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## Review article

# Reconceptualizing fossilization in second language acquisition: a review

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In recent fossilization literature, two problems have been raised repeatedly (e.g. Han, 2003; Long, 2003; Birdsong, 2004). First, the term ‘fossilization’ lacks a unified definition and, second, it has not been adequately described empirically. The works reviewed here seek to address this situation. Han (2004) describes a conceptual framework within which to understand existing work on fossilization, and Han and Odlin (2005) present a collection of empirical and analytical studies that help to ameliorate both the definitional and empirical shortcomings of contemporary fossilization research. Taken together, these volumes provide an admirable synthesis of existing research and problems, as well as noteworthy analyses of how to move forward empirically. For the moment, however, idiosyncratic perspectives on fossilization still prevail.

## I Introduction

The term ‘fossilization’, introduced by Selinker (1972), captures the observation that most adult second language learners never reach native-like proficiency in their target languages. This general lack of success contrasts starkly with child first language acquisition where native competence is the norm. The drive to understand this apparent discrepancy has sustained fossilization research, but has, thus far, produced relatively little empirical description and no universally acknowledged definition or explanation (e.g. Long, 2003; Birdsong, 2004). The two works reviewed here undertake to remedy these problems. Han (2004) introduces a conceptual framework for fossilization research, while Han and Odlin (2005) collect empirical and analytical studies

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that enhance current knowledge of the second language (L2) end state (e.g. the chapters by Han and Lardiere), and suggest alternative empirical approaches to non-native-like ultimate attainment (e.g. the chapters by Birdsong and Lakshmanan). The present review begins with an introduction to relevant conceptual and empirical problems in fossilization research. An examination of each work individually follows. Finally, it is shown that, despite the notable contribution of these volumes to clarifying the aims of fossilization research, the essential problems of defining and empirically describing the concept remain.

Recent analyses of contemporary fossilization research (e.g. Han, 2003; Long, 2003; Birdsong, 2004) have pointed out a great deal of variability in current definitions and descriptions of fossilization. Three significant areas of divergence are raised here. First, Han distinguishes between global and local fossilization. Globally, fossilization affects the entire interlanguage (IL), making it unlikely that any further L2 learning will occur. This impression arises from general portrayals of the cessation of development, where no attempt is made to distinguish particular subdomains or features of fossilized grammatical knowledge (e.g. Selinker, 1972; Tarone *et al.*, 1976). On the other hand, fossilization can also be seen in local terms, such that one particular subsystem (e.g. syntax) or even a particular feature (e.g. past-tense marking) can fossilize while development in other areas proceeds unabated. For example, such a combination of progress and stagnation for one Japanese learner of English is described by Schmidt (1983).

Second, fossilization is alternately understood as a product or a process.<sup>1</sup> From the product perspective, fossilization is the state of permanently frozen development, either globally or locally. Historically, this view originates from definitions such as the following (from Selinker and Lakshmanan, 1992: 197): '[fossilization is] the long term persistence of plateaus of non-target-like structures in the interlanguage of non-native speakers...'. Statements such as this imply that it should be possible to locate and document fossilized (i.e. completely non-developing) structures through empirical investigation. Frequent attempts to this effect have been made by fossilization researchers, as is shown below. From a process perspective, on the other hand, fossilization does not necessarily

<sup>1</sup>Or sometimes both (e.g. Kellerman, 1989).

require the absence of development in a particular area; rather, the term can also refer to a tendency towards the cessation of development. Originally, the idea of fossilization-as-process came from Selinker's (1972) notion of a fossilization mechanism, part of the latent psychological structure for language (Lenneberg, 1967). The operation of this mechanism over time was thought to prematurely interrupt L2 development in the vast majority of learners (perhaps up to 95%). Thus, the term 'fossilization' referred to the explanation for slowing/stopped development, and could be observed empirically only through its symptoms, such as 'backsliding'. The process-product distinction, then, boils down to whether the term 'fossilization' refers to a state that can be examined directly, or a cognitive process, observable only indirectly.

In recent years, however, this distinction has blurred to a degree. Han (2003, 2004), for example, redefines the process view in terms of the empirical predictions it makes. She emphasizes that evidence of fossilization can exist without proof that learning has stopped completely; importantly, though, fossilization-as-process need not be understood as an explanation or mechanism for this to be the case. On the other hand, from a product perspective there is no consensus that fossilization must indicate a total lack of change or variability in the IL. Sorace (1996), for example, develops the notion of 'permanent optionality', which proposes that the L2 end state can encompass variation and indeterminate linguistic competence. By contrast, Long (2003: 508–12) discusses his study of Ayako, a Japanese immigrant to Hawaii in 1948, who still exhibits 'volatile' inflectional marking on both nouns and verbs. From Long's point of view this instability (presumably an instance of stabilized optionality) indicates a lack of fossilization.

Finally, directly related to this product-process distinction is the problem of what constitutes suitable empirical demonstration of fossilization. Many researchers have sought to document fossilized structures in adult IL. To take one example, Thep-Ackrapong (1990; discussed in Long, 2003; Han, 2004) conducted a semester-long pedagogical intervention on a presumably fossilized learner, Lin, who had resided in the USA for 6 years at the time of the study. The investigation focused on infinitival complements. Lin was given explicit instruction, feedback and opportunity to practise these constructions, but, in a follow-up session one year later, there was no evidence that the

intervention had had an effect. This result was taken as evidence that these structures had fossilized. Under some views (e.g. Long, 2003), however, this result cannot be seen as conclusive due to insufficient length of the study and data collection. Only multi-year longitudinal production data from learners immersed in the target language can shed light on the slowing and ultimate cessation of L2 learning (for an example of a relevant study, see Lardiere, to appear).

In sum, in order for the study of fossilization to proceed effectively, some conceptual unity is required. Without agreement as to whether fossilization can operate on a global or local level, whether it is a product that can be measured or a tendency to be observed, or whether it must exhibit stability or simply stable optionality, it is impossible to design acceptable empirical studies and to interpret their results. These central issues have motivated the works presented here.

## II Han (2004)

Han's overall goal in *Fossilization in adult second language acquisition*, then, is to construct a preliminary account of failure in second language acquisition (SLA; Han, 2004: 4). Here, failure is defined as the permanent lack of mastery of a target language despite continuous exposure to adequate input; thus, for the purposes of this book, the term 'fossilization' can be equated with such failure in SLA. The impetus behind Han's effort is the need, discussed above, for a unified and systematic approach to fossilization research, and the hope that a coherent understanding of fossilization will lead to a more complete theory of SLA. Clearly, the development of an account of fossilization, even if only preliminary, is an ambitious goal for a work of 175 pages, and it cannot be said to have been completely successful. However, taken as a whole, Han's volume provides a useful synthesis of current problems in the field and a comprehensive framework within which to consider research on fossilization up to this point.

The body of this work consists of 7 chapters. Chapters 1–3 outline Han's conceptual framework for fossilization research, and explore definitions and explanations of the term. Chapters 4–6 apply Han's conceptual framework to empirical and analytical studies of fossilization. Chapter 4 examines critical period effects in SLA. Chapter 5 looks at native language

transfer, and Chapter 6 reviews empirical investigations of fossilization accompanied by a critique of existing research designs. Finally, Chapter 7 addresses the relationship of second language instruction to fossilization. Although not explicitly stated, the intended audience for this book appears to be researchers in the field of SLA and fossilization. Nevertheless, the material should also be accessible to students at both the graduate and advanced undergraduate levels, and will likely be especially informative to those just beginning research into fossilization.

Han's conceptual framework (outlined on pp. 8–9) is the foundation of this work. Motivated by the goal of unity in fossilization research, Han argues for the need to understand the concept on two levels: macroscopic and microscopic. Fossilization research on a macroscopic level seeks to explain why children learn languages more effectively than adults overall. Specifically, maturational constraints (i.e. critical period effects) and native language transfer are presented as macro-level factors. On a microscopic level, by contrast, fossilization research examines the linguistic features/domains that often fossilize differentially within learners (e.g. morphology is more likely to fossilize than vocabulary), as well as the factors (socio-affective, psychological, etc.) that cause learners to differ in their overall proficiency. The terms *intra-learner*, to refer to differential success within the IL of an individual learner, and *inter-learner*, to indicate overall differences in ultimate attainment across learners, are introduced (p. 7). Han's central message, then, is that the biological and cognitive constraints that exist on a macro-level cannot fully account for the variation in acquisition outcomes that has been attested in the ultimate attainment literature. A microscopic level of analysis is also necessary.

Han's framework includes several contentious positions vis-à-vis the fossilization literature. First, take the definition of fossilization with respect to ultimate attainment:

L2 ultimate attainment has at least three facets: (1) cross-learner general failure; (2) inter-learner differential success/failure; and (3) intra-learner differential success/failure ... clearly, within the ultimate attainment, *success and failure co-exist*. Nevertheless, the three facets of ultimate attainment do exhibit fossilization in that they involve permanently arrested development of some sort (pp. 7–8; italics in original).

This description seems to rule out the possibility of complete success (e.g. native-likeness) as an SLA outcome. However, Birdsong (2004;

2005) and Moyer (2004), for example, take issue with this position. Birdsong (2005) cites a study by Marinova-Todd (2003) in which 30 advanced L2 learners of English performed 9 tasks (2 pronunciation, 2 lexical knowledge, 3 morphosyntax, 2 language use) designed to assess their English proficiency. She found that 3 informants performed at or above native levels on all 9 tasks. Thus, it is not obvious that fossilization is an inherent part of ultimate attainment. Further empirical study is required to evaluate this conclusion.

Additionally, Han's framework encompasses the claims that fossilization is local as opposed to global, and that it is a process, not a product. The latter of these points is the more controversial. Recall that conceptualizing fossilization-as-process requires researchers to seek evidence of a tendency towards permanent stabilization as opposed to an invariant endstate. Han writes that, because of the methodological problems associated with demonstrating fossilization-as-product, 'it would seem necessary (and plausible) to conceptualize fossilization as a process, a process whereby learning manifests a strong tendency towards cessation.' (p. 23). However, empirically determining that a tendency towards the cessation of learning exists is not without its own problems (for a relevant discussion, see Long, 2003). Han offers no suggestions, neither here nor as part of her critique of research methodologies (Chapter 6), regarding how fossilization-as-process can be operationalized for empirical study.

The elaboration of Han's conceptual framework is followed by a review of macroscopic and microscopic research in fossilization. In order to demonstrate that 'L2 learners are *universally preconditioned* to fossilization' (p. 44; italics in original), both biological (i.e. critical period effects) and cognitive (i.e. native language transfer) constraints on SLA are raised. Han's discussion of the critical period literature will be our focus. Here, age of arrival into the target language environment is highlighted as the strongest predictor of ultimate attainment. Studies by Johnson and Newport (1989), which provides evidence for an age-related decline in syntactic competence starting around age 7, and Oyama (1976), which focuses on the effect of age of arrival on phonological attainment, are described in some detail. In addition to this evidence for age effects on a macro-level, however, Han also emphasizes the modular nature of the critical period (e.g. following Patkowski, 1980) and the

interaction between biological constraints and environmental/affective factors (e.g. Bialystok and Miller, 1999). The modularity of the critical period is argued to provide support for fossilization on a local level (p. 62), and the ability of affective variables to modulate ultimate levels of proficiency suggests that individual differences abound in SLA. Thus, Han argues, there is a basis for the belief that differential linguistic proficiency exists on both the intra-learner and inter-learner levels, as described within her framework.

The goal of Han's microscopic analysis of fossilization follows directly from this conclusion; Chapter 6 is intended to show that a variety of additional factors (four broad classes are mentioned: environmental, social, cognitive and psychological) are required to account for the wide range of possible L2 acquisition outcomes. Han does not actually elaborate on the details of inter- and intra-learner variation here. Instead, the chapter has three foci: presenting and critiquing existing research methodology, arguing for the modular nature of fossilization, and describing the Multiple Effects Principle (Selinker and Lakshmanan, 1992) as a way to understand the combination of micro-level factors in fossilization.

Han's exposition of what she considers to be the five main approaches to fossilization research (longitudinal, typical-error, advanced-learner, corrective-feedback and length-of-residence) is generally clear, if not optimally arranged. The discussion is divided into two sections, one presenting the methodologies and one critiquing them; however, no comment is made regarding the relative utility of the approaches or of the individual studies she describes in demonstrating fossilization. For example, in order to present longitudinal methodology, studies by Lardiere (1998a) and Schumann (1978) are described (pp. 88–90). The latter of these studies was based on 10 months of data collection from a learner who had been in the USA for 4 months at the time research began, while the former study described recordings made over 8 years apart from a learner who had immigrated to the USA approximately 10 years before the first recording session took place.

From the fossilization-as-process perspective that Han explicitly adopts, it is not clear that Schumann's study, unlike Lardiere's, is at all informative with respect to demonstrating fossilization. Schumann's informant, Alberto, showed very little development in terms of negation



across the 20 recordings collected; however, at the end of the study Alberto had only been in an English-speaking environment for 14 months. There is no reason to believe that his development in this area had not reached a temporary plateau. Han never raises this point, neither in the presentation nor in the critique of methodologies. She simply argues that the use of multiple research methodologies is important for characterizing the L2 end state, and that longitudinal studies are necessary to establish long-term stabilization (p. 99). The line between adequate and inadequate methodologies for studying fossilization is never made sufficiently clear.

Taken as a whole, Han's work convincingly argues that there are a number of factors – biological, cognitive, psychological and social – which give rise to differences in ultimate attainment (and fossilization) on both an inter- and an intra-learner level. At the same time, however, the presentation can be unclear and superficial in places, as in Chapter 6 (on micro-level factors) discussed above. Despite any issues that might linger, many of which simply await more conclusive research, this book has several notable strengths. The summary of existing problems is concise and thorough. The review of the literature provides a useful starting point for research in this area, and the chapter on teaching and fossilization will certainly be of interest to second language educators. Han's framework as well, though still preliminary, holds some promise as a means of situating fossilization research within the study of ultimate attainment.

### III Han and Odlin (2005)

In the introduction to their edited volume, *Studies of fossilization in second language acquisition*, Han and Odlin (p. 7) return to the major weaknesses of current fossilization research. First, there is no consensus as to how the term 'fossilization' should be understood. In order to address this problem, Han and Odlin argue, following Han (2004), that every interlanguage encompasses both success and failure. There will inevitably be aspects of the L2 that have fossilized as well as those which are native-like or still developing (pp. 9, 12). It follows from this claim that L2 learners can never attain truly native proficiency and, also, that fossilization must only apply locally as opposed to globally

(pp. 8–9). The second problem, it is argued (p. 7), is that explanation and description in fossilization have been ‘flip-flopped’. That is, ‘what we have here is not the logically prior description before explanation, but worse: explanation without description’ (quoted from Selinker and Han, 2001: 276). A central goal of this work, then, is to collect recent empirical and analytical studies with a view to addressing these deficiencies.

Following the introduction, the volume contains 8 papers (4 analytical and 4 empirical), a commentary by Larsen-Freeman (Chapter 10) and an afterword by Selinker. Analytical papers by Nakuma (Chapter 2), MacWhinney (Chapter 7), Tarone (Chapter 8) and Birdsong (Chapter 9) address each of the central problems of fossilization research: definitions, description and explanation. Nakuma and Birdsong focus on the concept of fossilization, Nakuma arguing for increased research into the empirically investigable components of fossilization, and Birdsong for a shift of attention towards success in ultimate attainment as opposed to failure. MacWhinney and Tarone concentrate on explaining fossilization: MacWhinney through an assessment of existing explanations, and Tarone by highlighting the role social factors have to play in determining levels of L2 ultimate attainment. The empirical studies by Lardiere (Chapter 3), Han (Chapter 4), Odlin, Alonso Alonso and Alonso-Vázquez (Chapter 5) and Lakshmanan (Chapter 6) consider a wide range of data from children and adults, both longitudinal and experimental. Lardiere and Han investigate the contribution of grammaticality judgements to ongoing longitudinal studies of adult end-state learners. Odlin *et al.* look at the acquisition of the English present perfect by monolingual Spanish and bilingual Spanish–Galician speakers, and Lakshmanan examines child attrition-reacquisition data (of Hindi–Urdu) as a means to advancing understanding of fossilization. Taken as a whole, the studies included in this volume represent multiple theoretical viewpoints (e.g. sociolinguistic, generative, emergentist), which is beneficial from the perspective of developing a more comprehensive conceptualization of fossilization and advancing empirical work in this area.

Let us turn to some perspectives on how fossilization can be effectively researched empirically. This issue is a primary concern of many of the authors represented here and, clearly, is of central importance to work on both fossilization and ultimate attainment in SLA. From an

analytical perspective, Nakuma argues against the view that fossilization is a 'phenomenon' that can be safely assumed to exist. Instead, he proposes that empirical research in fossilization should concentrate on deconstructing and testing the underlying hypotheses that make up the construct 'fossilization', such as how the product of fossilization can be successfully identified and measured (Nakuma argues that it cannot be; for a related discussion, see Long, 2003). However, Nakuma's argument is weakened in that he does not discuss any specific hypotheses that should be tested, nor how this line of research would differ from, say, conducting longitudinal studies to discover the extent and nature of fossilization as a phenomenon.

From an experimental angle, Lardiere and Han each look at how grammaticality judgement data can confirm prior findings based on naturalistic production data within ongoing longitudinal investigations of fossilization. Lardiere administered two grammaticality judgement tasks on English adverb placement 18 months apart to an adult native speaker of Chinese and Hokkien (named Patty) who has lived in the USA for more than 20 years. The findings of this study were consistent across both tasks and confirm the results of a previous study (Lardiere, 1998b) arguing that Patty's underlying knowledge of verb raising is native-like, despite her low level of suppliance of verbal morphology. Han similarly compared the results of two grammaticality judgement tasks with naturalistic data over a 7-year period. Her informants, two adult Chinese learners of English and one native English control, exhibited reliable judgements across the two tests. A comparison of these results with the naturalistic production of the Chinese learners from the same period confirmed this finding. These results are important both in terms of showing how multiple approaches to empirical research can be used in concert to good effect, as well as demonstrating the reliability of grammaticality judgement data over time.

Finally, arguments for a more dynamic conception of language and L2 learning can be found in several chapters of this volume, both experimental and analytical. Larsen-Freeman, for example, takes the following (comparatively strong) view:

What if we acknowledge, instead, that there is no end state because, first of all, there is no end? There is no finite uniformity to conform to. When we entertain a view of language as a dynamic complex adaptive system ... we recognize that every use of

language changes its resources, and the changed resources are then available for use in the next speech event. (p. 194)

From this perspective, it is argued, fossilization research would benefit from acknowledging the inherent variability of the linguistic system being acquired, as well as of the acquisition process itself. Conclusive evidence of non-development may never be found because the target itself is not stable.

This idea of dynamic interlanguage is applied by Tarone, who argues for the investigation of language play as a manifestation of the force of creativity that is essential to the process of language acquisition and change, thereby weakening the tendency towards stabilization (p. 163). Tarone cites examples of SLA language play among children from Broner and Tarone (2001), among others. This study found a number of cases where children – in this case fifth grade Spanish immersion students (10–11 year olds) – appeared to introduce new variability into the IL syntax and phonological systems through language play. In one example (p. 169), a boy, Leonard, introduces the word *celebro* as a variant for *cerebro* (meaning ‘head’) in order to amuse his classmates. After playing with the alternation for a time, both versions seem to remain in Leonard’s IL, as evidenced by his use of the novel form in a presentation later that week. According to Tarone, this occurrence suggests that language play may serve to destabilize rules or lexical items that might otherwise fossilize (even if these were correct to begin with).

The examples included here, albeit limited, demonstrate a great variety of perspectives, combined with a modicum of essential unity. In terms of the problems for fossilization raised in the introduction, for example, at least one unified position emerges: the preference for a local approach to fossilization. Lardiere (p. 48), for instance, explicitly states that her results are not consistent with a global view of fossilization. MacWhinney (p. 135) also supports the application of the term ‘local fossilization’ to characterize the specific areas of a learner’s idiolect that show little change. Within the process–product distinction, as well, there appears to be agreement that the notion of ‘fossilization’ does not entail an invariable frozen product nor a causal mechanism. This position is inherent, for example, in a dynamic systems approach to SLA, and also seems to be favoured by Nakuma and by Birdsong.

Thus, points of agreement can be found despite theoretical and methodological diversity.

#### IV Conclusions

Taken together, these volumes make an important contribution to the study of fossilization in that they combine a substantial body of empirical findings with a complete exploration of possible definitions, descriptions and explanations of this central concept in SLA research. The ultimate goal, however, is to arrive at a consensus regarding what fossilization is and how it can be described empirically. Here, less progress has been made. We have seen that theoretical unity in some areas has been reached by the authors represented here. Nevertheless, perspectives on fossilization remain diverse and idiosyncratic. Empirically, as well, there is little consensus as to what methodologies for investigating fossilization – apart from conducting multi-year longitudinal studies of learners immersed in the target language – will yield reliable results. Moving forward from this point, new methodological perspectives and additional empirical research will hopefully pave the way for increasing clarification of the issues that have been raised within these works.

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