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Introduction: Situating the concept of practice

Robert M. DeKeyser

Practice gets a raw deal in the field of applied linguistics. Most lay-people simply assume that practice is a necessary condition for language learning without giving the concept much further thought, but many applied linguists eschew the term *practice*. For some, the word conjures up images of mind-numbing drills in the sweatshops of foreign language learning, while for others it means fun and games to appease students on Friday afternoons. *Practice* is by no means a dirty word in other domains of human endeavor, however. Parents dutifully take their kids to soccer practice, and professional athletes dutifully show up for team practice, sometimes even with recent injuries. Parents make their kids practice their piano skills at home, and the world's most famous performers of classical music often practice for many hours a day, even if it makes their fingers hurt. If even idolized, spoiled, and highly paid celebrities are willing to put up with practice, why not language learners, teachers, or researchers? The concept of second language practice remains remarkably unexamined from a theoretical point of view. Misgivings and misunderstandings about practice abound and are often rooted in even deeper misunderstandings about what it is that language learners are supposed to learn. In this introductory chapter, I will try to provide some conceptual and terminological clarification in preparation for the rest of the book. In the concluding chapter, I will then formulate tentative recommendations for “the praxis of practice,” as they follow from these conceptual distinctions and from the other chapters.

It should be clear from the outset, of course, that the word *practice* in the title is not meant as the opposite of theory, as in “foreign language teaching policy vs. actual practice in secondary schools,” “practicing professionals,” or “the praxis of second language teaching.” The contributors to this book all understand practice in a much more focused way, as specific activities in the second language, engaged in systematically, deliberately, with the goal of developing knowledge of and skills in the second language. But within this broad definition there are still many different ways one can understand the concept of practice. Before we zero in on the meanings of practice in applied linguistics, however,

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let us have a brief look at how cognitive and educational psychologists have used the term.

The notion of practice in cognitive psychology

The study of skill acquisition is an important area within cognitive psychology (for a good, concise overview see Carlson, 2003). Researchers in that area have documented the acquisition of skills in a wide variety of domains, from algebra, geometry, and computer programming to learning how to drive a car or how to roll cigars. Increasingly, they also employ neuroimaging and other neurological data to document how different skills and different stages in the acquisition of the same skill are represented in the brain (e.g., Anderson, Bothell, Byrne, Douglass, Lebiere, & Qin, 2004; Posner, DiGirolamo, & Fernandez-Duque, 1997). Researchers who study skill acquisition processes all agree that reaction time and error rate decline gradually as a function of practice with a given task. But how is practice defined in this literature?

Carlson, a well-known contemporary theorist of skill acquisition, defines practice simply as “repeated performance of the same (or closely similar) routines” (1997, p. 56). This definition could easily be misinterpreted and may seem a throwback to the heydays of behaviorism; it does not define practice in terms of cognitive processes at all. Clearly, this cannot be what Carlson has in mind, however, because he defines skill as “the ability to routinely, reliably and fluently perform goal-directed activities as a result of practice with those activities” (1997, p. 45). The definition in Newell and Rosenbloom is more precise: “Practice is the subclass of learning that deals only with improving performance on a task that can already be successfully performed” (1981, p. 229). Not only does this definition make the learning/improving component of practice explicit, it also states clearly that practice in the narrow sense applies only to a task that can already be successfully performed. But the definition still remains vague because it does not say what constitutes a task. Is speaking French a task, or requesting a glass of water in French, or does using a conditional verb form to do this constitute a task? Any task outside the laboratory, whether in school or in “the real world,” consists of many components. Could practice be defined as referring to repeated engaging/improving in task components that can already be successfully performed? If so, how narrowly could a task component be defined? And would practice of task components separately be better or worse than practice of the whole task? There is no general answer to the latter question (VanLehn, 1989), but Lee and Anderson (2001), for instance, show how the learning of at least one complex task reflects the learning of much smaller parts.

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This brings us to the related question of the specificity of practice effects in skill learning. If tasks can be defined at such a low level, then how different can they be before they are different altogether? In other words, how much does practice on a task that shares certain characteristics with another, but also differs from it in a crucial way, contribute to improving performance on this other task? What determines transfer of the effect of practice? A number of studies have shown that the practice effect is quite specific in the sense that there is only minimal transfer between tasks that superficially appear to be each other's mirror image, such as writing versus reading a computer program (see esp. Singley & Anderson, 1989; cf. also Anderson, 1993, chap. 9; Müller, 1999).

This specificity of the practice effect is explained by the well-known distinction between declarative and procedural knowledge. In most forms of skill acquisition, people are first presented with *information*, e.g., rules about how to write a computer program or put a French sentence together in explicit form ("declarative knowledge"). Through initial practice they incorporate this information into *behavioral routines* ("production rules," "procedural knowledge"). This procedural knowledge consists of very specific rules and can be used fast and with a low error rate, but the disadvantage is its lack of generalizability.

Once established, procedural knowledge can become automatized. *Automatization* is a rather difficult concept because the term is used at three levels of generality, at least. In the broadest sense, it refers to the whole process of knowledge change from initial presentation of the rule in declarative format to the final stage of fully spontaneous, effortless, fast, and errorless use of that rule, often without being aware of it anymore. In a narrower sense, it refers to the slow process of reducing error rate, reaction time, and interference with/from other tasks that takes place after proceduralization. In the most specific sense, it designates a merely quantitative change in the subcomponents of procedural knowledge to the exclusion of any qualitative change or restructuring (i.e., excluding changes in which small subcomponents make up procedural knowledge at a given stage of skill development or how they work together).

Automatization in the last two meanings of the word is characterized by the "power law of practice": regardless of the domain of learning, both reaction time and error rate decline over time according to a very specific function that is mathematically defined as a power function; hence the term (see esp. Anderson, 2000; Newell & Rosenbloom, 1981). While the exact nature of the processes underlying the shape of this function (e.g., quantitative vs. qualitative change) is still a matter of debate, and while some question the universality of the power law (see esp. Anderson, 2000; Delaney, Reder, Staszewski, & Ritter, 1998; Haider & Frensch, 2002; Logan, 1988, 1992, 2002; Palmeri, 1997, 1999; Rickard, 1997,

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1999, 2004), all agree that reaction time and error rate (some studies also document decreased interference with/from simultaneous tasks) decline gradually as a function of practice with a given task.

The more automatized procedural knowledge becomes the clearer these effects. The transfer found between program reading/writing or, in the case of L2 learning, between production/comprehension skills, then, is explained by the fact that practice in each skill reinforces to some extent the declarative knowledge that is applicable to both. The procedural knowledge, however, is too specific to be transferred from one skill to another; therefore, the practice effect is highly skill-specific.

It should be pointed out here that automatized knowledge is not exactly the same as implicit knowledge. While implicit knowledge or implicit memory is always defined with reference to lack of consciousness or awareness (see, e.g., Reingold & Ray, 2003), absence of awareness is *not* a requirement for automaticity. Hence, one can have knowledge that is implicit but not automatic (because error rate is too high and speed is too low) in cases of incomplete implicit learning (the pattern may be merely probabilistic, so the learner feels unsure, hesitates, and often gets it wrong). On the other hand, one can have knowledge that is automatic but not implicit (because the learner has attained high speed and low error rate but is still conscious of rules, for instance, because he or she is a language teacher, whether of L1 or L2, or a linguist).

A further question concerns the nature of the practice effect for relatively complex tasks: Does it reflect speeding up small components (automatization in the narrowest sense), changing the nature of small components (restructuring), speeding up the way they work together, or changing the nature of how they work together (strategic change)? Increasingly, researchers find that automatization in the narrowest sense is probably much more limited than often assumed and that “attention is subject to a far greater degree of top-down control” (Pashler, Johnston, & Ruthruff, 2001, p. 648).

In the same way that it is hard to decide whether and how to break up a task into components to be practiced separately, it is hard to decide how often to provide feedback on performance in complex tasks. Wulf, Schmidt, and Deubel (1993) found that constant feedback was better for learning fine parameters of a task, whereas intermittent feedback (63 percent of the time) was better for learning the task as a whole. As this study involved a perceptual-motor task, it is unclear to what extent its findings would generalize to a cognitive skill such as language learning, however. Moreover, decisions need to be made about when to provide feedback. On the one hand, immediate feedback may disrupt the execution of higher-order routines that are also being learned (cf. Schooler & Anderson 1990, quoted in Anderson, 2000), but on the other hand, feedback should not be delayed too much because it may be most efficient

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when it is provided while the procedural “knowledge” that led to the error is still active in memory. Most importantly, perhaps, a substantial amount of evidence suggests that what is best for improving performance in the short run can be worst in the long run, especially for transfer. Less frequent feedback leads to less immediate improvement but to better performance in the long run, at least for a variety of perceptual and motor tasks (Schmidt & Bjork, 1992). Needless to say, eventual performance and transfer are more important in real life and even to some extent in school contexts than short-term performance.

The notion of practice in educational psychology

Educators and educational psychologists do not doubt the importance of practice. Even during the heydays of the cognitive revolution, Ausubel, Novak, and Hanesian wrote:

Although much significant meaningful learning obviously occurs during initial presentation of the instructional material, both overlearning and most long-term retention presuppose multiple presentations of trials (practice). Both learning process and outcome customarily encompass various qualitative and quantitative changes that take place during these several trials. Learning and retention, therefore, ordinarily imply practice. Such practice, furthermore, is typically specific (restricted to the learning task) and deliberate (intentional). (1978, p. 311)

Much more recently, Bransford, Brown, and Cocking, for instance, stated that “in deliberate practice, a student works under a tutor (human or computer based) to rehearse appropriate practices that enhance performance” (1999, p. 166) and pointed out that deliberate practice can lead to an enormous reduction in the time it takes individuals to reach real-world performance criteria. Ericsson and associates (Ericsson, Krampe, & Tesch-Römer, 1993; Ericsson & Charness, 1994; Starkes & Ericsson, 2003; see also Ericsson, 1996; Ericsson & Lehmann, 1996) have documented in astounding detail the enormous amount of deliberate practice it takes to become a truly expert performer such as a world-class musician, chess player, or athlete. Others (e.g., Maguire, Valentine, Wilding, & Kapur, 2003; Wilding & Valentine, 1997; cf. also Ericsson, 2003) have documented large effects of deliberate practice in performance of highly specific memory tasks.

As is often the case, however, terminology varies from author to author. Legge, for instance, makes a distinction between practice, which may “simply involve using the skills that have been acquired, sometimes imperfectly” (1986, p. 228), and training, which involves “a deliberate scheme to assist learning.” On the other hand, Haskell (2001) gives

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training a more narrow, negative meaning of drilling or teaching recipes, which leads to the well-known lack of transfer. It should be clear that we will use the term *practice* in a sense that is both narrower than Legge's (for we are dealing with activities planned to assist initial learning of new elements of a language) and much broader than mere drilling (for we include a variety of loosely structured communicative activities).

A large part of the educational literature on practice concerns the issue of transfer, whether it be from one classroom task to another or from the classroom to performance on the job. A central concept here is that of transfer-appropriate processing: transfer is likely to occur to the extent that the cognitive operations involved in the new context, task, or test recapitulate or overlap with those engaged in during initial learning (see, e.g., Whittlesea & Dorken, 1993). "Knowledge that is overly contextualized can reduce transfer; abstract representations of knowledge can help promote transfer" (Bransford et al., 1999, p. 41). One particular form that this problem can take is that of trying to teach procedural knowledge without an adequate declarative base. Singley and Anderson (1989) point out not only that transfer between related skills such as reading and writing computer programs is limited but that where it does happen it appears to occur via declarative knowledge of the underlying rules. If a student only grasps a problem through a limited number of examples, learning may be quick but transfer is doubtful. If the principle or rule underlying the examples is thoroughly understood, transfer will be much easier, but examples are still necessary for establishing usable knowledge (see esp. Anderson, Fincham, & Douglass, 1997). "Without an adequate level of initial learning, transfer cannot be expected. The point seems obvious, but it is often overlooked" (Bransford et al., 1999, p. 41).

On the other hand, narrow procedural knowledge, while it is less generalizable, is not only the most efficient in those contexts where it is applicable but it is also more durable (Healy, King, Clawson, Sinclair, Rickard, Crutcher et al., 1995; Healy, Barshi, Crutcher, Tao, Rickard, Marmie et al., 1998).

The concept of practice in applied linguistics

Few applied linguists have attempted to define what exactly constitutes practice. Ellis has been among the most explicit. He states that "practice... involves an attempt to supply the learner with plentiful opportunities for producing targeted structures in controlled and free language use in order to develop fully proceduralized implicit knowledge" (1993, p. 109). This may seem uncontroversial, but what Ellis says in

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the next few sentences makes it clear that the concept is far from obvious. Because of the emphasis he puts on procedural knowledge, he takes the point of view that (production) practice is important for teaching pronunciation and formulaic knowledge but not for the teaching of grammar rules: “What is being challenged here is the traditional role it has played in the teaching of grammatical items” (p. 109). This point of view, of course, reflects the Chomskyan distinction between competence and performance: practice is to improve performance, not to teach competence, the most prototypical form of which is our intuitive knowledge of grammar rules. This competence has always been seen as either acquired or not, but not something gradual; furthermore, once something has been acquired, Chomskyan theory sees it as available for use in performance, except for certain constraints on the latter which are considered to be beyond the scope of linguistics proper (see e.g., Chomsky, 1965, p. 3; 1980; 1986, chaps. 1 and 2).

The Chomsky/Ellis point of view, however, is at odds with both the cognitive psychology of skill acquisition and much current theorizing in applied linguistics, most notably with VanPatten’s theory of input processing. Cognitive psychologists stress the role of practice in transforming declarative/explicit knowledge into procedural/implicit knowledge. Clearly, it is implicit knowledge that corresponds to the Chomskyan notion of linguistic competence, not explicit, and clearly practice is needed to achieve it, unless one believes it is also *acquired* completely implicitly – and Ellis does not seem to believe *that*: “Perhaps we do not have to bother with trying to teach implicit knowledge directly” (2002, p. 234).

VanPatten’s theory of input processing (e.g., 1996, 2003), on the other hand, clearly aims at building the procedural knowledge needed for the use of grammar rules in comprehension *after* the declarative knowledge of these rules has been taught explicitly. (VanPatten’s thinking is clearly in line with skill acquisition theory on this point; whether this procedural knowledge transfers easily to production skills is a different matter, as will be discussed.) Ellis himself appears to have shifted recently toward a less radical competence/performance, rule/item, declarative/procedural, implicit/explicit view: “Production, then, may constitute the mechanism that connects the learner’s dual systems, enabling movement to occur from the memory-based to the rule-based system and vice versa. If this interpretation is correct, learners may not be so reliant on input as has been generally assumed in SLA. They may be able to utilize their own internal resources, via using them in production, to both construct and complexify their interlanguages” (2003, p. 115). This also seems to be the position of Diane Larsen-Freeman: “Output practice, then, does not simply serve to increase access to previously acquired knowledge. Doing and learning are synchronous” (2003, p. 114).

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As previously stated, in this book we define practice as specific activities in the second language engaged in systematically, deliberately, with the goal of developing knowledge of and skills in the second language. Contributors to this volume put different emphases on the importance of practicing what one already knows in principle (see Legge's definition above, and the chapters by Muranoi and DeKeyser in this volume) versus deliberately engaging in tasks that are supposed to draw attention to new phenomena or engender new insights (see esp. the chapters by Leow and Mackey in this volume). As Robinson (this volume) points out, the two processes typically go together anyhow. While accessing existing knowledge, the learner becomes aware of gaps or inconsistencies in it, which may lead to restructuring or expansion of this knowledge, potentially by incorporation of input from a native-speaking interlocutor.

Issues surrounding practice in applied linguistics

While much of the literature quoted in the first two sections of this chapter is couched in language that may be unfamiliar to second language acquisition researchers, parallels abound between the questions asked in cognitive and educational psychology and those that bedevil our own field. How skill-specific and how task-specific is the effect of practice; in other words, how much transfer can be expected? How much feedback should be given, how, and at what time to maximize the effect of practice? Can explicit knowledge be automatized through practice to the point of becoming equivalent to implicit acquired knowledge? How does automaticity develop in the course of practice? These issues will be outlined here and discussed in more depth in the final chapter of this book.

Complete answers to these questions are not available in large part because empirical research on practice has been quite limited in recent decades. Between the bad memories of audiolingual mechanical drills and the subsequent emphases in the 1970s, 1980s, and 1990s on authentic communication, focus on meaning, and task-based learning, few researchers in the post-audiolingual period have addressed the issue of practice head-on (cf. also Larsen-Freeman, 2003, pp. 102 and 106).

The skill-specificity issue is probably the one that has drawn the most attention in applied linguistics lately (see esp. DeKeyser, Salaberry, Robinson, & Harrington, 2002; Izumi, 2002, 2003; Muranoi, this volume; VanPatten, 2002a, 2002b, 2003, 2004). Cognitive psychology has much to say about the specificity of skills (see esp. Anderson, 1993; Anderson & Fincham, 1994; Anderson, Fincham, & Douglass, 1997; Müller, 1999; Singley & Anderson, 1989), but of course its findings cannot be transferred blindly to issues of second language acquisition. Both

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Ellis (1992, 1993, but see the 2003 quote on page 7) and VanPatten (see esp. VanPatten & Cadierno, 1993; VanPatten & Oikkinen, 1996) take the view that while input practice leads to acquisition, output practice merely serves to improve fluency. On the other hand, studies such as those by DeKeyser (1997), DeKeyser and Sokalski (1996), and Izumi (2002) clearly show a lack of transfer between receptive and productive skills at the level of both proceduralized and automatized knowledge.

The problem of transfer, discussed so often in cognitive psychology and even more in educational psychology, applies also at the broader level of transfer from declarative knowledge to procedural skill and of knowledge and skill from one context to another, in particular from the classroom to the native-speaking environment. Transfer from declarative knowledge to procedural skill has been discussed very widely (see e.g., Carroll, 2001; DeKeyser, 1997, 2003; Doughty, 2003; Ellis, 1992, 1993, 2003; Hulstijn, 2002; Krashen, 1982, 1999; McLaughlin, 1987; Skehan, 1998), and is often referred to as the interface issue. A typical case of the other kind of transfer, from the classroom context to the real world, is, of course, the semester abroad context. Research on the latter topic illustrates both that this transfer is far from obvious and that study abroad is not as obviously ideal for practicing foreign language skills as is often assumed (see esp. Brecht & Robinson, 1993; Brecht, Davidson, & Ginsberg, 1995; DeKeyser, this volume). DeKeyser argues that these two transfer issues, from one kind of knowledge and skill to another and from one context to another, are intertwined in study abroad programs.

Another prominent issue already mentioned is the separation of a complex skill into separate components in terms of teaching, practicing, and providing feedback. Most L2 teaching methodologies of the last 30 years, such as communicative language teaching, the natural approach, and task-based learning, are much less inclined to take language apart into small components than was the case for older methods such as grammar-translation, audiolingualism, or cognitive code. But what exactly the ideal point is on the analytic/synthetic dimension of curriculum design, and what this implies for practice activities, is still far from resolved, especially in the foreign language context (see esp. Ortega, this volume).

The usefulness of feedback in general, and of specific techniques such as explicit error correction, negotiation of meaning, or recasts has been the subject of much debate in applied linguistics but has only recently become the subject of a considerable number of empirical studies (see esp. Iwashita, 2003; Leeman, 2003; Nicholas, Lightbown, & Spada, 2001; Pica & Washburn, 2002). It appears from this literature that feedback tends to have a substantial positive effect (see esp. Leeman, this volume, and the meta-analysis in Russell & Spada, 2006), but the amount of empirical evidence gathered so far is insufficient to answer more specific questions about when and how to give feedback with any degree

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of certainty. Clearly, we need to know more about these questions, and about others, which have hardly been addressed at all. How useful is feedback for different elements of language, not just for pronunciation versus grammar versus vocabulary, but even, say, for rules versus items versus prototypes, simple rules versus complex rules, frequent items versus infrequent items? And, perhaps most important, how should the frequency and the nature of feedback be adapted to the stage of learning or skill acquisition? Much work remains to be done in this area.

Automatization, on the other hand, is an issue that has not drawn much focused attention yet, let alone provided the accumulation of evidence that is needed to guide practice. As argued on page 3, automatization in the broad sense has many faces. In applied linguistics these are illustrated, for instance, in the work of Healy et al. (1998), who show that strategy shifts from rules to items as well as from items to rules can both occur as a result of ample practice with linguistic structures, and in that of DeKeyser (1997), who shows that automatization in a more narrow sense can take place for second language grammar rules following the same power-function learning curve documented in the acquisition of skills in other domains. Many questions remain, however, especially about the integration of such findings from a skill acquisition perspective with findings from the second language acquisition literature.

While the acquisition of complex skills, skill specificity, skill transfer, feedback on performance, and automatization of skills are issues for which applied linguists can certainly find much inspiration in the cognitive and educational literature, we also face a number of difficult choices that are characteristic of second language teaching, such as the relationship between form and meaning and the difference between teaching form and teaching forms. Clearly, form-meaning connections are the essence of language, and taking them apart more than necessary for practice activities would be unwise, but there are areas of language such as phonetics, phonology, and morphological paradigms where narrowly focused, repeated practice activities with forms can be useful (DeKeyser, 1998). Such practice activities have traditionally been called drills. They have been alternately advocated, demonized, derided, and resuscitated, often even without making the distinction between different kinds of drills.

As (talking about) drilling has been so out of fashion for a number of years, it may be good to remind some younger readers of this volume of the three-way distinction made by several authors after the concern for communicative language teaching became well established but before it evolved, at least at the level of academic debate, into an almost exclusive focus on meaning. Paulston (1970, 1972; cf. also Paulston & Bruder, 1976) made a three-way distinction between mechanical, meaningful, and communicative drills (MMC). Mechanical drills were defined