

Fossilization—A classic concern of SLA research*

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Introduction

A frequently noted fact out of a spectrum observed of second language acquisition (SLA) is that in almost all post-pubescent learners, learning stagnates, in spite of all or any favorable conditions that would otherwise propel it (Gass and Selinker, 2008; Sharwood Smith, 1994; Towell and Hawkins, 1994; VanPatten and Williams, 2007). Whereas this fact itself has largely remained a conundrum—withstanding abundant speculations that exist, it is further complicated by two additional facets, selectivity and variability. That is, learners do not seem to stabilize prematurely within and across each and every linguistic domain (e.g., phonology, semantics, morphology, syntax), hence selectivity; nor do they all stall on the same linguistic elements, hence variability, even though noticeable overlap does exist, particularly in learners of the same first language background.

The phenomenon of truncated learning was first brought into sharp focus by Selinker (1972). Nearly 40 years have since elapsed. Where are we in terms of identifying the relevant data and theorizing about the lack of learning phenomenon metaphorically known as “fossilization”? In this chapter, I will trace the history of research, focusing, in particular, on the evolution of conceptual changes and the trajectory of empirical research, starting with a brief discussion of the theoretical status of the construct. Along the way, core issues will be highlighted. I will end the chapter with a sketch of future directions as well as with a brief discussion of the implications of fossilization research for second language (L2) instruction.

Historical discussion

The centrality of fossilization to SLA theory construction

The conception of “fossilization” (Selinker, 1972) as a central phenomenon of SLA stems first from a generic, impressionistic observation, as encapsulated in an oft-cited quote from Bley-Vroman (1989):

Few adults are completely successful; many fail miserably, many achieve very high levels of proficiency, given enough time, input, and effort, and given the right attitude, motivation, and learning environment. (p. 49)

This observation was corroborated by findings of empirical research, notably through data from a large-scale longitudinal study by the European Science Foundation of uninstructed L2 learners

(Perdue, 1993). The observation on the general lack of success in post-pubescent L2 learning was readily affirmed by research on other critical issues, such as the role of biological maturation (e.g., Hyltenstam and Abrahamsson, 2003; Long, 1990, 2005; cf., Byrnes, Chapter 31, this volume; DeKeyser, Chapter 27, this volume).

Researchers have reckoned that the percentage of L2 learners able to achieve native-speaker competence is nil to 5 percent (Bley-Vroman, 1989; Long, 1990; Selinker, 1972; see, however, Birdsong, 1999; Montrul and Slabakova, 2003; White and Genesee, 1996), meaning that the vast majority, that is, 95 percent or more, of L2 learners stop short of that level of attainment. Given the stark asymmetry between the success and the failure rate, it only stands to reason that it is the vast majority of L2 learners, not the small number of “outliers” like a learner named Julie reported in Ioup *et al.* (1994), that should be the source of relevant data for SLA theory construction. Selinker (1972, p. 212) argues that the 5 percent successful learners “may be safely ignored—in a counterfactual sense—for the purposes of establishing the constructs which point to the psychologically-relevant data pertinent to most second-language learners” (see, however, Birdsong, 2004, 2006).

In the earliest conception, the term “interlanguage,” referring to an imperfect yet autonomous linguistic system created in the course of L2 learning, was almost synonymous with “fossilization” (Selinker, 1972); many have even claimed that the latter is really what had spurred the field of SLA into existence (Han and Selinker, 2005; Long, 2003). However, the general perception of fossilization has evolved over the years: In the contemporary view, fossilization remains a central characteristic of interlanguage (Bley-Vroman, 1989) and continues to serve as a touchstone for the adequacy of theories of SLA. In Larsen-Freeman’s (2006) words, “fossilization provides the stage where issues central to SLA play out . . . In order to account for learning, the province of SLA, we should be able to say not only what it is, but also when and why it cannot or does not occur” (p. 193).

By the fossilization “yardstick,” then, adequate theories must explain both learning and lack of learning (Gass and Selinker, 2008; VanPatten and Williams, 2007). As Bley-Vroman (2009) points out, “the theory must permit everything from the so-called near-native cases like Julie (Ioup *et al.*, 1994) to cases in which the acquired grammar is dramatically different from that of the input, like Schmidt’s (1983) Wes or Schumann’s (1978) Alberto” (p. 178). Updating his Fundamental Difference Hypothesis, Bley-Vroman underscores that “addressing the logical problem of foreign language learning¹ requires, in short, postulating an acquisition system that does not work reliably and does not [lead to convergent grammars]” (p. 178).

The sine qua non of fossilization

Given the theoretical import of fossilization, it would seem necessary to attain some uniformity in defining the construct among researchers and across studies. However, doing so has proven quite daunting.

In its inception (Selinker, 1972), the construct of fossilization was both phenomenological and epistemological, thus referring, on the one hand, to observable linguistic units that appear to have stalled short of the aspired targets and, on the other hand, to a cognitive mechanism.

Fossilization, a mechanism . . . underlies surface linguistic material which speakers tend to keep in their interlanguage productive performance, no matter what the age of the learner or the amount of instruction he receives in the target language. (Selinker, 1972, p. 229)

The terminological duality has, over the years, led to a proliferation of uses of the term, with its denotations running the gamut from low proficiency (e.g., Thep-Ackrapong, 1990), to typical

error (e.g., Kellerman, 1989), and to systematic use of erroneous forms (e.g., Allwright and Bailey, 1991), while prompting a greater number of speculations on the fossilization mechanism (for review, see Han 2004a). Thus, as Birdsong (2004, 2006) has aptly noted, fossilization has become a “catch-all” term, and as such, is theoretically and empirically vacuous. In a similar vein, Long (2003) indicates that the construct of fossilization conflates *explanandum* with *explanans* and is therefore ambiguous.

Another notable, conceptual development over the years is that by and large, the hypothesized scope of fossilization has expanded from being local to global. Consequently, fossilization is considered to affect not just discrete or isolated linguistic elements, as initially assumed, but rather, the gestalt of the interlanguage system. Selinker and Lamendella (1978), for instance, define fossilization as:

... permanent cessation of interlanguage learning before the learner has attained target language norms at all levels of linguistic structure and in all discourse domains in spite of the learner's positive ability, opportunity, and motivation to learn and acculturate into target society. (p. 187)

Bley-Vroman (1989) refers to fossilization as follows:

It has long been noted that foreign language learners reach a certain stage of learning—a stage short of success—and that learners then permanently stabilize at this stage. Development ceases, and even serious conscious efforts to change are often fruitless. Brief changes are sometimes observed, but they do not “take.” The learner backslides to the stable state. (pp. 46–47)

And similarly, Tarone (1994) states:

A central characteristic of any interlanguage is that it fossilizes—that is, it ceases to develop at some point short of full identity with the target language. (p. 1715)

The term fossilization has, therefore, been utilized to characterize an ultimate stage or an end state of L2 learning (cf., Herschensohn, 2009). Notice, though, that the endstate view does not seem to preclude that fossilization is not ineluctable for some learners. Indeed, in Tarone *et al.* (1976), we can find a sub-categorization of L2 learners into the non-fossilized and the fossilized, suggesting (a) that not all learners will experience fossilization but (b) that some learners are doomed to failure at the outset (see, e.g., Washburn, 1991).

As it turns out, however, neither the endstate nor the fossilized learner view holds up to empirical scrutiny. SLA empirical research to date has shown unequivocal evidence of intra-learner variability; that is, individual learners have been found to achieve differential success across and within linguistic domains and subsystems. Success, in this context, is defined as “acquiring a grammar like that of a native speaker” (White, 2003a, p. 243). Longitudinal studies on fossilization, in particular, have provided compelling evidence that learning continues even in putatively “fossilized” learners (see, e.g., Lardiere, 1998, 2007). In short, fossilization has demonstrated to be local rather than global. Based on such findings, Han and Odlin (2006) hypothesize:

L2 acquisition will never have a global end state; rather, it will have fossilization, namely, permanent local cessation of development. (p. 8)

But what counts as local cessation of learning? Most of the definitions of fossilization proposed to date, though quite diverse, have collectively revealed three distinct properties: (a) persistent deviance from the target, (b) resistance to external influence, including explicit instruction and corrective feedback, and (c) being out of the learner's control. Notably, however, most definitions

have failed to cognize a fundamental premise on which fossilization was initially predicated. Selinker, from his earliest definition up until his more recent ones, has consistently emphasized the need for a number of learning conditions to be met as a preliminary to any discussion of fossilization. Thus, for determining fossilization, Selinker and Lamendella (1979) have stressed such conditions as the “ability, opportunity, and motivation to learn the target language and acculturate into the target society” (p. 373), which Han (2004a) later reformulates into “three preconditions”: (a) abundant exposure to input, (b) adequate motivation to learn, and (c) plentiful opportunity for communicative practice. Upholding these conditions is crucial, as it helps to ensure that the fossilization phenomenon is sufficiently circumscribed to be theoretically, empirically, and practically interesting and productive.

Han (1998, 2004a) offers a two-tier definition:

COGNITIVE LEVEL: Fossilization involves those cognitive processes or underlying mechanisms that produce permanently stabilized interlanguage forms.

EMPIRICAL LEVEL: Fossilization involves those stabilized interlanguage forms that remain in learner speech or writing over time, no matter what the input or what the learner does. (2004a, p. 20)

The purpose of the two-tier definition is to differentiate a theoretical and an empirical level at which fossilization can be described and theorized. Neither endeavor, as will be discussed in the sections that follow, has been quite adequate—notwithstanding that fossilization has been one of the few SLA constructs that have made its popularity, beyond SLA circles, with L2 practitioners.

Core issues

The study of fossilization faces a number of conceptual and empirical challenges. Some of these challenges have been systematically discussed in Long (2003), Lardiere (2007), and Han (2004b): Han (2004b) deals at length with what she sees as five central issues: (a) Is fossilization global or local? (b) Is L2 ultimate attainment isomorphic with fossilization? (c) Is fossilization a product or process? (d) Is stabilization synonymous with fossilization? And (e) Should empirical studies of fossilization span five years or more? Long (2003) poignantly addresses four empirical issues, among others: (a) assuming, not demonstrating, fossilization; (b) selecting inappropriate learners for study; (c) basing findings on insufficient data; and (d) using inadequate analyses. Similarly, Lardiere (2007) takes on several, including volatility.

In this section, I discuss two more. The first issue pertains to the nature of fossilization research, which, to some, showcases a practice of what Bley-Vroman (1983) has referred to as the “comparative fallacy.” Fossilization studies are allegedly parasitic on comparison of interlanguage with target language, and more specifically, of L2 learners with monolingual native speakers. A problem with such comparative practice is, as Larsen-Freeman (2006) aptly points out, that it overemphasizes surface deviance while overlooking other, deeper levels of interlanguage such as semantics and usage patterns that do not appear to involve errors of form. Han (2008) concurs and subsequently demonstrates (Han, 2010) that meaning can be a greater source of learning difficulty than form (cf., Bardovi-Harlig, Chapter 9, this volume; Slabakova, Chapter 8, this volume), lending support to Larsen-Freeman's (2006) claim that “because using a language requires using its elements accurately, meaningfully, and appropriately (Larsen-Freeman, 2001), surely inaccurate forms are not the only evidence of fossilization” (p. 194). Indeed, a growing number of studies of very advanced learners, including the oft-cited Ioup *et al.* (1994) study, have offered the insight that meaning and function or, rather, discourse syntax and semantics are the hardest to acquire, suggesting that those should be proper domains for fossilization research.

A paramount concern with the comparative approach, as Larsen-Freeman (2006) further notes, is its predication on “a particular view of language—a view of monolithic, homogeneous, idealized, static end-state competence, where language acquisition is seen to be a process of conformity to uniformity” (p. 194). She advocates, instead, a dynamic view of language which presumes no end and no state. While the no-end/no-state view is highly debatable in the context of L2 learning, fossilization researchers should certainly heed her admonition, namely that “While the concept of fossilization is inherently target-centric, researchers of it must take into account the fact that the target is not monolithic and is always moving, although, of course, different aspects of language change at different rates” (p. 195), and be highly circumspect when determining instances of fossilization.

In a completely different vein, Cook (1992, 1999, 2008) also raises doubts about the comparative approach. The crux of Cook’s argument is that the competence developed by L2 learners, dubbed “multi-competence,” is necessarily of qualitative difference from that of monolingual speakers. Comparing the two will, therefore, be meaningless and even misleading. Both research and pedagogical practices must therefore reconceptualize the goal of L2 learning, in his view: for research, instead of measuring L2 success against the native speaker norms and assuming that those are what learners have aspired to, profiles should be created of successful L2 learners against which to then evaluate the success or lack thereof of L2 learning in individual learners. For practitioners, Cook’s suggestion is that teaching should aim at aligning students with those profiles (see, however, Davies, 2003; Han, 2004c).

Though seemingly orthogonal, the multi-competence view and fossilization research are not entirely out of synch. The former simply rules out native-speaker competence even as a possibility for L2 acquisition, hence averting comparisons, while the latter seeks to document its psychological reality but, more importantly, to find its etiology and does so in reference to the target language. The comparative approach is necessary at times, as some have strongly argued (Birdsong, 2004; Franceschina, 2005; Lardiere, 2003). Han (2004c) suggests that native speaker data should be used only as an aid or a means to elucidate a learning phenomenon, not as an end, say, merely to present native-non-native differences as practiced in Romero Trillo (2002). Franceschina (2005) insightfully points out that to compare or not should be a decision made on the basis of “the aims of individual investigations and not by an *a priori* decision about what SLA researchers should or should not be interested in” (Franceschina, 2005, p. 18).

Still, if fossilization research is not about revealing surface deviance of a given interlanguage from its intended target but about uncovering an underlying mechanism of L2 acquisition, it appears that more attention should be given to the internal logic of interlanguage than to differences, as Bley-Vroman has counseled, and accordingly, that there should be less interlanguage and target language comparison but more within-interlanguage analysis, both in scope and depth.

A second issue that I wish to consider briefly here is whether or not the term fossilization should be extended to forms that have been acquired, and somewhat relatedly, whether or not fossilization and acquisition are driven by the same mechanism. R. Ellis (1985) argues that because fossilization is part of the interlanguage process, occurring at one point in time, there should be both fossilized errors and non-errors (see also, Vigil and Oller, 1976). Most researchers, however, hold that fossilization applies only to non-targetlike forms, conceptualizing fossilization as “a process that may occur in the second language acquisition context as opposed to first language acquisition” (Hyltenstam, 1988, p. 68).

Fundamentally, in tying fossilization to acquired forms, researchers conflate fossilization with stabilization. Their rationale is that just as non-targetlike features can stabilize, so can targetlike features be construed as a form of stabilization. This view is neither theoretically plausible nor

empirically and practically desirable (see discussion in the next section of different types of stabilization). At the very least, it masks rather than elucidates the complexity of second language learning, inasmuch as it lumps what may very well be disparate phenomena. SLA research over the past four decades has striven for a greater and finer-grained understanding of the learning process, outcome, and mechanism. Differentiating fossilization from other types of stabilization can therefore be crucial to a more sophisticated understanding of this unique learning and cognitive phenomenon of SLA. It would simply be a hard-sell argument that truncated learning, manifested as persistent deviance from the target, has followed the same cognitive process as for complete acquisition.

Perhaps a more interesting and substantive question with regard to fossilization and acquisition is whether or not they have the same underlying mechanism. Following the above line of thinking, although their processes may very well be different, it would nevertheless seem implausible that fossilization and acquisition each are driven by a different mechanism. Theoretically, it would not be enticing to posit two mechanisms, as doing so would compromise the parsimony of the theory, a well-sought-after virtue by theorists (Jordan, 2004). More important, it is difficult to argue that for a given L2 learner there are two mechanisms, one leading to learning and one to incomplete learning. Empirical findings on fossilization as local rather than global point favorably to the understanding that one mechanism drives two processes, with one “non-contaminated,” as in the case of acquisition, and the other “contaminated” or tempered with by the L1 (cf., Lardiere, Chapter 7, this volume), as in the case of fossilization. Fossilization, after all, is not zero learning but incomplete learning.

Such appears to have been the reasoning behind current theoretical approaches to accounting for acquisition and fossilization, such as the generative approach (see, e.g., Hawkins, 2000; Lardiere, 1998, 2007; Sorace, 1993, 2003; White, 2003b) and the connectionist approach (see, e.g., N. Ellis, 2006). From a somewhat eclectic perspective and with fossilization as her main explanandum, Han (2009) recently posited a Selective Fossilization Hypothesis, which proposes a unitary mechanism, made up of L1 markedness and L2 input robustness and their interaction, for both fossilization and acquisition. According to the hypothesis, predictions can be made, by examining the nature of L2 input such as frequency and variability and, similarly, the nature of the corresponding L1 feature such as its frequency and variability, about (a) what is acquirable, (b) not as acquirable, (c) fossilizable, and (d) not as fossilizable. The hypothesis further translates into a numerical model (a set of formulae) that enables the calculation of the interaction of L1 input robustness and L2 markedness vis-à-vis a given target feature and subsequently its fossilizability. Importantly, in this framework, *that* feature is not simply a form, but a unity (or lack thereof) of form, meaning, and function (Larsen-Freeman, 2001).

Data and common elicitation measures

To date, empirical research on fossilization has, primarily, been clinical rather than controlled or statistical, relying heavily on naturalistic data, the goal often being to isolate instances of fossilization. Typically, the methodology employed is a longitudinal case study, though cross-sectional studies exist as well, with the data analyzed more qualitatively than quantitatively.

Earlier studies on fossilization have relied exclusively on natural samples of learner language, drawn primarily from untutored learners (see, e.g., Agnello, 1977; Schumann, 1978; Shapira, 1978; Stauble, 1978). By way of illustration, Shapira (1978), for a year and a half, followed Zoila, a 25-year-old Guatemalan woman, a native speaker of Spanish learning English as the L2 without instruction. Data collected consisted of transcripts of conversation interviews conducted at three points in time, each interview session lasting from 30 to 45 minutes. The data were then analyzed

around ten grammatical structures: the plural *-s*, the third-person singular *-s*, plural NP subjects followed by the verb BE, BE copula, BE+ *V-ing*, negation of sentences with BE, negation of sentences with verbs other than BE, Yes/No questions, WH-questions, and possessive *-s*. Obligatory occasion analysis, which counts tokens of targetlike use, was carried out to assess and compare Zoila's production accuracy vis-à-vis these targeted constructions, both synchronically and diachronically, using 80–85 percent suppliance in all obligatory environments as the benchmark. Results indicated "little or quite insignificant development in the acquisition of any of the ten grammatical categories studied" (p. 248). Shapira then invoked biological, cognitive, affective accounts of a critical period (Lenneberg, 1967) to understand why there was little progress, arguing that (a) the putative biological changes—such as cortical lateralization—around puberty, (b) the cognitive and social changes induced by the onset of formal operations, and (c) psychological distance triggered by language and culture shock all might have been responsible for the fact that little progress had been made except in the area of fluency. In addition, learner strategies such as prioritizing communication over formal accuracy and L1 transfer were offered as potentially confounding factors.

It should be noted, however, that Zoila's learning was not a complete failure: Although little morphosyntactic progress was observed in her during the one and a half years, "a process of 'replacement' of transferred vocabulary by English equivalents" was attested (Shapira, 1978, p. 254), which suggests differential intra-learner interlanguage development. Similar findings were reported by Schmidt (1983, 1984) on Wes, an adult Japanese immigrant to Hawaii, whose ability to communicate displayed a steady and impressive rate of increase but whose grammatical development appeared to have made no progress over a period of three years. Thus, as MacWhinney (2006) has noted, "fossilization is not an across-the-board phenomenon. Rather, we find continual growth in some areas and relative stability of error in others" (p. 135).

The best-known early study on fossilization is that of Schumann (1978), a ten-month longitudinal case study. The subject, Alberto, was an adult native speaker of Costa Rican Spanish, who had resided in the USA for four months. In his home country, Alberto had received six years of instruction in the English language, at the intensity of two to three hours a week. He was reported to be able to "speak only a few words and phrases in English," limited to select topics such as work and shopping, at the onset of the study. The data comprised, primarily, 20 tapes of recordings of spontaneous conversations between Alberto and the researcher. Obligatory occasion analysis of the data, focusing on Alberto's use of the English auxiliary and its related structures, the negative, and the interrogative, showed little development in these areas over the ten-month period. Interestingly, in this study, the lack of progress was revealed also through comparison with other learners of a similar L1 background, shedding light on the idiosyncratic nature of fossilization. According to Schumann, several factors contributed to the lack of learning in Alberto, but two, in particular: social and psychological distance.

To the extent that the early studies such as the ones described above established, via longitudinal data, stabilization of morphosyntactic deviances from the target language, they are invaluable for their contribution to the inception of an empirical basis for fossilization. However, the methodological weaknesses of the early studies are also important, which mitigate their evidential credibility. For one thing, the fact that these studies all focused on early stage learners is enough cause for concern: Had the learners had enough exposure to the target language—one of the three preconditions for empirically determining fossilization? And how had they fared in terms of the two other preconditions, motivation and opportunity for communicative practice? Indeed, what the early studies offered by way of explanations often point to the lack of satisfaction of these conditions. That is, they indicated that the subjects neither had had much contact with the target language nor the opportunity to practice and/or the motivation to strive for accuracy.

Schumann's Acculturation Hypothesis (1978, 1986), for example, precisely claims that social and psychological distance from the target culture and language constricts exposure to input. Hence, it would not be an unreasonable contention that if those learners had had enough exposure and so forth, they might have progressed beyond the observed plateau.

Another major question that can be raised with the early studies is whether or not the observed stabilization equals fossilization. Han (1998; cf., Han, 2004a; Selinker and Han, 2001) distinguishes three underlying forces of surface stabilization. First, stabilization can result from a natural slow-down in the learning process. According to skill acquisition theory, learning (language learning included) is subject to the power law of practice; that is, learning heightens as a result of practice but gradually declines and plateaus, with further, repeated practice (DeKeyser, 2007; Verspoor *et al.*, 2008). Second, stabilization can stem from the initiation of mental activity, as can occur, for instance, in stage two of the well-documented U-shaped learning whereby learning behavior (a) starts out being targetlike as a function of mechanic imitation of stimuli, (b) then turns non-targetlike as a result of inception of a chain of analytic processes, and (c) eventually becomes targetlike again as a result of successful restructuring of mental representations. Finally, a third scenario of surface stabilization is that it can be a result of fossilization, in which case learning has ceased prematurely. Detection and differentiation of these different types of surface stabilizations can be challenging but not impossible. For example, applying multivariate statistical analysis to the data can determine whether learning has indeed come to a halt, as Berdan (1996) has demonstrated. In his reanalysis of Schumann's data using a statistical procedure called logistic regression, Berdan showed that "Alberto is in the process of acquiring negation" (p. 206), one of the structures that Schumann had adjudicated as fossilized. The change was non-dramatic, for sure, but "incontrovertible" (p. 237). It thus seems that what Alberto experienced was not fossilization, but rather, slow learning (see, however, Verspoor *et al.*, 2008).² Clearly, how to accurately determine fossilization remains a methodological challenge.

The stabilization/fossilization intricacy is compounded by another phenomenon which Long (2003) has referred to as "volatility." Long's concern is counter-evidence: What constitutes counter-evidence to claims of fossilization? He argues that stabilization and variation are mutually exclusive (cf., Birdsong, 1999). Other researchers, such as Schachter (1996), Lardiere (2007), and Han (2004a, 2006), have argued and demonstrated that there can be fossilized variation.

Unlike the studies conducted in the 1970s and the early 1980s which focused on early-stage, untutored learners, fossilization research conducted in the mid-1980s through the mid-1990s turned its attention to instructed learners. In most cases, researchers would employ corrective feedback as a strategy to gauge fossilization, reasoning that if the efficacy is nil to low for the perceptually persistent interlanguage forms, then those forms may have fossilized (see, e.g., Lin, 1995; Mukattash, 1986; Schouten, 1996; Thep-Ackrapong, 1990; Washburn, 1991). Studies of this nature were liable to the same criticisms leveled at the earlier studies in that they, too, did not ensure that the subjects had been learning under exogenously and endogenously favorable conditions. Furthermore, they operated on premises about corrective feedback that current research has proven false. For example, it was tacitly assumed that corrective feedback is a one-way process involving transactions from a giver to a receiver, and/or that corrective feedback should be equally effective for every linguistic feature.

Since the mid-1990s, researchers have gradually moved away from early-stage learners to so-called endstate learners, that is, learners who, as defined by White (2003a), "have completed their L2 acquisition" and who are "no longer L2 learners but, rather, bilingual (or multilingual) speakers or users of the L2" (p. 241). Two types of endstate learners have been examined thus far: those who have reached a high level of proficiency and subsequently had extended immersion, and those who have been long-term residents (five–ten years), in the target language society but who

nevertheless have not reached a high level of proficiency. Because the three preconditions (i.e., input, motivation, and opportunity for practice) can be quite safely assumed with either type of endstate learners, they, arguably, offer the best testing ground for fossilization: Whatever deviance can be found in them is most likely to have persisted for a long time and least likely to change (cf., Sorace, 2003).

Studies focusing on endstate learners are generally either longitudinal or non-longitudinal. The longitudinal studies tend to last longer (\geq ten years) than their counterparts in the early days (\leq two years). One such study can be found in Lardiere (1998), a single case study lasting nearly ten years focusing on a subject named Patty. A native speaker of Chinese, Patty had resided in the USA for 18 years and was married to a native speaker of American English, the target language. Interview data were collected at three points over time, and the analytical focus was on Patty's use of pronominal case marking and past-tense inflectional morphology. Obligatory analysis with frequency counts over time provided indisputable evidence of fossilization, importantly, as a local phenomenon: Patty's past-tense marking in an eight-year period. However, her pronominal marking was fully target-like. (For analysis of other aspects of Patty's grammar and similar findings, see Lardiere, 2007.)

Unlike the studies undertaken in the 1970s and 1980s, a marked methodological development in the more recent longitudinal studies is the variegation of data. Instead of relying on one type of data, researchers employ a combination of multiple data types, including, but not limited to, natural and clinically elicited samples of learner production (Ellis and Barkhuizen, 2005). For instance, in Han (2000, 2006, 2010) naturalistic writings were sampled from the case subject(s) over time and, concurrently, data were elicited via translation and acceptability judgment tasks. Thus, multiple perspectives were staged for co-constructing and/or co-verifying evidence of fossilization and for elucidating its nature and etiology.

The majority of the contemporary studies on endstate learners are, distinctly, non-longitudinal (see, e.g., Coppieters, 1987; Franceschina, 2005; Hopp, 2004; Liu, 2007; Montrul, 2002; Papp, 2000; Sorace, 1993) and controlled. They typically focus on very advanced learners or so-called "near-native speakers," that is, L2 learners who "have reached a level of surface equivalence with native speakers in language use and proficiency" (Coppieters, 1987, p. 547), using nonlinguistic data such as acceptability judgments and reaction times (Ellis and Barkhuizen, 2005). Sorace (1993), for example, explored near-natives' intuitions regarding constructions associated with Italian unaccusatives, using a methodological procedure called magnitude estimation whereby groups of native speakers of French and English who were near-native speakers of Italian were asked to assign numerical ratings to 48 sentences presented to them one by one, based on their perception of the relative acceptability of each sentence to its previous sentence. The results, similar to those reported from the longitudinal studies, indicated differential attainment, with fossilization being local rather than global.

Overall, research on endstate learners to date has seen an expansion of its scope from morphosyntactic features to phonological features and from mental representations to processing. Liu (2007), for instance, examined phonological recoding in Chinese character recognition by near-native speakers/readers of Chinese. The study had an experimental design that allowed comparisons of native speakers and near-natives vis-à-vis the lexical processing procedure (i.e., how and what types of information are activated during word processing and semantic integration), in particular, the activation of tonal information in processing Chinese characters. Lexical decision and semantic judgment tasks were administered to both the native and the near-native speakers of Chinese. Results showed similarities as well as qualitative and quantitative differences. For example, while both groups activated phonetic information to assist their decoding of Chinese characters and semantic integration of characters at the sentence level, the natives outperformed the near-natives both in terms of efficiency and accuracy, and where qualitative

difference is concerned, the natives activated tonal (phonological) information but the near-natives either did not activate it or activated it late. This study was the first to document fossilization in lexical processing.

In summary, research on fossilization has undergone steady and substantive changes over the last four decades. The changes are most visible in the population chosen for study and in the types of data sampled. Importantly, over the years there has been increasing effort to ensure that the selected subjects meet the preconditions of input, motivation, and practice opportunity. The studies so far have collectively shown that fossilization is local and selective, affecting certain domains and/or subsystems only.

Applications

Research on fossilization, though seemingly accentuating a negative aspect of SLA, nevertheless has unique and critical contributions to make to L2 pedagogy. First and foremost, it dispels a long-held assumption that instruction is necessary and helpful, regardless, suggesting, instead, that instruction is helpful sometimes, under certain conditions, and in relation to certain linguistic elements (see, e.g., Han, 2001). Importantly, research on fossilization has pointed to a need to differentiate in SLA study between learning and acquisition (Krashen, 1981); while everything may be learnable, not everything can be acquirable. In this case, acquisition or success is defined as the ability to use language accurately, fluently, and appropriately (cf., Bailey and Tarone, Chapter 3, this volume). Instruction, and explicit instruction, in particular, as delimited by understandings drawn from fossilization research, should subsequently target those that are amenable to it and ignoring those that are not. More specifically, it should focus on those that are explicable via simple, surface rules, giving less attention to those that are not. Though still largely an empirical question, it would seem from extant research that the efficacy of instruction may improve if done implicitly vis-à-vis features bearing complex form-meaning-function relations (see, however, Hulstijn and de Graaff, 1994). In brief, effective instruction should be differential, varying according to the nature of learner difficulty in relation to different features of the target language.

Findings from existing research on fossilization highlight two sets of morphosyntactic features as hard to acquire and to which instruction is not or only partially useful: (1) interface features (Sorace, 2005) closely interacting with semantics and pragmatics, for example, verbs of causative alternation in English or the topic-comment construction in Chinese and (2) grammatical morphemes and functors, such as nominal declensions, verbal inflections, and articles, which encode abstract concepts such as definiteness, tense, and aspect. These features are largely immune to instruction, even though, ironically, they tend to receive most attention in the classroom. The learning of these features requires rich and consistent exposure to contextualized, naturalistic input, something that classroom instruction typically falls short of.

Instruction can sometimes promote or induce fossilization, as demonstrated in fossilization research (see e.g., Han, 2001). Inadequacies in input quality and quantity, pedagogical procedures, and/or opportunities for communicative practice can singly or in combination engender premature stabilization of interlanguage features (cf., Han, 2004a), in which case stabilization may become a harbinger of fossilization. SLA research on classroom learning over the past four decades has produced and reverberated a clear message for teachers, namely that instructional capacity is limited for stimulating acquisition, due largely to the inherent limitations of the classroom, and yet it can be boosted when combined with experience-based learning in naturalistic environments (see, e.g., DeKeyser, 2007; Rifkin, 2005).

Teachers in the past have manifested two polarizing attitudes toward fossilization. While some have embraced it whole-heartedly and thereby have been overgenerous in applying the term to an

array of errors including those that either have not fossilized or may never fossilize by a standard interpretation of fossilization, others have shied away from it, refusing to believe that there can ever be such a thing as no learning and therefore to do anything about any potential incidences of fossilization. Clearly, neither attitude helps learning. Fossilization research drives home the message for teachers that it does matter if the teacher has or has no understanding of fossilization: Knowledge would lead to efforts to maximize learning while entertaining realistic expectations about the learning outcome, whereas ignorance would lead to use of non-differentiated strategies, which diminishes rather than enhances learning.

Future directions

Even though fossilization has garnered considerable attention from researchers over the past four decades and a general understanding has been formed about its nature and scope, much of it remains to be explored and substantiated, both empirically and theoretically. As is clear from the discussion in this chapter and elsewhere, the L2 literature on fossilization, though substantially ameliorated in the last 15 years, has for long exhibited an imbalance between data and explanations, with explanations outstripping the empirical data, a scenario which Han and Odlin (2006) have depicted as the "fossilization flip-flop," i.e., explanation before description (cf., Byrnes, Chapter 31, this volume). Therefore, it is necessary that future empirical research continue to build the descriptive database, abiding by the three preconditions for subject sampling, namely, exposure to input, motivation, and opportunity for communicative practice. A longitudinal approach should serve as the primary methodology, for, as Long (2003; cf., Selinker and Han, 2001) has compellingly argued, there is no substitute for it when it comes to empirically determining fossilization (for discussion on duration of longitudinal research, see Han, 2004b). In the meantime, multiple types of data must be sought for greater validity and reliability of the research findings. Only when an adequate database is in place can any theoretical work become meaningful and useful.

On the theoretical front, in spite of the abundance of explanations available in the literature, there have been few attempts to *systematically* explain fossilization (see, e.g. Selinker and Lakshmanan, 1992), and virtually none for both fossilization and acquisition. The overwhelming majority of the existing accounts are random, *post hoc*, atomistic, and non-generalizable. In Han (2004a), about 50 such explanations were listed exhausting almost every factor relevant to language acquisition. However, with insights on fossilization permeating the entire SLA literature, and more importantly, with substantially increased amount of robust descriptive evidence, the time is now ripe for performing theoretical analysis of existing findings relating to fossilization as well as acquisition and to construct hypotheses that can guide further empirical research.

Future research must also strive to substantiate the current understanding of issues, among them (a) the relationship between instruction and fossilization and (b) the idiosyncratic nature of fossilization. Concerning instruction and fossilization, it would be a desirable goal, among others, for fossilization research to not only identify features that do not seem amenable to any kind of instruction, but also build gravity indices for the fossilizable features. Such types of information would prove invaluable to teachers and materials writers, as they can use the research-based information to help organize teaching and select implementation strategies. With respect to the idiosyncratic nature of fossilization, while much has been said about fossilization being intra-learner, which gradually has led to the assumption of fossilization as an individual difference phenomenon, the fact has often been overlooked that where fossilizable features are concerned, there is a great deal of commonality across learners. For example, where L2 acquisition of English articles is concerned, learners from miscellaneous L1 backgrounds tend to exhibit omission of articles in the following linguistic environments: when a noun is (a) modified by an adjective,

(b) in topic position, (c) representing a subsequent- (as opposed to first-) mention referent, and (d) when the referent object is in the immediate environment (for detailed discussion, see Trenkic, 2009). Teasing apart what is idiosyncratic from what is universal is important to achieving a finer-grained understanding of fossilization and its underlying mechanism.

Finally, future research must break new ground. This would require, on the one hand, going beyond the customary domains and units of investigation, such as surface forms, and on the other hand, examining fossilization alongside other major phenomena such as acquisition and attrition. Doing so would not only be theoretically compelling, if uncovering a unitary cognitive mechanism is a goal for SLA research, but also practically beneficial for understanding fossilization itself. As a Chinese saying goes, 触类旁通 (read as chu4 lei4 pang2 tong1), which can be glossed for this context as the following: A better understanding can be achieved of the issue at hand when looking beyond it and into other seemingly remote concerns.

Notes

- * I thank the editors and the anonymous reviewers for their insightful comments on an earlier version of this chapter. Any errors are exclusively my own.
- 1 The logical problem in foreign language learning refers to an overall lack of success in L2 learning, which, in Bely-Vroman's recent formulation, is manifested across the board as (a) lack of reliability (gap between the interlanguage grammar and the grammar underlying the target language input) and (b) lack of convergence (incongruence between individuals' interlanguage grammars).
- 2 A reanalysis of Cancino *et al.* (1978) by Verspoor *et al.* (2008) indicates no change in Alberto's use of negation strategies. This raises an interesting question: Could the reported changes or lack thereof have been artifacts of statistical analysis?

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Heritage languages and L2 learning

Olga Kagan and Kathleen Dillon

Historical discussion

The heritage language field began developing in the late 1990s, and “the recognition of heritage language learners as a variable in second language research is recent” (Gass and Selinker, 2008, p. 23). A coherent, commonly held theory of Heritage Language Acquisition (HLA) has yet to be formulated. Scholars in countries where immigrant populations have sought formal study of their home language continue to define the term and the field itself. Since our expertise is largely limited to US issues, we will refer to heritage languages in the USA, but we think that many of the principles are also applicable to home/community language learners in the growing number of other countries with large immigrant populations. In this chapter we focus on heritage language learners (HLLs), that is those speakers of heritage languages who choose to study their home language in a K–16 setting. (In the USA K–16 refers to the primary, secondary, and tertiary levels of education.) We discuss the most commonly used definitions of HLLs, and we situate heritage language discussion in a historical context, within the framework of research on bilingualism and second language acquisition (SLA) as well as instructional practices. We then examine how heritage language (HL) teaching over the past 10–15 years has been tied to an increase in immigration and changing immigration patterns, which have presented the challenge of offering instruction in a “foreign” language to students who already speak that language at home. We describe who these learners are, how they are different from other language learners, and what kind of research has been done to determine their key characteristics. Finally, we recommend some research-based approaches to HL instruction.

The term

The term “heritage language” originated in Canada (Cummins, 2005, p. 585), where it has since been replaced by the term “home-background” language. Australians use the term “community languages” (Lo Bianco, 2008), and in Europe “heritage languages” are referred to as “immigrant,” “home,” “regional,” and “minority” languages (Regional and minority languages may not be considered to be heritage languages in the USA. This is an example of the varying uses and understandings of the term “heritage.” In many countries the term “community languages” is the equivalent of “heritage languages” in the USA). (European Commission: Multilingualism, available at http://ec.europa.eu/education/languages/languages-of-europe/doc139_en.htm.)

In Scandinavian countries, dramatic changes in immigration patterns from distant parts of the world have greatly increased their populations’ ethnic diversity. Legislation related to