, R. M. (1995). Learning second language grammar rules: An experiment with a miniature linguistic system. *Studies in Second Language Acquisition*, *17*, 379–410.

DeKeyser, R. M. (1997). Beyond explicit rule learning: Automatizing second language morphosyntax. *Studies in Second Language Acquisition*, *19*, 195–221.
de Villiers, J. G. (1980). The process of rule learning in child speech: A new look. In K. E. Nelson (Ed.), *Children's language* (Vol. 2; pp. 1–44). New York: Gardner.
Dong, W., & Liu, D. (1984). *English: Senior 1*. Beijing: People's Education Press.
Doughty, C., & Williams, J. (1998). *Focus on form in classroom second language acquisition*. New York: Cambridge University Press.
Dulany, D. E., Carlson, R. A., & Dewey, G. I. (1984). A case of syntactical learning and judgment: How conscious and how abstract? *Journal of Experimental Psychology: General*, *113*, 541–555.
Educational Testing Service. (1991). *The secondary level English proficiency test*. Princeton, NJ: Educational Testing Service.
Ellis, R. (1987). Interlanguage variability in narrative discourse: Style shifting in the use of the past tense. *Studies in Second Language Acquisition*, *9*, 1–19.
Ellis, R. (1991). Grammaticality judgments and second language acquisition. *Studies in Second Language Acquisition*, *13*, 161–186.
Ellis, R. (1994). A theory of instructed second language acquisition. In N. C. Ellis (Ed.), *Implicit and explicit learning of languages* (pp. 79–114). San Diego, CA: Academic Press.
Entwistle, N. (1981). *Styles of learning and teaching: An integrated outline of educational psychology for students, teachers, and lecturers*. New York: Wiley and Sons.
Foster, P., & Skehan, P. (1996). The influence of planning and task type on second language performance. *Studies in Second Language Acquisition*, *18*, 299–323.
Gass, S. (1983). The development of L2 intuitions. *TESOL Quarterly*, *17*, 273–291.
Gass, S. (1987). The resolution of conflicts among competing systems: A bidirectional perspective. *Applied Psycholinguistics*, *8*, 329–350.
Gass, S., Mackey, A., Alvarez-Torres, M. J., & Fernández-García, M. (1999). The effects of task repetition on linguistic output. *Language Learning*, *49*, 549–581.
Grant, N. J. H., & Liu, D. (1992). *Junior English for China: Book 1*. Beijing: People's Education Press.
Grant, N. J. H., & Liu, D. (1993). *Junior English for China: Book 2*. Beijing: People's Education Press.
Grant, N. J. H., & Liu, D. (1996). *Junior English for China: Book 3*. Beijing: People's Education Press.
Green, P. S., & Hecht, K. (1992). Implicit and explicit grammar: An empirical study. *Applied Linguistics*, *13*, 168–184.
Grigg, T. (1986). The effects of task, time, and rule knowledge on grammar performance for three English structures. *University of Hawai'i Working Papers in ESL*, *5*, 37–60.
Hatch, E., & Lazaraton, A. (1991). *The research manual: Design and statistics for applied linguistics*. Boston: Heinle & Heinle.
Hu, G. (1999). *Explicit metalinguistic knowledge at work: The case of spontaneous written production by formal adult Chinese learners of English*. Unpublished doctoral dissertation, Nanyang Technological University, Singapore.
Hu, W., & Liu, Y. (1986). *English: Senior 3*. Beijing: People's Education Press.
Huddleston, R. (1988). *English grammar: An outline*. New York: Cambridge University Press.
Hulstijn, J. H. (1990). A comparison between the information-processing and the analysis/control approaches to language learning. *Applied Linguistics*, *11*, 30–45.
Hulstijn, J. H., & de Graaff, R. (1994). Under what conditions does explicit knowledge of a second language facilitate the acquisition of implicit knowledge? A research proposal. *AILA Review*, *11*, 97–112.
Hulstijn, J. H., & Hulstijn, W. (1984). Grammatical errors as a function of processing constraints and explicit knowledge. *Language Learning*, *34*, 23–43.
Johnson, K. (1996). *Language teaching and skill learning*. Oxford: Blackwell.
Kahneman, D., & Treisman, A. (1984). Changing views of attention and automaticity. In R. Parasuraman & D. R. Davies (Eds.), *Varieties of attention* (pp. 29–61). San Diego, CA: Academic Press.
Krashen, S. (1982). *Principles and practice in second language acquisition*. Oxford: Pergamon Press.
LaBerge, D. (1981). Automatic information processing: A review. In J. Long & A. Baddeley (Eds.), *Attention and performance* (Vol. 9; pp. 173–185). Mahwah, NJ: Erlbaum.
Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago: University of Chicago Press.
Langacker, R. W. (1987). *Foundations of cognitive grammar: Vol. 1. Theoretical prerequisites*. Stanford, CA: Stanford University Press.
Leow, R. P. (1997). Attention, awareness, and foreign language behaviour. *Language Learning*, *47*, 467–505.
Lewis, M. (1986). *The English verb: An exploration of structure and meaning*. Hove, UK: Language Teaching Publications.

Logan, G. (1988). Toward an instance theory of automatization. *Psychological Review*, *95*, 492–527.
Logan, G., & Etherton, J. (1994). What is learned during automatization? The role of attention in constructing an instance. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *20*, 1022–1050.
Massaro, D. W., & Cowan, N. (1993). Information processing models: Microscopes of the mind. *Annual Review of Psychology*, *44*, 383–425.
Master, P. (1988a). Teaching the English article system (Part 1). *English Teaching Forum*, *26*, 2–7.
Master, P. (1988b). Teaching the English article system (Part 2). *English Teaching Forum*, *26*, 18–25.
Master, P. (1990). Teaching the English articles as a binary system. *TESOL Quarterly*, *24*, 461–478.
McLaughlin, B. (1987). *Theories of second-language learning*. London: Arnold.
Mehnert, U. (1998). The effects of different lengths of time for planning on second language performance. *Studies in Second Language Acquisition*, *20*, 83–108.
Mueller, J. H., Schuessler, K. F., & Costner, H. L. (1970). *Statistical reasoning in sociology*. Boston: Houghton Mifflin.
Muranoi, H. (2000). Focus on form through interaction enhancement: Integrating formal instruction into a communicative task in EFL classrooms. *Language Learning*, *50*, 617–673.
Newell, A., & Rosenbloom, P. S. (1981). Mechanisms of skill acquisition and the law of practice. In J. R. Anderson (Ed.), *Cognitive skills and their acquisition* (pp. 1–55). Mahwah, NJ: Erlbaum.
Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 instruction: A research synthesis and quantitative meta-analysis. *Language Learning*, *50*, 417–528.
Odlin, T. (1986). On the nature and use of explicit knowledge. *International Review of Applied Linguistics in Language Teaching*, *24*, 123–144.
Ortega, L. (1999). Planning and focus on form in L2 oral performance. *Studies in Second Language Acquisition*, *21*, 109–148.
Paradis, M. (1994). Neurolinguistic aspects of implicit and explicit memory: Implications for bilingualism and SLA. In N. C. Ellis (Ed.), *Implicit and explicit learning of languages* (pp. 393–419). San Diego, CA: Academic Press.
Pica, T. (1983). The article in American English: What the textbooks don't tell us. In N. Wolfson & E. Judd (Eds.), *Sociolinguistics and language acquisition* (pp. 222–233). Rowley, MA: Newbury House.
Posner, M. I., & Petersen, S. E. (1990). The attention system of the human brain. *Annual Review of Neuroscience*, *13*, 25–42.
Preston, D. R. (1989). *Sociolinguistics and second language acquisition*. Oxford: Blackwell.
Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. (1985). *A comprehensive grammar of the English language*. London: Longman.
Renou, J. M. (2000). Learner accuracy and learner performance: The quest for a link. *Foreign Language Annals*, *33*, 168–180.
Robinson, P. (1997). Generalizability and automaticity of second language learning under implicit, incidental, enhanced, and instructed conditions. *Studies in Second Language Acquisition*, *19*, 223–247.
Rosch, E. (1973). On the internal structure of perceptual and semantic categories. In T. E. Moore (Ed.), *Cognitive development and the acquisition of language* (pp. 111–144). San Diego, CA: Academic Press.
Rosch, E. (1974). Linguistic relativity. In A. Silverstein (Ed.), *Human communication: Theoretical explorations* (pp. 95–121). Mahwah, NJ: Erlbaum.
Rosch, E. (1975a). Cognitive reference points. *Cognitive Psychology*, *7*, 532–547.
Rosch, E. (1975b). Cognitive representations of semantic categories. *Journal of Experimental Psychology: General*, *104*, 192–233.
Rosch, E. (1977). Human categorization. In N. Warren (Ed.), *Studies in cross-cultural psychology* (Vol. 1; pp. 1–49). San Diego, CA: Academic Press.
Rosch, E. (1978). Principles of categorization. In E. Rosch & B. Lloyd (Eds.), *Cognition and categorization* (pp. 27–48). Mahwah, NJ: Erlbaum.
Rosch, E., & Mervis, C. B. (1975). Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology*, *7*, 573–605.
Rosch, E., Simpson, C., & Miller, R. S. (1976). Structural bases of typicality effects. *Journal of Experimental Psychology: Human Perception and Performance*, *2*, 491–502.
Sajavaara, K. (1986). Transfer and second language speech processing. In E. Kellerman & M. Sharwood Smith (Eds.), *Crosslinguistic influence in second language acquisition* (pp. 66–79). Oxford: Pergamon Press.
Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, *11*, 129–158.

Schmidt, R. (1992). Psychological mechanisms underlying second language fluency. *Studies in Second Language Acquisition*, *14*, 357–385.
Schmidt, R. (1994). Deconstructing consciousness in search of useful definitions for applied linguistics. *AILA Review*, *11*, 11–26.
Schmidt, R. (1998). The centrality of attention in SLA. *University of Hawai'i Working Papers in ESL*, *16*, 1–34.
Schneider, W., Dumais, S., & Shiffrin, R. (1984). Automatic and control processing and attention. In R. Parasuraman & D. R. Davies (Eds.), *Varieties of attention* (pp. 1–27). San Diego, CA: Academic Press.
Schwartz, B. (1986). The epistemological status of second language acquisition. *Second Language Research*, *2*, 120–159.
Segalowitz, N. S., & Segalowitz, S. J. (1993). Skilled performance, practice, and the differentiation of speed-up from automatization effects: Evidence from second language word recognition. *Applied Psycholinguistics*, *14*, 369–385.
Seliger, H. W. (1979). On the nature and function of language rules in language teaching. *TESOL Quarterly*, *13*, 359–369.
Shanks, D. R., & St. John, M. F. (1994). Characteristics of dissociable human learning systems. *Behavioral and Brain Sciences*, *17*, 367–447.
Sharwood Smith, M. (1991). Speaking to many minds: On the relevance of different types of language information for the L2 learner. *Second Language Research*, *7*, 118–132.
Sharwood Smith, M. (1994). *Second language learning: Theoretical foundations*. London: Longman.
Shiffrin, R. M. (1976). Capacity limitations in information processing, attention, and memory. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes: Vol. 4. Attention and memory* (pp. 177–236). Mahwah, NJ: Erlbaum.
Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: Part 2. Perceptual learning, automatic attending, and a general theory. *Psychological Review*, *84*, 127–190.
Shirai, Y., & Andersen, R. W. (1995). The acquisition of tense-aspect morphology: A prototype account. *Language*, *71*, 743–762.
Sindermann, G., & Horsella, M. (1989). Strategy markers in writing. *Applied Linguistics*, *10*, 438–446.
Skehan, P. (1996). A framework for the implementation of task-based instruction. *Applied Linguistics*, *17*, 38–62.
Skehan, P. (1998). *A cognitive approach to language learning*. Oxford: Oxford University Press.
Skehan, P., & Foster, P. (1997). Task type and task processing conditions as influences on foreign language performance. *Language Teaching Research*, *1*, 185–211.
Skehan, P., & Foster, P. (1999). The influence of task structure and processing conditions on narrative retellings. *Language Learning*, *49*, 93–120.
Smith, E. E., & Medin, D. L. (1981). *Categories and concepts*. Cambridge, MA: Harvard University Press.
Sorace, A. (1985). Metalinguistic knowledge and language use in acquisition-poor environments. *Applied Linguistics*, *6*, 239–254.
Spada, N. (1997). Form-focused instruction and second language acquisition: A review of classroom and laboratory research. *Language Teaching*, *30*, 73–87.
State Education Commission of China. (1990). *Quanrizhi zhongxue yingyu jiaoxue dagang (xiudingben)* [English syllabus for full-time secondary schools; revised version]. Beijing: People's Education Press.
Stokes, J. D. (1985). Effects of student monitoring of verb inflection in Spanish. *The Modern Language Journal*, *69*, 377–384.
Tarone, E. (1985). Variability in interlanguage use: A study of style-shifting in morphology and syntax. *Language Learning*, *35*, 373–403.
Tarone, E. (1988). *Variation in interlanguage*. London: Arnold.
Tarone, E., & Parrish, B. (1988). Task-related variation in interlanguage: The case of articles. *Language Learning*, *38*, 21–44.
Taylor, J. R. (1995). *Linguistic categorization: Prototypes in linguistic theory* (2nd ed.). Oxford: Clarendon.
Taylor, J. R. (1998). Syntactic constructions as prototype categories. In M. Tomasello (Ed.), *The new psychology of language: Cognitive and functional approaches to language structure* (pp. 177–202). Mahwah, NJ: Erlbaum.
Tomlin, R. S., & Villa, V. (1994). Attention in cognitive science and second language acquisition. *Studies in Second Language Acquisition*, *16*, 183–203.
Towell, R., Hawkins, R., & Bazergui, N. (1996). The development of fluency in advanced learners of French. *Applied Linguistics*, *17*, 84–115.

VanLehn, K. (1996). Cognitive skill acquisition. *Annual Review of Psychology*, *47*, 513–539.
VanPatten, B. (1990). Attending to form and content in the input: An experiment in consciousness. *Studies in Second Language Acquisition*, *12*, 287–301.
VanPatten, B., & Cadierno, T. (1993). Explicit instruction and input processing. *Studies in Second Language Acquisition*, *15*, 225–243.
Whitman, R. L. (1974). Teaching the article in English. *TESOL Quarterly*, *8*, 253–262.
Wickens, C. D. (1984). Processing resources in attention. In R. Parasuraman & D. R. Davies (Eds.), *Varieties of attention* (pp. 63–102). San Diego, CA: Academic Press.
Williams, J. (1999). Learner-generated attention to form. *Language Learning*, *49*, 583–625.
Yamaoka, T. (1988). A semantic and prototype discussion of the "be easy to V" structure: A possible explanation of its acquisition process. *Applied Linguistics*, *9*, 385–401.
Zobl, H. (1992). Sources of linguistic knowledge and uniformity of nonnative performance. *Studies in Second Language Acquisition*, *14*, 387–402.

APPENDIX A

TARGET USE-RELATED RULES

1. *The* is used before common nouns to indicate shared knowledge derived from direct or indirect anaphoric reference (i.e., definite specific reference).
2. *The* is used before a singular count noun to refer to a class as a whole (i.e., generic reference).
3. *A*(*n*) is used before a singular count noun to indicate that the referent is not identifiable in the shared knowledge of the speaker and the hearer; that is, the referent has not been mentioned before and is assumed to be unfamiliar to the hearer (i.e., indefinite specific reference).
4. *A*(*n*) is used before a singular count noun to refer to the representative of a class (i.e., generic reference).
5. Ø is used with mass nouns and plural count nouns to indicate an indefinite amount of material or an indefinite number of objects, people, and so forth that are referred to (i.e., indefinite specific reference).
6. Ø is used with plural nouns and mass nouns to refer to the representatives of a class (i.e., generic reference).
7. The simple present is used with stative verb senses to refer to a state that obtains in the present period as distinct from the past.
8. The simple present is used in conditional and temporal clauses in reference to the future.
9. The simple past is used with dynamic verb senses to refer to a single definite event in the past.
10. The simple past is used in certain hypothetical subordinate clauses to express what is contrary to the belief or expectation of the speaker or hearer or to indicate the nonoccurrence of some event or state in the present or future.
11. The present perfect is used to refer to an indefinite event that occurred in the past but whose result still obtains.
12. The present perfect is used, often with adverbial phrases of duration, to refer to a state or event starting in the past and leading up to the present.

SAMPLE SENTENCES USED TO ELICIT METALINGUISTIC KNOWLEDGE

请用汉语解释与下列句子中 **the**（下面划有横线）用法有关的语法规则 。

1. Richard borrowed a book and a magazine, but he only returned the book.
2. The aeroplane has revolutionized travel.

请用汉语解释与下列句子中 **a/an**（下面划有横线）用法有关的语法规则 。

3. An old farmer saw a horse on his farm.
4. A leopard is a very dangerous animal.

请用汉语解释为何在下列句子所含划线名词前使用零冠词（不用 **the** 或 **a/an**） 。

5. Every morning, he wakes up to hear birds singing in the trees.
6. Gold is a precious metal.

请用汉语解释与下列句子中所使用的时态（下面划有横线）有关的语法规则 。

7. He is interested in what is going on.
8. Will you give her my message when she comes back?

请用汉语解释与下列句子中所使用的时态（下面划有横线）有关的语法规则 。

9. My brother went to Africa last year.
10. If he were here, he would be able to help us a lot.

请用汉语解释与下列句子中所使用的时态（下面划有横线）有关的语法规则 。

11. Who has broken the window?
12. We have been good friends since 1972.

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APPENDIX B

PROTOTYPICALITY JUDGMENT TEST

下列十二条语法规则涉及六个英语结构的两种不同用法。每条规则附有一个说明例句。这些规则按所涉及的结分成六组。在涉及同一结构的两条规则中，你认为哪一条规则描写的用法是该结构比较典型的用法？

定冠词

规则 1：用在一个可数名词单数形式前，表示该名词所指乃整个类别。
例句：The cat has been a domestic pet for thousands of years.

规则 2：用在一个上文已直接或间接提到的普通名词前，表示该名词所指的人或事物是谈话双方共知的。
例句：A dog is chasing a cat. The cat is in trouble.

不定冠词

规则 1：用在一个可数名词单数形式前，使该名词所指的人或事物代表整个类别。
例句：A dog is man's friend.

规则 2：用在一个可数名词单数形式前，表示谈话双方无法根据上文确定该名词所指的人或事物，即谈话中第一次提到的人或事物。
例句：A dog is chasing a cat.

零冠词

规则 1：用在一个可数名词复数形式或一个不可数名词前，泛指该名词所指的一类人或事物中的一部分。
例句：Every morning, he can hear birds singing in the tree.

规则 2：用在一可数名词复数形式或不可数名词前，使该名词所指的人或事物代表整个类别。
例句：Birds have been on the earth for millions of years.

一般现在时

规则 1：用在条件或时间状语从句中，表示将来发生的事情。
例句：When he finds out the truth, he will be very unhappy.

规则 2：用在表示状态的动词上，表示目前存在的某一状态。
例句：He is very unhappy because his girlfriend has left him.

一般过去时

规则 1：用在虚拟从句中，表示现在和将来不可能发生的情况或纯然假设的情况。
例句：If he were here, he would help us to solve this problem.

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规则 2： 用在表示动作的动词上，表示过去发生的一个特定动作或事件 。
例句: Last night, he went to the airport to meet his friend.

现在完成时

规则 1： 用来表示过去发生的某个动作，其结果对现状有影响 。
例句: I have seen the film you are talking about.

规则 2： 用来表示一个从过去持续到现在的状态或情况 。
例句: I have been in this city for two years.

APPENDIX C

VERSION 1

Each version of the original instrument contained 60 erroneous sentences or passages. For the sake of space, only those that contained errors involving the target uses under investigation are reproduced here. These were administered in scrambled order rather than the order presented here.

下列各题中的语句有错误或不恰当，请将它们改正确 。
请不要背离原意并将所有的句子完整写出 。

1. A woman and an old man came to see John. Old man introduced himself as John's uncle.
2. Cow is a useful animal.
3. When he came back from his holiday, he brought three things: old watch, beautiful knife, and new camera.
4. Foreign correspondent is a reporter who is stationed in a foreign country by a news agency.
5. There are the beautiful flowers and apple trees in my garden, where I work and spend my spare time.
6. The plants need sunlight, oxygen and water to live and grow.
7. She was very sad, because she knows that we are leaving her on Saturday.
8. We'll start as soon as you will be ready.
9. He has moved out last Monday.
10. If he is with us, we would feel much better now.
11. Mrs. Jackson: Where are the apples I bought yesterday?
    Her three sons: They had all been eaten.
12. My friend lived in Singapore since 1982.

VERSION 2

下列各题中的语句有错误或不恰当，请将它们改正确 。
请不要背离原意并将所有的句子完整写出 。

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1. Jack borrowed a bike from a friend, but when he rode it one of wheels fell off.
2. Cat is a domestic pet.
3. They came to my birthday party and gave me three birthday gifts: nice pen, lovely tie, and beautiful album.
4. Journalist is a person who writes for a newspaper or a magazine.
5. We now know that people who smoke the cigarettes every day are more likely to suffer from cancers.
6. The birds are creatures with feathers and wings.
7. I was worried about his safety, for I haven't heard from him since last Saturday.
8. I'll let you know if I'll hear from her.
9. I have gone to see him last Friday.
10. If I am you, I would invite her to come.
11. Mr. Richard: Where is your sister?
    Mr. Ellis: She had gone to Chicago.
12. How long was it since you last visited your parents?