

A Synthesis of Second Language Acquisition

Paul Garside

Abstract: The still relatively young field of Second Language Acquisition (SLA) has nevertheless inspired a wide range of theories, with each one attempting to illuminate the process of learning a language other than one's mother tongue. Drawn from such disparate disciplines as linguistics, cognitive psychology, and neuroscience, some of these theories can initially seem contradictory. However, rather than being in competition with each other, I believe that in most cases they can in fact be viewed as complementary. This is because, while sometimes overlapping, they often focus on different aspects of the process. As no theory is fully comprehensive, they can therefore each enhance our understanding of the field in some way. In this paper, with a particular emphasis on the comprehension of language, I attempt to draw some of the major theories of mainstream SLA together to form a comprehensive account of how the complex process of second language learning unfolds.

Keywords: *SLA, comprehension, production*

Introduction

Learning and studying languages other than one's mother tongue is commonplace around the world, whether in instructed or naturalistic contexts. Yet the field of second language acquisition (SLA), which attempts to explain the processes involved in this phenomenon, is still relatively new. Because of the complexity of language learning, SLA has increasingly drawn on other disciplines, such as linguistics, cognitive psychology, and neuroscience, in order to make sense of the myriad issues, both individual and social, deliberate and incidental, age-related and universal. This has led to a plethora of theories, each of which can illuminate different aspects of the process. Even theories that at first glance appear contradictory can, I believe, complement each other and add to the overall understanding of the field.

The need for human beings to communicate is without doubt the driving force behind language, but the fact remains that there can be no production without comprehension. Not only do listeners and readers have to comprehend the language they are exposed to, but every successful speaker and writer must have gone through the process of absorbing and understanding in the first place. Comprehension can therefore be viewed as the starting point of acquisition and every theory of SLA has to account for it in some form, even those that place more emphasis on the role of output. In this paper, I examine some of the key theories in the field, focusing particularly on comprehension, in an

attempt to form a coherent account from such seemingly disparate elements.

Innatism and Universal Grammar

Given the complexity of language, and the fact that all children allowed to develop under normal circumstances become fully competent speakers, it seems clear that humans have an innate predisposition for learning their L1. Further, the fact that they achieve this feat without any conscious effort suggests that most of the work has already been completed in the evolutionary forge. This is backed up by many studies among animals and birds, which have found communication techniques that can be considered the precursors of various aspects of human language. This, combined with the evidence of pidgin and creole language development, and the fact that deaf children naturally create improvised systems of gestural communication, provides an overwhelming case for the biological specialization of human language learning (Jackendoff, 2002).

The degree of this innate specialization, sometimes referred to as Universal Grammar, is controversial, with the central issue concerning the so-called *poverty of the stimulus* argument, whereby learners can comprehend and produce utterances they have never previously heard. Pinker (2007) has convincingly shown that underlying concepts such as causation and motion constrain how far L1 speakers are willing to generalize linguistic forms, but whether L2 learners retain this ability has also been the subject of much debate.

The question of whether interlanguage competence is subject to the same kinds of constraints as native competence rests on whether it can be shown empirically that L2 learners also acquire abstract linguistic features that are underdetermined in the input (White, 2015). This proposal is somewhat problematic, however, given that linguistic competence cannot be directly observed; that is, performance data must be used to infer competence. One such study was undertaken by White and Juffs (1998), who used grammaticality judgement and production tests to show that their participants (16 adult speakers of L1 Mandarin Chinese) successfully observed island constraints in the formation of *wh*- questions.

Studies such as this show that learners do have an aversion to certain types of grammatical errors, and hence there are inherent constraints on a learner's interlanguage. However, they are limited to very specific and highly abstract forms and do not address the fact that adult learners tend to have much greater difficulty with all aspects of learning a second language than children. Therefore, I believe that Universal Grammar is far more relevant to L1 and early L2 learning, before cognitive shifts transform the way in which the brain acquires language.

Usage-Based Approaches

A radically different perspective is offered by proponents of usage-based approaches to

SLA. Rather than focusing on innate constraints specific to language, these scholars argue that general cognitive mechanisms are the driving force behind language learning, as with all other forms of learning (Ellis & Wulff, 2015). They maintain that exposure to input is the key, with frequency of encounters implicitly tallied and neural connections strengthened as a result. This phenomenon is known as associative learning, whereby linguistic features that occur frequently have heightened resting levels of activation and can thus be rapidly accessed. The strength of this theory is that it accounts for the implicit and unconscious learning that, in practice, represents the greater part of language development. It also accounts for the fact that forms that are not used regularly fall gradually from memory, as any lapsed language learner can attest.

Nevertheless, this theory does raise questions regarding the disparity of ultimate attainment between L1 and L2 learning. In other words, if frequency is of overriding importance, why do second-language learners often struggle with particular features of the L2, whether phonological, syntactical, etc., regardless of their prevalence in the input? First, the effect of frequency can be compromised by factors such as the salience, complexity, and contingency of the form. Second, and of crucial importance, entrenchment of the L1 can lead to the overshadowing and even blocking of certain forms (Ellis, 2008). For example, articles are notoriously difficult to acquire among learners whose L1 lacks them because they lack saliency, both semantically and phonologically, and such learners often simply fail to perceive them in the input.

Where usage-based accounts differ from most other mainstream cognitive approaches to SLA is in the total rejection of age-related biological explanations. While acknowledging broad genetic constraints on the maturation of learning capabilities, no credence is given to the concept of a critical period, beyond which the attainment of native-like competence becomes extremely difficult, if not impossible. While there is merit in the rationality of this theory, and the unwillingness to ascribe learning to mysterious black boxes and language acquisition devices, the evidence in favor of age effects is, I believe, overwhelming.

Age Effects and the Critical Period Hypothesis

Evidence in support of the Critical Period Hypothesis has been garnered using a variety of methodologies. For example, DeKeyser (2000), using grammaticality judgment tests, found that only immigrants to the United States who had begun learning English in childhood achieved native-like competence. He claimed that this is because they were able to learn implicitly, while the adults no longer had access to such mechanisms and were forced to rely on explicit, analytic abilities instead. As a result, aptitude correlated strongly with achievement among adults, but played no role in determining the success of child learners. DeKeyser concluded that all learners lose the ability to induce abstract linguistic patterns between the ages of 6-7 and 16-17.

A different methodological approach was pursued by Weber-Fox and Neville (2011), who gathered neurological data using event-related brain potentials (ERPs) from

Chinese-English bilinguals. They found that L2 proficiency was negatively affected by later immersion, but, importantly, that different aspects of language produced differential age effects. For instance, immersion after the age of seven resulted in limited proficiency with auditory sentence structure, while speed of identifying semantic anomalies declined after the age of eleven. Another interesting finding was that no age effects were detected for the processing of content words. This implies that such vocabulary items are learned explicitly, using declarative memory, which does not suffer the same kind of decline as implicit learning ability. Overall, this study adds to the growing body of evidence in support of biological age-effects, but that they do not operate uniformly. Each aspect of language, and indeed each subprocess, should therefore be considered independently.

The Declarative-Procedural Model

Having examined some of the evidence in support of biological age-effects and the so-called critical (or sensitive) period, let us now consider the theoretical basis for these findings more closely. Ullman (2015) has claimed that two main memory systems underpin the long-term storage of language in the brain, both of which have their roots in the prelinguistic evolution of humans. These are the *declarative* and *procedural* systems.

Declarative memory stores knowledge about facts and events, and provides the foundation for the mental lexicon. Knowledge can be learned rapidly in declarative memory, sometimes with just a single exposure to the stimulus, such as a word or rudimentary grammar rule. This knowledge is (at least partly) explicit and therefore available to conscious awareness. Crucially, declarative memory improves during childhood, which means it becomes easier for people to learn explicitly as they get older.

Procedural memory, on the other hand, underlies implicit learning and the use of motor and cognitive skills. It is mainly specialized for learning sequences and rules, including grammatical structures. This kind of learning requires repeated exposure or practice, although knowledge can be accessed rapidly and reliably once learned. However, whereas declarative memory improves during childhood, procedural memory appears to decline. The consequences for L2 learning are that adult learners are initially reliant on declarative memory for both lexical *and* grammatical (i.e., rule-based) forms, although procedural memory can still be used by adults and improves with practice.

Neuroimaging studies generally support the idea of qualitative differences between L1 and L2 in terms of grammatical processing. This is not the case for lexical processing, however, which explains the finding of Weber-Fox and Neville (2011) that vocabulary items are not subject to age-effects. Nevertheless, with increases in proficiency adult learners can achieve L1-like neural processing, not only for lexical knowledge but also for some aspects of grammar. Although it must be emphasized that native-like processing should not automatically be equated with native-like proficiency (Morgan-Short & Ullman, 2014).

Skill Acquisition Theory

As well as providing a theoretical basis for empirical findings, the declarative-procedural model also has important practical implications for L2 learning, some of which are expressed in Skill Acquisition Theory. In this theory adult language learning is seen as similar to other skills, such as learning a new sport or a musical instrument. What they have in common is that the starting point is consciously held (declarative) knowledge, which is then superseded by more fluent, largely effortless behavior via extensive practice. DeKeyser (2011) has referred to the former as knowledge *that* and the latter as knowledge *how*. A common misconception is that declarative knowledge actually turns into procedural knowledge, whereas in reality both forms develop in parallel, with a shift in reliance from the former to the latter reflecting more skilled behavior.

How this relates to second-language learning specifically can be clearly seen with regard to grammatical structures. Learners in instructed contexts usually start out by memorizing a rule, for example how to form the past tense. This knowledge is then applied, hesitatingly at first, but then more fluently with repeated use. Crucially, according to DeKeyser (2015), the former is a prerequisite to the development of the latter. Therefore, if such rule-based knowledge is not learned sufficiently well in the first place, effective proceduralization is unlikely to take place.

It should be clear from the preceding paragraphs that Skill Acquisition Theory is limited in scope, as it applies mainly to adult (or adolescent) learners who are learning relatively simple structures in instructed contexts. It does not apply so readily to young children, who lack the cognitive development to learn explicitly, or to implicit learning in general. On the other hand, the context outlined above represents a huge number of L2 learners around the world, especially those in EFL situations. Indeed, as DeKeyser (2011) has pointed out, it is unrealistic to expect such learners to have sufficient time or input to learn *without* explicit attention to form.

Precisely because of this limited scope, Skill Acquisition Theory complements the other theories we have looked at very well. It clearly overlaps with the declarative-procedural model, although with a greater focus on practical applications. In addition, the existence of biological age-effects are implied in its appeal to the cognitive advantage that older learners possess. Finally, the focus on explicit learning dovetails with the heavily implicit focus of usage-based accounts and associative learning. Furthermore, even explicit form-focused pedagogical techniques contribute to the implicit statistical tallying that is fundamental to usage-based theories, a point which has been acknowledged by Ellis (2005). Indeed, Ullman (2015) has taken pains to point out that declarative memory underpins implicit, as well as explicit, knowledge.

Skill Acquisition Theory is most often thought of as relating to language production, with most applicable studies being output-based. A good example of this is De Jong and Perfetti's (2011) study examining the effects of the 4-3-2 fluency-building activity. Yet the concept of proceduralizing knowledge through practice equally applies to language comprehension. For example, De Jong (2005) found that extensive aural comprehension training increased processing speed among learners of L2 Spanish without leading to

errors in later production tasks.

Input Processing

Another very practical theory, with a more obvious focus on comprehension, is Input processing (IP), which takes as its starting point the notion that learners prioritize meaning, and hence lexical items, over form (Van Patten, 2015). The implication is that L2 learners often do not process non-content words and therefore, particularly if equivalent forms do not exist in the L1, they will be difficult to acquire. This recalls the concept of negative L1 transfer, or entrenchment, which is a fundamental aspect of connectionist and usage-based theories (e.g. MacWhinney, 2008).

Another implication of this theory is that learners will apply default L1 processing strategies when parsing the input unless they become aware that it is inappropriate to do so. A common example given by IP proponents is that English L1 speakers often mistakenly give primacy to word order when processing Spanish. If the first pronoun in a sentence is assumed to be the subject this can impede understanding because Spanish, with its more flexible word order, allows object pronouns to appear in sentence initial position. Learners can, therefore, benefit from focused instruction that draws attention to such predictable errors, while maintaining the connection between form and meaning.

This kind of input-based instruction has been found to be useful in addressing the kinds of errors mentioned above, although Morgan-Short and Bowden (2006) attempted to compare its effectiveness with output-based instruction. Based on their results, they claimed that the output version performed at least as well as PI, and so argued that meaningful output-based (as well as input-based) practice should be provided during early stages of instruction. This conclusion is questionable, however, as delayed posttests found PI gains to be more stable. Moreover, the output group also received input during instruction and feedback, making it hard to attribute the results of this group to the effects of output alone.

Comprehension versus Production?

The methodological difficulties in comparing input- versus output-based instruction revealed by Morgan-Short and Bowden's (2006) study suggest that this might ultimately be an unproductive line of research. It does, however, hint at what has historically been one of the major controversies in SLA; namely, whether input alone is sufficient for acquisition to occur.

Such arguments go back at least as far as Krashen (1982), who famously claimed that the provision of comprehensible input (the so-called $i+1$) is all that is needed to successfully precipitate acquisition. Further, he insisted that production is simply the result, not the cause, of SLA, and that comprehension and the processing of input alone drives L2 acquisition. What now seems like quite an extreme position in fact has its roots

in Universal Grammar and the idea that input triggers the setting of parameters, which is seen as part of the biological endowment of humans. As discussed earlier, this concept originates from, and is far more applicable to, L1 learning; yet Krashen attempted to apply it wholesale to L2 learning, which he saw as fundamentally similar to learning one's native tongue. It seems clear today, however, that learning an L2 is fundamentally not the same as learning an L1, not least due to the effects of having learned the L1 in the first place, which leads to the kinds of transfer effects mentioned before.

Nevertheless, the relative roles of input and output continue to be debated. On the one hand, Van Patten (2004), who developed processing instruction, has claimed that acquisition is not dependent on output. Although he accepts that it is useful for developing fluency and accuracy, he maintains that it does not alter the nature of the developing system. Others claim a more fundamental role for output. For example, DeKeyser (2011), in support of Skill Acquisition Theory, has claimed that comprehension and production skills develop separately, and are therefore dependent on the corresponding provision of input and output. Further, Swain (1995), in her influential Output Hypothesis, stated that output facilitates acquisition more generally as it promotes noticing gaps in the interlanguage, hypothesis testing, and the development of metalinguistic knowledge.

Comprehension in the Context of Interaction

It is clear from the above that both comprehension and production are integral to SLA. I have also argued that it can be problematic to separate them empirically. One theoretical standpoint that seeks to bring them together is the Interaction Approach, which subsumes elements of Krashen's Input Hypothesis and Swain's Output Hypothesis. In this approach, learning is seen as a result of exposure to language and the production of language, as well as feedback directly on that production (Gass & Mackey, 2015). From this perspective, it is the pressure to understand, and be understood, during communication that drives language learning.

Input serves a vital role in terms of the provision of positive evidence, which has also been emphasized by UG researchers. In other words, it serves as the basis for hypotheses about how the language works. For input to be effective, however, it must be comprehensible and the importance of communicative interaction is that it specifically tailors input to the needs of the individual. In practical terms, once non-comprehension of an utterance has been signalled (for example in the form of a clarification request) this prompts the interlocutor to reformulate or modify the utterance in a process known as the negotiation of meaning.

There is no doubt that this process is an important strategy for maintaining smooth and fruitful interaction. What has been questioned, though, is how often it actually occurs in practice, especially in classroom contexts (Foster, 1998). Such criticisms were robustly denied by Gass, Mackey, and Ross-Feldman (2011), who compared the performance of learners of L2 Spanish in classroom and laboratory-based settings. They

were given three types of interactive tasks, with three interactional features focused on for analysis. These were the negotiation of meaning, language-related episodes (LREs) and recasts. The authors found that, although there were differences in the frequency with which these features were used, this depended solely on task type and not instructional setting. In other words, no significant differences were observed in interactional patterns between the two contexts. They concluded that differences between contexts should not be assumed but rather that task type should be carefully considered in order for learners to make the most of the pedagogical benefits of interaction.

Sociocultural theory

Although initially pertaining to L1 learning, another approach that emphasizes the importance of interaction is Sociocultural Theory (SCT). A further similarity with the Interaction Approach is that comprehension is primarily viewed as a precursor to improved production. Where SCT departs from mainstream SLA is in the claim that acquisition itself actually occurs in the social sphere, rather than in the internal cognitive apparatus of the individual (Lantolf, Thorne, & Poehner, 2015).

The central construct in SCT is mediation, which is predicated on the notion that all human activity is regulated by artifacts, whether materially or socially constructed. Examples of the former include everything from pens and paper to dictionaries and computer software, while the latter includes language itself. According to this theory, human activity can thus be object-regulated, other-regulated, or self-regulated. The first of these is self-explanatory, but we will take a closer look at the second and third categories.

Other-regulation refers to mediation by people, which includes any form of feedback or assistance from experts or teachers (whether formally or informally). The key concept here is the Zone of Proximal Development (ZPD), which represents the potential learning an individual could achieve with the guidance of more knowledgeable others (Vygotsky, 1978). Although Sociocultural Theory has been criticized for its lack of clarity regarding the actual processes involved in SLA, the concept of the ZPD has been influential in shifting the focus away from purely internal, cognitive mechanisms of the learner. It is surely impossible to become a proficient user of a language without any form of external assistance (or mediation). It is the aim of SCT to highlight the inherently social nature of this process.

Be that as it may, any theory that fails to take account of the individual's internal resources is bound to be incomplete. To this end, learners who are no longer reliant on external mediation in particular situations are said to have achieved self-regulation (Lantolf, Thorne, & Poehner, 2015). In SCT, this process of gaining control over linguistic resources is called internalization, although once again it is not entirely transparent as to how this occurs. This lack of detail makes it very difficult to verify empirically and the theory in general seems to mainly boil down to a change of emphasis from the individual to the social.

Complexity Theory

It is clear by now that SLA is a very complex process, and that no one theory has been able to account for all the discrete elements involved while being applicable to all contexts. This reality has, in effect, been recognized by the growing popularity within the field of Complexity Theory, which perhaps comes as close as anything to unifying the various strands.

Complexity Theory, which has also been applied to disciplines as diverse as physics and economics, emphasizes the concept of spontaneous emergence from the interaction of the various components within a system (Larsen-Freeman, 2015). In other words, such systems are self-organizing as their development is not externally directed. This aligns with the views of connectionists, such as MacWhinney (2008), who see the various aspects of linguistic knowledge as being represented in a series of self-organizing maps in accordance with usage. Usage in this case refers, of course, to comprehension as well as production, as each time a feature is called upon (either receptively or productively) this strengthens the connections and adjusts the weightings between sets of neurons.

The implications for SLA are that the process of learning will, by definition, be dynamic and nonlinear. Dynamic means that an individual's interlanguage remains in a constant state of flux as it adapts to any and all changes in the environment. Nonlinear refers to the fact that there is no isomorphic relationship between cause and effect. This will come as no surprise to teachers who have witnessed their corrective feedback seemingly fall upon deaf ears! Nonlinearity also implies that development is not unidirectional, as learners often forget what they have learned without regular reinforcement. It also accounts for bidirectional transfer, with the use of one language affecting the use of another within a single multilingual system (Larsen-Freeman, 2015).

Conclusion

The field of SLA is necessarily an interdisciplinary one, relying on insights from such fields as cognitive science, education, and sociology, as well as linguistics. This helps to explain the range of theories that exist, even within a relatively mainstream account such as this. In order to provide a truly broad-based account it would be necessary to examine in greater detail how SLA is affected by individual differences among learners, as well as addressing the multitude of social and learning contexts that exist around the world.

Despite these limitations, I hope to have shown how all of these theories can be seen as parts of the whole. That is, by zooming in as well as out, we can see how they each illuminate a different aspect of the process. Usage-based accounts illustrate how language operates at the micro level as connections are formed and reinforced between neurons, while innatist theories and the Declarative-Procedural model help to explain the existence of biological age-effects. Skill Acquisition Theory, the Interaction

Approach, and Input Processing, meanwhile, adopt a more practical outlook and examine the pedagogical implications arising from theory. Finally, Complexity Theory, with its all-encompassing view of language development, hints at a fusion between cognitive and social perspectives.

I have emphasized comprehension as being the starting point of acquisition (at least in the cognitive sense) in this account, but that is not in any way intended to diminish the role of production. Indeed, although it is common to view second language learning in terms of input and output, it is arguably more profitable to see it as reliant on an interconnected network of cumulative experiences, each of which plays its own small part.

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