

INTRODUCTION

ONE of the most entertaining and overlooked films of the latter half of the twentieth century was Jean-Jacques Annaud's *Quest for Fire*. It is a prehistoric, coming-of-age tale that roughly fits into the "road trip" genre. Annaud's movie recounts the story of an early tribe of hominids called Oulhamrs, who depend on fire for survival but who have not yet figured out how to make it on their own. In the beginning of the film, the Oulhamr caves are sacked by another species of hominid, and in the ensuing melee the Oulhamr keeper of the flame takes refuge in a bog, where he watches the tribe's only remaining embers cool and die. Oulhamr leader Naoh and two of his cohorts then set out to find a new source of fire. Along the way they learn not only Prometheus' art, but the art of laughter, the art of proper love-making, and, remarkably, a foreign language.

The uncharitable viewer will find a few details in *Quest* that don't seem to add up. For instance, the special effects make-up gives the actors portraying Oulhamrs an appearance that is neither *Neanderthal* nor *Homo sapiens*, but somewhere in between (the illustrations in the 1979 edition of J. H. Rosny's book on which the movie is based are of unambiguously modern humans). The marauders are far more primitive. They bear some resemblance to *Paranthropus robustus*, circa 1.7 million years BCE, but without the tiny *P. robustus* skulls, which must have been too tricky for 1980s-era special effects artists. On the other hand, the culturally advanced Ivaka tribe we see later in the film is modern in every way. So where exactly in prehistory are we?

From a linguistic standpoint, the film has even stranger moments. The "language" spoken by the Oulhamrs was invented for Annaud's movie by novelist Anthony Burgess, who had earlier made up that quirky, Russian-influenced variant of English for *A Clockwork Orange*. Oulhamrian sounds more like what is sometimes called a "proto-language" than a real language. It consists of little more than apish grunts. The entire dialogue in *Quest* is thus incomprehensible, save for two words. In one scene we hear Naoh grunt *Hot!* as he stares transfixed into a campfire, and later on his sidekick shouts something that sounds like *deer* as he spies game off in the distance. The filmmaker, it seems, is hinting that the roots of English stretch all the way back to archaic cave dwellers.

If this imaginative etymology is hard to swallow, then consider the film's take on bilingualism. Since the scientific study of language acquisition began in earnest in the mid-twentieth century, one of its most important discoveries has been that the gift of speech – like the gift of flight or the ability to hunt other

creatures for food – requires special equipment, both physical and cognitive. If the Oulhamrs had the wherewithal to learn and process a complex language, then presumably they would have been speaking glibly from the beginning of the movie. If they were not so endowed, then they would never have been able to acquire the language of the Ivakas in less than a year, as they do toward the end of the film. Among modern humans, learning a foreign language in adulthood can be a herculean task; certainly not one that can be pulled off with such casualness.

If I were to bring all this to Annaud's attention, I imagine he would tell me to lighten up. *Quest* is science fiction. By all evidence, the transition from pre-linguistic to linguistic hominids spanned hundreds of thousands and possibly even millions of years. It is simply not feasible to tell the story of that transition in a movie if one insists on verisimilitude at every turn. In *Quest*, Annaud has tried to compress that long history into a single generation for allegorical reasons. His foray into language among early hominids is really part of a broader portrayal of intracultural conflict and resolution among our ancestors. Like all good science fiction movies, *Quest for Fire* does not pretend to answer scientifically interesting questions. It is content to arouse the imaginations of moviegoers, in the hope that they will start to ask themselves such questions.

By that standard, Annaud's film is an unqualified success. It is interesting that the release of *Quest* coincided with the rise of evolutionary studies in linguistics. In the last quarter of the twentieth century, linguists like Philip Lieberman (1987, 1998, 2006), Derek Bickerton (1981, 1990, 1995), and Steven Pinker (1994, 1997, 1999, 2002), as well as psychologists like Eric Lenneberg (1964, 1967), Daniel Dennett (1978, 1995, 1996), and others began a comprehensive investigation of the biological and evolutionary foundations of human languages. Their research was part of a more general study of evolution and the human mind, which has since come to be known as **evolutionary psychology (EP)**. This branch of cognitive psychology has broadened its scope to include subjects as diverse as spatial perception (Gaulin, 1992; McBurney, Gaulin, Devineni, & Adams, 1997; Eals & Silverman, 1994), ethics (Wright, 1994; Ridley, 1997; Shermer, 2004), and even theology (Atran, 2002; Boyer, 2001; Wilson, D. S., 2002). EP has always been a profoundly interdisciplinary enterprise, drawing on insights from paleontology, biology, anthropology, linguistics, and philosophy.

EP is nevertheless a scientific undertaking at its core, and as such it seeks natural explanations for the phenomena it investigates and rejects both metaphysics and supernaturalism. Its origins go back to the beginnings of evolutionary studies. In his *Descent of Man*, Darwin (1871/1981) expressed confidence that his then-novel theory would one day shed light on many facets of human intelligence, such as our ability to formulate abstract concepts, our sense of beauty, and, of course, our peculiar talent for sharing such information via a computationally complex system of communication. And while Darwin was

clearly ahead of his time as a biologist, his work often shows the prejudice of his era, most disturbingly in his harsh views of race and class. For instance, Darwin attributes the “low morality of savages” to insufficient powers of reasoning and lack of self-control, while poverty can be attributed to the reckless behavior of those who “are often degraded by vice” (1871/1981, pp. 99, 117).

It is perhaps no surprise that natural scientists of the twentieth century concentrated on Darwin’s legacy as a biologist, while those in the humanities and social sciences obsessed over his socio-political views. The latter provoked a hostile backlash, and the short history of EP as an autonomous discipline has consequently been marked by strident assaults, ranging from reasoned to vicious, and quite often from critics with unmistakable socio-political agendas of their own. Fortunately, Darwin the humanist can now safely be ignored because Darwin the biologist has prevailed. As Wright (1994) noted, something akin to a Kuhnian “paradigm shift” has come about in the humanities and social sciences. “A group of mainly young scholars have challenged the settled worldview of their elders,” claims Wright. They have “met with bitter resistance, persevered, and begun to flourish” (p. 6).

The EP Wars have dragged on for longer than Wright or anyone else might have imagined, and the “elders” he speaks of were around long enough to train a new wave of scholars in the tenets of the old paradigm, and to some extent even to convince them that the old paradigm was really still the new paradigm. Nevertheless, within most of the social sciences, including linguistics, the momentum has shifted perceptibly, and the most entrenched opponents of EP are now fighting a rearguard action as the evolutionary perspective continues to make new inroads into more and more disciplines.

WHAT THIS BOOK IS ABOUT

In his critique of Cartesian dualism, Damasio (1994) framed the EP agenda in terms of three premises, which will serve our purposes exceptionally well:

- (1) The human brain and the rest of the body constitute an indissociable organism, integrated by means of mutually interactive biochemical and neural regulatory circuits; (2) The organism interacts with the environment as an ensemble: the interaction is neither of the body alone nor of the brain alone; (3) The physiological operations that we call mind are derived from the structural and functional ensemble rather than from the brain alone: *mental phenomena can be fully understood only in the context of an organism’s interacting in an environment.* (xv–xvii, my emphasis)

The book you are now reading is about language, which is among the mental phenomena that Damasio has in mind. Such phenomena are the consequences of the machinations of our brain, which is a functional biological structure that ought to be analyzed like other functional structures such as hands, teeth, legs, and eyes. We analyze such structures by studying their properties in the context of the history of the organism in its environment. In simplest terms, our special communicative abilities came about because throughout our evolutionary history, complex languages offered substantial survival advantages. The well-understood processes of natural selection therefore underlie our present linguistic abilities. Our species is alone in having taken this path, and every normal member of our species comes to have this ability by traversing predictable maturational stages. This has traditionally been called the **nativist** view. To study human languages from the nativist perspective is, among other things, to try to understand the evolutionary history that led to our having this amazing kind of knowledge.

This book differs from more general studies of evolution and language in that it focuses on a particular kind of human language, namely one that is learned later in life, after fluency in a first language has already come about. The study of SLA brings with it special challenges because adult second languages differ markedly from first or “native” languages on virtually all relevant variables:

- ◆ **First language acquisition among young children is an astonishingly rapid process.** All over the world, for all of recorded history, children have managed to become fluent in a language in a period of three to four years, with little explicit help from parents and peers. On the other hand, it is not the least bit uncommon to find adults who have struggled with a second language for a decade or more without achieving fluency.
- ◆ **First language acquisition is effortless.** Parents of five-year-olds sometimes complain that their most challenging educational task is not teaching children how to talk; it’s teaching them how to be quiet. Simply exposing children to a linguistically rich environment is enough to ensure fluency. Adults who try to learn a second language, on the other hand, find the process laborious, difficult, and frustrating.
- ◆ **First language acquisition requires no formal training.** Human languages are governed by highly abstract rules that speakers apply uniformly to utterances. Yet those same abstractions appear nowhere in grammar books. If they did, they would serve no purpose. Most children are nearly fluent speakers when they first start to read. People in non-literate cultures have no such manuals—many have no formal system of education at all—yet they learn complex languages too; languages that equally exploit one and the same set

of principles as other languages. Adults, on the other hand, often do learn languages via explicit training that “focuses on form,” and they are generally said to benefit from such instruction.

- ◆ **“Stasis” in the case of first language acquisition is nearly invariable.** In the absence of gross mental, neurological, or psychological abnormality, first language acquisition is universal. All children in all cultures become native speakers; that is, they become indistinguishable on linguistic grounds from others in their community. Adult second language learners, on the other hand, vary considerably with respect to outcome. While children almost always achieve native fluency, adults almost never do.

These are the differences that distinguish SLA research from psycholinguistics in general and that therefore constitute the core of the SLA research agenda.

CHAPTER 1: THE GENERATIVE TRADITION

The thesis I intend to develop in this book is that the particular facts about SLA, like those having to do with language acquisition and human behavior in general, are best explained from the evolutionary perspective. My intent, in other words, is to sketch the foundations of a purely naturalistic account of SLA. Somewhat paradoxically, this begins in Chapter 1: The Generative Tradition with a recapitulation of the history of theoretical syntax, which from its inception purposefully ignored biological and psychological issues. It did so mostly out of necessity: In the mid-twentieth century, when the scientific investigation of languages began in earnest, linguists had few instruments for investigating the white and gray matter that housed language along with countless other cognitive functions. Tests like **fMRI scans**, **PET scans**, and Doppler sonography would not be widely available until later. So what came to be known as *generative theory* set out to create a model of linguistic knowledge based on linguistic behavior; that is, on the kinds of utterances humans produce and, equally important, on those that they never produce. It quickly became apparent that those models were so complex that they essentially ruled out all explanations of acquisition based on classical learning theories. In this way, theoretical syntax, by a process of elimination, made the nativist view of language acquisition inevitable. Chapter 1 will clarify the theoretical conclusions about the nature of human language because those conclusions will guide discussions in subsequent chapters. The discussion in Chapter 1 is intended primarily for readers not heavily vested in theoretical syntax. Those who are will find the discussion familiar and may therefore want to read it casually. The summary there will leave readers in a much stronger position when it comes time to evaluate the claims encountered later on.

CHAPTER 2: LANGUAGE ONTOGENY

Originally, the expectation was that the many postulates that came from theoretical syntax would one day be observed as real psychological phenomena, much in the same way that astrophysicists first described black holes mathematically but eventually found at least tentative empirical evidence of their reality. Things have not quite worked out that way in linguistics, but over time theoretical and empirical studies of language have converged on a common set of conclusions concerning the mechanics of language acquisition. These will be the focus of discussion in Chapter 2: Language Ontogeny. The conclusions in the first chapter come essentially from *negative evidence*. If you are trying to find out where a certain kind of knowledge or skill comes from, it makes sense to start by rounding up the usual suspects, so to speak, which in our intellectual tradition are divine providence, experience, and human nature. If the first two can be eliminated as explanatory factors (for convenience, the discussion of providence will be postponed until Chapter 4, when persistent creationist and **intelligent design** arguments are addressed), then our attention turns to nature. Thus Chapter 2 examines *affirmative evidence* for the nativist view. Since the focus is on adult second languages, we will pay special attention to evidence concerning the critical period hypothesis (CPH), which we owe mostly to Lenneberg (1964, 1967). The CPH postulates a maturational period, running roughly from one year of age through adolescence, during which the brain is optimally prepared to acquire a language. We will see in Chapter 2 that the CPH has consistently found confirmation from a wide array of independent sources including assessment of immigrant populations, research into language recovery patterns following brain damage, mapping studies of brain organization of late bilinguals, and cases of extreme **language deprivation**. Within the medical establishment, where facts about age and the likelihood of language loss and recovery sometimes impinge on decisions of how to deal with serious medical conditions, the CPH is accepted without controversy.

CHAPTER 3: LANGUAGE PHYLOGENY

At first blush, the CPH is a mystifying aspect of language development. It's as if nature, in a rush to design an elaborate means of communication that children could learn as quickly as possible, forgot to make allowances for new languages later in life. Chapter 3: Language Phylogeny sheds some light on that mystery by examining language development from a much different perspective. Having established the theoretical basis of nativism in Chapter 1 and its empirical basis in Chapter 2, we investigate language evolution of our species. The evidence we

rely on from prehistory is somewhat spotty, of course, but rich enough nevertheless to offer an understanding of what sort of world our hominid ancestors lived in, and how that world structured their linguistic development.

It is the environment of prehistoric humans that provides the best indications as to why language was so advantageous to our predecessors, and why second languages are so fundamentally different from native languages. We have only to make a list of the things that would have been difficult or impossible for non-linguistic hominids—for example group hunts, the distribution of foodstuffs and goods, social cohesion, and of course warfare—to understand why those endowed for language would have a leg up on others. And since so much of the cognitive development of a young child depends on language, it is not difficult to understand why the ability to acquire a language rapidly at a young age would be doubly advantageous.

On the other hand, the study of human prehistory does not offer much evidence that the ability to acquire a second language in adulthood would have been beneficial for the nomadic, hunting-and-gathering humans who represent the vast majority of the history of our species. From the earliest migrations out of Africa around 120,000 BCE until fairly recently, the human diaspora across Africa, Eurasia, and the Americas was sparse and widely diffuse. The mega-eruption of the Toba volcano in Sumatra, circa 75,000 BCE, may have reduced the entire human population to just a few thousand (Ambrose, 1998; Rampino & Ambrose, 2000). Even later, when humans began their transition from a nomadic to an agricultural lifestyle, they numbered only about five million; roughly the population of Toronto, Canada, dispersed across six continents (Hawks, Hunley, Lee, & Wolpoff, 2000). For vast stretches of our history—significantly, those during which our linguistics abilities evolved—human cultures lived in relative isolation. Intercultural contacts were occasional, brief, and hostile. It is this fact that explains the stark qualitative differences between first and second language acquisition. For palaeolithic hunter-gatherers, the ability to master a first language early in life was, for the most social of all animals, an eminently useful adaptation. The ability to acquire another language in adulthood was not and, consequently, was not selected for propagation. Seen in this light, the critical period hypothesis is not so mysterious after all. It actually fits rather nicely into the mosaic of evolutionary theory.

CHAPTER 4: THE DEFENSE OF EVOLUTIONARY LINGUISTICS

Chapter 4: The Defense of Evolutionary Linguistics addresses the surprisingly resilient anti-Darwin backlash and its efforts to trivialize and even deny biological bases for language abilities. We are interested here in a scientific account of

SLA. A few discussions in Chapter 4 may therefore seem out of place because they are of a social or political nature. This merely reflects an unfortunate but unavoidable fact about the debates over **evolutionary psychology**. Pinker (2002) poignantly devoted large chunks of his influential *The Blank Slate* to showing that many of the arguments used against evolution have themselves been socio-political rather than substantial. They must therefore be refuted on those terms.

There are three currents of anti-Darwinism that merit attention. The first, and easiest to dismiss, is an assault on evolution *in toto* that comes from the far-right fringes of Christian fundamentalism in the United States. Although fundamentalists are best known for their attempts to force their peculiar interpretation of the Bible into natural science curricula, Chapter 4 shows how they have expanded their campaigns into areas traditionally within the purview of the humanities and social sciences. In fact, linguistics is their favorite new topic, and one on which they have published a plethora of bizarre tracts and papers. However, none of their efforts poses even a passing threat to evolutionary linguistics.

The two other assaults on evolution and language studies come not from the far right but from the far left. They are an example of what Ehrenreich & McIntosh (1997) once ridiculed as “secular creationism” – that is, an effort to “dismiss the possibility that there are any biologically based commonalities that cut across cultural differences” (p. 12). One of these is the denial of the biological basis of language altogether, or at least an argument that biology is only a minor factor in understanding language acquisition. The other is an attack on the critical period hypothesis in particular. When we look closely at either of these arguments, we will find no threat to Darwinism here either. Secular creationism is based on a caricature of linguistic theory and amounts to little more than a knee-jerk reaction to things genetic.

CHAPTER 5: SECOND LANGUAGE METHODOLOGY

In Second Language Methodology, some nuts-and-bolts consequences of the evolutionary perspective for matters like foreign language methodology and educational policy are explored. It has long been assumed in applied linguistics that the proper way to do business is to (a) develop a theory of the nature of language, (b) use that theory to develop a theory of language acquisition, and (c) use the theory of language acquisition to create instructional programs that will bring about language proficiency more efficiently. *Prima facie*, this is not such a bad idea in that it parallels to some extent what goes on in other disciplines. To cite an overused example, America’s twentieth-century nuclear weapons program started as a theoretical enterprise in Berkeley, moved to an empirical program in Chicago, and finally to an applied program in Los Alamos, where the first

nuclear device was built. **Behaviorism** similarly began as a theoretical project, moved quickly into laboratory experimentation, and then to the specifics of language acquisition with Skinner's (1957) *Verbal Behavior*. Ultimately, it found its way into second language methodology in the form of the **audiolingual teaching** method.

On the pedagogical front, the news from evolutionary studies is neither good nor bad. The evolutionary perspective sees language acquisition—first and second—as a maturational phenomenon. Nurture is an indispensable part of ontogenetic development, but it does not trump nature. Efforts to teach children to walk weeks after birth would be futile, not to mention cruel. Similarly, efforts to accelerate adult second language acquisition via special programs have generated considerable excitement over the years, but they have uniformly failed to live up to their promotions. The brain develops according to a plan of its own, and while we can do much to hinder that development, our options for accelerating it are limited. Thus discussions in Chapter 5 will not support any particular, pre-packaged teaching method, and will only include some very general observations about pedagogical practices.

This is not to say that work on foreign language methodology is without merit. On the contrary: my personal view is that teaching methods and materials desperately need an overhaul. We may envision a future in which creative writers and thinkers will be attracted to this enterprise. Their motivation will be to produce engaging materials geared toward real-world applications like international commerce and translation. Their success will stem in large measure from a willingness to reject the conformity imposed by programmatic agendas of the past. At the same time, rational pedagogy and language policy in general will, with luck, be constrained by an awareness that one cannot countermand tens of thousands of years of evolution merely by redesigning educational materials.

CONCLUDING REMARKS

All told, by the time we reach our conclusions, there may be relatively little cause for optimism concerning the psychological study of SLA and its practical applications. But then, one of the reasons that evolutionary psychology has provoked so much hostility in the past is that it has, on more than one occasion, told us things about ourselves that we would rather not hear. In his many ruminations on evolutionary theory and modern epistemology, the late paleontologist Stephen Jay Gould (Gould & Lewontin, 1979) liked to poke fun at what he called the "Panglossian Paradigm." Gould (who was no fan of EP, incidentally) was referring to the views of the hopelessly sanguine antagonist in Voltaire's classic novel *Candide* (1759/1977). Dr. Pangloss was under the spell

of an Aristotelean heritage that conceives of natural processes in goal-driven, teleological terms. By this concept of nature, all living things in their primal state contain an essence that defines their nature and drives them inexorably towards stasis. Every tiny acorn thus has within itself a mighty oak, and given a normal, uninterrupted course of development, every one will grow toward that destiny and no other. It is therefore demonstrated, believed Pangloss, “that things cannot be otherwise; for since everything is made for an end, everything is necessarily made for the best end” (p. 230).

The intellectual foundations of Dr. Pangloss’s optimism actually go well beyond Aristotle. We could just as easily cite our Judeo-Christian heritage and its contention, per the *Book of Genesis* (1:28–30), that humans have a God-given duty to subdue their environment, to replenish it, and to take dominion over everything within it. If such dominion were part of a cosmic plan, then the planner would have designed other organisms accordingly. Not only would every seed from every orange carry the essence of a new orange tree, but that tree – as is evident from the sweet taste of its fruit – would exist uniquely for the sustenance and pleasure of humans. This agreeable arrangement would even extend to non-living things, or so figured Dr. Pangloss. Not only were noses designed to carry spectacles, legs to sport britches, and pigs to be roasted on spits, but even stones “were formed to be quarried and build castles” (p. 230). Even the syphilis that ravaged Pangloss’ body in Chapter 4 of *Candide* was part of a grand plan, because without syphilis we would not have had Columbus’ trip to the Americas and therefore no chocolate. Although Voltaire’s novel is satire, the Panglossian Paradigm is a pervasive if not ubiquitous part of our intellectual heritage. It is also, as Gould pointed out, a thoroughly unscientific view of how nature works.

What’s worse, it is a sneaky fallacy, rarely stated overtly, but often lurking just below the surface of one’s assumptions. It is so sneaky, in fact, that it managed to compromise linguistic research, and especially applied SLA research, even before evolution became an issue. In the best of all possible worlds, immigrant parents would arrive in a new country and, like their young children, become fluent in a couple of years merely through casual linguistic interaction with peers. In the next-best possible world, any differences that might be observed between child first language acquisition and adult second language acquisition would be due to affective factors like motivation, introversion, difficulty in acculturation, and so forth. After all, such factors are in most people’s minds much easier to remedy than biological factors. In the best of all possible worlds, business professionals and diplomats could achieve a high level of fluency in a second language in a short period of time, without interrupting their normal affairs. In the best of all possible worlds, it would be sound policy to defer foreign language educa-

tion until the college years, so that other pressing needs like math and science education could be met in elementary and intermediate schools.

From wishful thoughts like these, it is not even a leap of logic but a skip to assume that second language teaching methodology ought to be in the business of developing materials to meet our rosy objectives. The consequence has been that an inordinate amount of time and resources in SLA research has been devoted to tinkering with language curricula in the hopes of finding the pedagogical equivalent of the fountain of youth.

We will have to be on the lookout for Panglossian optimism throughout this book, both in our review of past SLA research and in our own attempts to establish an evolutionary account of second language acquisition. That may force us to draw some sobering conclusions about our mental dispositions. So be it: one should never assent to a theory out of self-interest anyway. Constructing a theory of cognition based on social exigencies is archetypally Panglossian. And while the scientific study of second language acquisition is barely a half-century old, it is mature enough already to shed that legacy once and for all.