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INTRODUCTION: COGNITIVE PERSPECTIVES ON DIFFICULTY AND COMPLEXITY IN L2 ACQUISITION

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INTRODUCTION

The theme that runs through the contributions to this special issue is *difficulty*, an important yet challenging theme in second language acquisition (SLA) that, after the demise of the contrastive analysis hypothesis (e.g., Stockwell, Bowen, & Martin, 1965), has only been latent in second language (L2) research; however, it has been attracting renewed and more explicit interest in the wake of the recent surge of research on language *complexity* (e.g., Bulté & Housen, 2012; Miestamo, Sinnemäki, & Karlsson, 2008; Ortega, 2012; Pallotti, 2015; Trudgill, 2011), and its scope and significance are becoming increasingly clear. This special issue addresses the question of what makes learning some aspects of L2 grammar more or less difficult, arguing that this question can only be properly understood by reference to the synergistic influence of properties of the L2 *target feature* (e.g., linguistic complexity, frequency, and salience; DeKeyser, 2005; N. C. Ellis, 2006), the *learning conditions* (e.g., implicit vs. explicit learning; de Graaff & Housen, 2009; R. Ellis, 2006; Long & Robinson, 1998), and the *individual learner* (e.g., attention and awareness, working memory, and language aptitude; Juffs & Harrington, 2011; Sawyer & Ranta, 2001; Wen, Borges Mota, & McNeill, 2015).

Despite its importance in SLA, difficulty has rarely figured explicitly as a primary research variable, and relevant findings have mostly appeared in isolated publications (e.g., Collins, Trofimovich, White, Cardoso, & Horst, 2009; DeKeyser, 2005; R. Ellis, 2006; Goldschneider & DeKeyser, 2001; Li, 2013; Ozeki & Shirai, 2007; Roehr & Gánem-Gutiérrez, 2009).

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To our knowledge, there has been no recent single volume devoted to the intricate interactions between the various types of factors that ultimately determine L2 difficulty and thus L2 learning outcomes (yet see Robinson, 1996, 2002). In addition, the study of difficulty in SLA has been plagued with terminological difficulties, conceptual confusion, and misunderstandings of its relationship with other related yet conceptually distinct constructs such as linguistic complexity, learnability, and developmental stages and orders of acquisition. In this article we therefore explain what we mean by *difficulty* and propose a taxonomic framework (see Figure 1) that can be used as a starting point for the systematic study of the nature and role of difficulty in SLA.

WHAT IS SECOND LANGUAGE DIFFICULTY?

Key to understanding how a second language is learned is understanding the difficulties that are associated with it. There is ample evidence, both anecdotal and scientific, that second language acquisition is indeed difficult (at least when compared to some other types of human learning like first language acquisition) and that certain aspects of learning a second language are more difficult than others (DeKeyser, 2005; Marsden, Williams, & Liu, 2013). There is no consensus, however, on what the difficult aspects of an L2 are, and what it is that makes these aspects difficult, nor has the more fundamental question of what L2 difficulty actually entails been explicitly addressed. Second language difficulty has rarely been thoroughly theorized (yet see Collins et al., 2009; DeKeyser, 2005; N. C. Ellis, 2006; Robinson, 1996, 2005), although indirect information about what L2 difficulty entails, or what difficult aspects of L2 learning are,

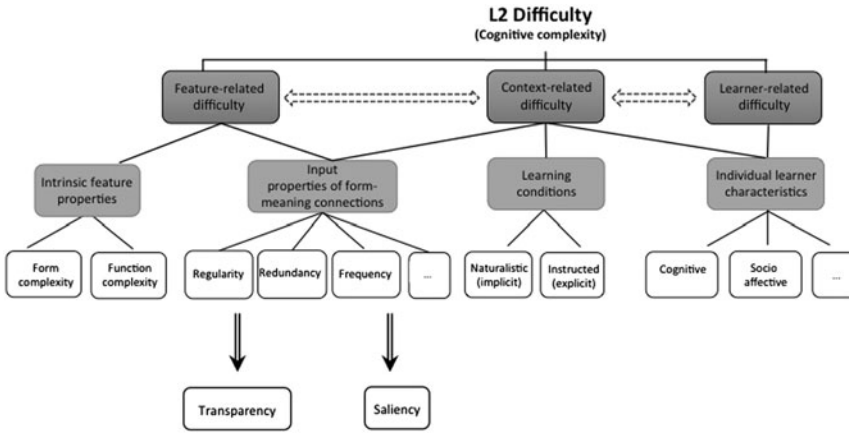


Figure 1. A taxonomy of L2 difficulty.

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can be found in various other research strands, such as in studies on ultimate attainment in SLA, learnability and teachability, developmental patterns and orders of acquisition, fossilization, attrition, and the effects of instruction.

In the absence of a generally accepted definition, previous studies have often simply stated certain L2 features (e.g., English articles, Spanish prepositional objects, or French direct objects pronouns) to be "hard," "complex," "challenging," "problematic," or "difficult" for L2 learners. A smaller body of research has explicitly contrasted two or more grammatical features differing in difficulty in a single study, often with the aim of investigating their susceptibility to implicit and explicit learning. Examples here include different types of English interrogatives (Mackey, 1999) and relative constructions (Ammar & Lightbown, 2005; Izumi, 2002), inversion versus pseudoclefts (Robinson, 1996), passive voice versus adjectival participles (Williams & Evans, 1998), regular past *-ed* versus comparative *-er* (R. Ellis, 2007), French negation versus passives (Housen, Pierrard, & Van Daele, 2005), Dutch degrees of comparison and verb-final word order (Andringa, De Glopper, & Hacquebord, 2011), and locative suffixes versus consonant alternation in semi-artificial Finnish (Alanen, 1995). The contrasts in these studies are typically based on such considerations as a feature's early versus late emergence in language development, its proneness to error in learner productions, or its complexity (see subsequently) (Housen, 2014; Spada & Tomita, 2010).

However useful these examples may be, there are problems with such an inventory approach and with the operational criteria on which they are (often implicitly) based. Though it may be relatively simple to distinguish between difficult and less difficult features within a single study, it is often not clear how such distinctions should be operationalized in more general terms so that findings can be compared. There is also insufficient empirical information about the developmental timing of most language features in most target languages for this criterion to serve as a reliable metric for operationally determining L2 difficulty. Moreover, equating difficulty with, for instance, late-acquired, error-prone, or complex features will not in itself explain *why* some L2 features are difficult to acquire. More generally, circularity looms when defining the difficulty of a feature in terms of its developmental timing, accuracy, or linguistic complexity while at the same time explaining its developmental timing, error proneness, or linguistic complexity as a function of its difficulty. Finally, the approach taken by previous research often assumes that difficulty is an absolute, static property of language features that essentially resides in their linguistic makeup (i.e., their "complexity"), and thus that a given feature will be equally difficult for all learners, at all times and in all contexts, an assumption that does not withstand even superficial scrutiny.

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Clearly, a more explicit characterization of difficulty as a theoretical construct is needed, if only to establish the construct validity of the difficulty criteria and metrics employed in empirical research (Bulté & Housen, 2012; Pallotti, 2009). Attempts at defining L2 difficulty have recently been made in the frame of recent research on language complexity (Bulté & Housen, 2012, 2014; Miestamo, 2008; Pallotti, 2009, 2015). Indeed, many previous studies have used the term *complex* (vs. *simple*) instead of, or alongside, *difficult* (vs. *easy*) language features. However, the term *complex(ity)* as used in the L2 literature is polysemous and ambiguous (Bulté & Housen, 2012, 2014; Ortega, 2012; Pallotti, 2009, 2015). To redress this situation, contributions to this issue adhere to a specific cognitive definition of complexity, which is related to but conceptually and analytically distinct from structural complexity (Bulté & Housen, 2012; Miestamo, 2008; Pallotti, 2015). *Structural complexity* (also *linguistic* or *absolute complexity*) refers to the inherent linguistic properties of a language feature or (sub)system and is typically operationalized in terms of the number and variety of the discrete components of which a language feature consists, and the number and nature of their internal relationships and interconnections with other features. *Cognitive complexity* (also *relative complexity*) has to do with how costly, demanding, or difficult a given language feature is for a given language learner in a given learning context, particularly in terms of the mental resources allocated and cognitive mechanisms deployed in processing and internalizing the feature. Cognitive complexity is different from structural complexity in the sense that the structural complexity of a language feature can contribute to its cognitive complexity, but it does not coincide with it. As the contributions to this special issue argue and demonstrate, and as is outlined subsequently, other factors also contribute to cognitive complexity. To avoid terminological confusion, we use the shorthand term *difficulty* in this article when cognitive complexity rather than structural complexity is intended, following Bulté and Housen (2012) and Pallotti (2009).

Thus defined, L2 difficulty can be operationalized and empirically gauged by means of subjective, holistic ratings (e.g., by experts, language teachers, or language learners themselves; see Rodriguez Silva & Roehr-Brackin, 2016), introspective methods (e.g., think-aloud protocols; see also Cerezo, Caras, & Leow, 2016), objective measurements of time spent on task (e.g., reaction times; see Godfroid, 2016), or psychophysiological measures such as brain activity (e.g., Event-Related Potentials; Morgan-Short, Sanz, Steinhauer, & Ullman, 2010) and eye movements (e.g., eye tracking; Godfroid & Uggen, 2013; Simoens & Housen, 2016). In sum, a language feature is more difficult than another if its processing and learning requires more time and/or more mental activity from a particular language learner in a particular learning context.

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Definitional and operational issues aside, it is clear that L2 difficulty is not a monolithic and static notion but, rather, a multifaceted and dynamic construct that results from a number of factors that interact in determining L2 difficulty. These factors pertain to the subject of the learning (the L2 learner), to the learning target (the L2 features), and to the context of learning (learning conditions). Although there is no consensus as to what the relevant factors exactly are, we can make a first broad distinction between *subjective*, *learner-related* factors and *objective*, *feature-related* difficulty factors (Figure 1; DeKeyser, 2005, 2016).

Subjective, Learner-Related Difficulty

Subjective, learner-related—or *(intra)individual*—difficulty results from the encounter of language features with the language learner's individual capacities and abilities. It speaks to the obvious yet basic fact that what is difficult for one L2 learner may be not or less difficult for another. At the core of the learner factors that mediate L2 difficulty are individual differences in cognitive abilities, particularly in language aptitude and its various subcomponents (Carroll, 1981; Robinson, 2005; Yalçin & Spada, 2016), working memory (Daneman & Carpenter, 1980; Juffs & Harrington, 2011; Tagarelli, Ruiz-Hernández, Vega, & Rebuschat, 2016), and implicit and procedural learning ability (Granena, 2013; Morgan-Short, Faretta-Stutenberg, Brill-Schuetz, Carpenter, & Wong, 2014; Suzuki & DeKeyser, 2015; Tagarelli et al., 2016; Yalçin & Spada, 2016). Other relevant learner factors include the learner's previous knowledge—in particular, knowledge of the first language or another previously learned language (and its correspondence to the L2; Della Putta, 2016), overall L2 proficiency and stage of L2 development (Pienemann, 2005), and certain socioaffective and personality factors (e.g., motivation, extraversion, and anxiety; Dörnyei, 2005; Robinson, 2002). These individual learner differences are core ingredients of L2 learning difficulty; they constitute the difficulty that the learners themselves bring to L2 learning. This chimes with DeKeyser (2003, p. 331), who characterized subjective difficulty as the ratio of a language feature's inherent linguistic complexity to the learner's ability to handle such a feature. This brings us to the second major source of L2 difficulty: the difficulty that stems from the L2 target feature itself.

Objective, Feature-Related Difficulty

Some language features are more cognitively demanding for all language learners, irrespective of their individual learner characteristics. This

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represents objective, feature-related—or *interindividual*—difficulty and constitutes the second broad source of learning difficulty. For taxonomic purposes, objective, feature-related difficulty can be seen as resulting from two closely related types of factors: from a feature's intrinsic properties, on the one hand, and from how a language feature appears in the input, on the other hand. The first factor here closely corresponds to the notion of structural complexity mentioned earlier. The intrinsic, structural complexity of language features or systems crucially depends on one's linguistic theory, of which there are many (e.g., generative, typological, or cognitive linguistics). Hence, what is complex in one theory may be less complex in another.

Avoiding allegiance to a particular theory, L2 scholars such as DeKeyser (1998, 2005, 2016) and Doughty and Williams (1998) have further distinguished between formal and functional dimensions of the intrinsic structural complexity of L2 features. L2 complexity research has most frequently been concerned with aspects of *formal complexity*, which includes such factors as the structural "substance" of a linguistic element in terms of the number and nature of its constituent components (e.g., English *-ing* vs. *-s*), the number of positional variants of a feature (e.g., *-ing* has no allomorphs, whereas *-s* has three), or the number of operations needed to derive a target form from a base form (e.g., forming passive clauses from underlying active structures). *Functional* (also *conceptual*, *semantic*) *complexity* refers to the number and nature of the meanings and functions expressed. For instance, some meanings are said to be less prototypical, embodied, or iconic, or more interconnected, specific, abstract, or multilayered, and, hence, conceptually more complex than others (e.g., grammatical tense vs. grammatical aspect or grammatical vs. biological gender). Hendriks and Watorek (2011) illustrate research on functional complexity in SLA.

But linguistic forms, their meanings, and their functions do not present themselves to the learner in isolation; rather, as DeKeyser (2005, 2016) stresses, what matters is how forms and functions of features are mapped onto each other. This is as much a function of the language features themselves as of the (linguistic and sociolinguistic) context in which they are used. Relevant factors here include the *multiplicity* and *regularity* of form-meaning mappings, which in turn determine their *transparency* (or *opacity*) in the input. Linguistic constructions with a regular, one-to-one mapping between form and meaning (e.g., the English superlative marker *-est*, meaning "most") are more transparent and assumedly less difficult than features with irregular or multiple mappings between form and meaning (e.g., the English *-s* suffix, which can express plural, genitive, and agreement forms; as an agreement marker it moreover syncretically marks third person + singular number + present tense). Other factors that may cloud the transparency of a feature's form-meaning connection include its communicative *redundancy* (e.g., plural *-s*

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has more semantic-communicative value than 3sg *-s*, which is largely redundant) and *optionality* (e.g., null pronouns in Spanish and Italian or the French negative *ne*). Thus, linguistic phenomena such as *polysemy*, *homonymy*, and *ambiguity* (one form, multiple meanings); *allomorphy* and *synonymy* (one meaning, multiple forms); *regularity*; *optionality*; and *communicative redundancy* all refer to characteristics of linguistic features that conspire to make their form-meaning mapping in the input more or less transparent. These factors further interact with other input-related properties of linguistic features, such as their frequency of occurrence, to make a feature more salient and accessible to the learner's perceptual-cognitive apparatus and, hence, more or less difficult to learn. *Salience*, an increasingly prominent notion in the cognitive study of SLA, is itself a composite, multicomponential, and multidimensional concept in search of a construct definition and valid operationalizations, as N. C. Ellis (2016) demonstrates.

The feature-related difficulty sources mentioned previously operate under contextually constrained learning conditions. The relative salience, frequency, and transparency of the form-meaning mapping are not static properties of linguistic features but are malleable and can thus vary from learning context to learning context. Of particular relevance here is the distinction between naturalistic, unguided learning contexts, in which these factors arise incidentally and are primarily processed implicitly, and instructed, structured, or guided learning contexts, in which explicit attempts are made to direct learners' cognitive resources to the targeted form-meaning mappings by enhancing their transparency, modifying their input frequency, or otherwise increasing their salience so that, ultimately, their learning difficulty is mitigated. In this view then, the essential role of instruction, and by extension the learning context as a whole, is to reduce L2 learning difficulty by manipulating the relevant feature-related factors, in addition, of course, to manipulating relevant learner-related factors as well as the interactions between feature-related and learner-related factors.

The distinction between naturalistic/implicit and instructional/explicit learning contexts is also related to the nature of the learning target. In addition to being exposed to language features and their form-meaning associations in naturalistic and structured input, instructed L2 learners are often also provided with metalinguistic propositions (typically called "grammar rules") describing or explaining the form, function, and use of linguistic features. Importantly, pedagogical language rules are different from the underlying target language features themselves (i.e., from the perceived or intuited "rule-like" patterns of covariance in the input) and, likewise, the complexity of a language feature and the complexity of its corresponding pedagogical rule are not the same (e.g., simple patterns of structural covariance can be described by means of either simple or elaborate metalinguistic propositions; Housen et al., 2005).

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Rodríguez Silva and Roehr-Brackin (2016) relate the distinction between pedagogical-metalinguistic rules, on the one hand, and the underlying linguistic representations that these rules aim to capture, on the other hand, to the distinction between implicit and explicit knowledge in SLA. Pedagogical rules may be either difficult or easy to learn as explicit, declarative knowledge, but the complexities of the underlying language features themselves relate primarily to the difficulty of learning them as implicit knowledge (as determined by their objective intrinsic and input-related complexity differentials; see also Dietz, 2002; R. Ellis, 2006; Housen, 2014; Rodríguez Silva & Roehr-Brackin, 2016). In contrast, the complexity and explicit learning difficulty of pedagogical language rules are a function of factors such as the *elaborateness* (the number of concepts, steps, subrules, or criteria they contain), *conceptual clarity* (amount and degree of technicality of metalanguage used), *scope* (with general rules vs. specific rules), and *reliability* and *truth value* (number of exceptions) of the rules (Hulstijn & de Graaff, 1994; Dietz, 2002; Rodríguez Silva & Roehr-Brackin, 2016).

Determining the exact nature and the relative weight of the various factors that contribute to feature-related, learner-related, or context-related difficulty is a task for future SLA research. However, no matter how insightful the outcomes of such endeavors will be, they will not suffice for predicting actual learning success in L2 learning because, as stated earlier and as several contributions to this issue argue (e.g., DeKeyser, N. C. Ellis, Della Putta, Tagarelli et al., Yalçin & Spada), the essence of L2 difficulty resides not in any of these factors in and by themselves but, rather, in how they interact. The importance of studying such interactions has already been stressed by DeKeyser (2003), who wrote that "the study of the three-way interaction between aptitudes, treatments and psycholinguistic features of the learning targets can provide much more insight into all three of these factors than the study of any one of them in isolation can hope to accomplish" (p. 337). So far, however, few studies have responded to DeKeyser's call by investigating how the various factors interact in determining L2 learning difficulty and, ultimately, in understanding learning outcomes in SLA (see Robinson, 1997, for a rare exception).

RATIONALE FOR AND OVERVIEW OF THE ISSUE

With these issues in mind, our goal in compiling this special issue has been to bring together new, theoretically motivated, and methodologically rigorous experimental studies that together form a cross-section of current research on difficult aspects of L2 grammar acquisition. The six feature articles in this issue display the range of goals, the breadth of scope, the diversity of methods, the emerging trends, and the challenges

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in this domain of research, while at the same time offering new empirical results that advance our understanding of the nature of difficulty in SLA. To this end, we have invited contributors who investigate the learning of a wide range of difficult L2 features from a variety of L2s that have not or have rarely been studied before, and we have asked the authors to explicate their definitions and operationalizations of L2 difficulty. In the first study, Godfroid investigates the learning of strong, stem vowel changing verbs in German, a case of allomorphy whose difficulty results from its communicatively redundant and perceptually nonsalient nature. The second study, by Della Putta, examines the difficulty of learning two nonsalient syntactic structures in L2 Italian: the prepossessive determiner article (PPDA) and the prepositional accusative (PA). Although both structures pose specific learning difficulties for Spanish-speaking learners of Italian (SSLI), the PPDA is hypothesized to be less difficult for SSLIs than the PA, as they have to learn the PPDA on the basis of positive evidence in the Italian input, whereas they have to "unlearn" the PA, a syntactic pattern deeply entrenched in their L1 yet absent in the L2, on the basis of indirect negative evidence. The third article, by Yalçin and Spada, compares the learning by L1 Turkish speakers of two English grammatical structures—passives (difficult) and past progressives (simple)—that have contrasting learning difficulty due to differences in structural complexity, transparency of form-meaning connections, input frequency, and salience. The next article, by Cerezo, Caras, and Leow, examines how L1 English speakers learn four types of Spanish *gustar* constructions of varying difficulty operationalized in terms of differences in structural complexity and in the number of steps that learners must take to process each subtype. The fifth study, by Tagarelli, Ruiz, Vega, and Rebuschat, looks at three German-like verb-placement rules in a semi-artificial language that differ in structural and cognitive complexity in terms of the number of clauses per T-unit and the position of the subordinate clause relative to the matrix clause involved. Finally, Rodríguez Silva and Roehr-Brackin take an alternative approach to operationalizing L2 difficulty by comparing L2 learners' and L2 teachers' perceptions of the difficulty of 13 English grammatical structures (e.g., if clauses, dative alternations, and verb complements) against predictions of the implicit and explicit L2 learning difficulty of the same 13 structures based on the range of factors introduced in the preceding paragraphs.

Importantly, the contributors to this issue do not see L2 difficulty as resulting from purely objective linguistic factors only (as in much previous research) but, rather, acknowledge that L2 difficulty, and ultimately L2 learning outcomes, emerges from the complex synergies of linguistic factors with learner factors and contextual factors. For instance, Della Putta examines how the relative difficulty of the two target features in his study is mediated by two instructional learning conditions, one providing

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textually enhanced input and the other traditional classroom exposure. Cerezo et al. also address the interaction between feature-related and context-related factors by investigating how the difficulty of processing and learning the Spanish *gustar* constructions is influenced by three types of learning contexts: guided induction, deductive instruction, and an uninstructed control context. Yalçin and Spada address the issue of the two-way interaction between linguistic factors and individual learner variables (i.e., subjective difficulty) by investigating the role of language aptitude when learners are faced with learning easy and difficult L2 features. Finally, the study by Tagarelli et al. is particularly noteworthy because it is one of the first interaction studies in this domain to venture beyond first-order, two-way interactions to investigate how L2 learning difficulty arises from the three-way interplay among linguistic factors (structural complexity), contextual factors (the incidental vs. instructed condition), and individual learner variables (working memory and procedural learning ability).

Although the various types of variables contributing to L2 difficulty are addressed differently in each contribution, and not all authors explicitly foreground L2 difficulty, the theme of L2 difficulty nevertheless provide a larger backdrop for the issue. At the same time, the contributions go beyond the general theme of difficulty in SLA by addressing other issues of current interest, such as the nature and role of aptitude (Yalçin & Spada), working memory (Tagarelli et al.), attention and awareness (Cerezo et al., Godfroid, Tagarelli et al.), implicit and explicit knowledge (Cerezo et al., Della Putta, Godfroid, Rodriguez Silva & Roehr-Brackin, Tagarelli et al.), and the effects and effectiveness of various forms of implicit and explicit instruction (Cerezo et al., Della Putta, Godfroid, Tagarelli et al.). In addition to the six feature articles, we have also invited two leading experts to comment on the themes of the issue and on its contributions. Nick Ellis offers an in-depth discussion of salience, one of the strongest predictors of L2 learning difficulty and outcomes, arguing that its study is best couched in the theoretical frameworks of emergentism and complex, usage-based adaptive systems. Finally, the commentary by Robert DeKeyser elaborates on the taxonomy outlined in this article and provides an elaborate discussion of the multiple factors that conspire to determine learning difficulty, again stressing how they interact while also acknowledging the challenges posed by the study of these interactions.

Collectively, the contributions to this special issue show that investigating L2 learning difficulty is a daunting but essential and fascinating undertaking: It is daunting because of the multidimensional nature of L2 difficulty; the complex interacting effects of learner-related, feature-related, and context-related variables; and the many challenges, both conceptual and methodological, that their investigation presents. It is also essential and fascinating because the study of L2 difficulty has the

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potential to shed light on how different aspects of L2 grammar are learned, and how this in turn implicates theory construction in SLA and L2 teaching practice alike.

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