1 Introduction

Second language learning is a multi-faceted field that covers a range of subdisciplines. For example, researchers have investigated the phenomenon of learning a second language (L2) from a formal linguistic perspective, from a sociocultural perspective, from a neurolinguistic perspective, and from a psycholinguistic perspective, to name a few of the approaches that scholars have taken. In addition, to these theoretical orientations, numerous topics that influence second or foreign language learning have been investigated including, aptitude, attitude, age-related effects, motivation, affect, and language transfer, to name a few. This chapter presents an overview of ways to account for 1) why it is difficult to learn a second language and 2) why it is that learning generally falls short of complete mastery of the target language. The literature referred to in this chapter is focused on adults who have learned their native language and who are then learning another language. Other contexts of learning (e.g., heritage language learning – learning the language of one’s home environment or the language of ancestry or bilingual learning – learning two languages simultaneously are not covered in this chapter). For a fuller array of topics and more in depth treatment, the interested reader is referred to Gass and Mackey (2013). When addressing the fundamental question of how second languages are learned, at least in the context of adult (i.e., post-pubescent) learning, there are two assumptions that can be made: 1) the learner has a full-formed grammar of their L1 and 2) input is the sine qua non of learning. How these two factors figure into scholarly approaches differs on the basis of one’s theoretical orientation.

The chapter is organized as follows. In the first section, I consider Universal Grammar, a formal approach to learning, that is, where a focus on the forms acquired is the primary concern. This is followed by research on processing and addresses how language learners are constrained by limitations on their ability to process information. The third part of the chapter deals with areas that are outside of a learner’s

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1 Second language learning refers to learning a language in the environment in which it is spoken (learning French in France, Italian in Italy). Foreign language learning refers to learning a language in the environment where the surrounding language is the native language (an English speaker learning Italian or Spanish in the U.S.).

2 The interested reader is referred to the discussion in Gass and Glew (2008, in press) for ways different terminology (e.g., SLA, bilingualism) has been used.
control and how these also impact final outcomes. Finally, the chapter touches on limitations on L2 learning caused by physical limitations (hearing), focusing on the acquisition of sign language and on learning by hearing-impaired individuals.

FORMAL APPROACHES

Formal approaches to L2 learning investigate language form with the goal of understanding the linguistic system (known as a learner language or interlanguage) that learners have acquired at any point in time. The theoretical linguistic perspective most commonly considered is Universal Grammar (UG), the most well-known of generative theories. Underlying this approach to L2 learning is the idea that language learning (both first and second) involves (to greater or lesser degrees) innateness. Whether innateness involves principles that are specific to language learning or whether innateness involves principles that are relevant for all types of learning is a matter of debate (see the discussion on emergentism/usage based approaches in O’Grady, 2001, 2008, 2013 and in O’Grady, Kwak, Lee, and Lee (2011). This will be further dealt with in the section on input below.

The Universal Grammar approach, the focus of this section, is of the first type and sets out to specify the principles that constrain and therefore facilitate language learning. Because first languages are learned relatively quickly and because first language (L1) learning is generally successful, there must be some underlying innate language properties that guide first language learning. The phenomenon of fast and successful acquisition is not in dispute for L1 learning. Within the UG view, there is an assumption that language is a highly complex and abstract system and the learning of that system relies on something other than the input that a learner (child or adult) receives. UG represents an innate language faculty that constrains the possibility of what language is, thereby reducing the burden on a child. An example from White (1989) serves to exemplify what is meant. Consider the possibilities in 1–2 of using either want to or wanna.

(1) Who do you want to see?
(2) Who do you wanna see?

Further consider 3–4 where wanna is not possible (*indicates an ungrammatical sentence).

(3) Who do you want to feed the dog?
(4) *Who do you wanna feed the dog?

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3 There are many areas that could be covered in this chapter including motivation, affect (e.g., anxiety, culture/language shock), and aptitude. The decision to eliminate these topics reflects a conscious choice to only deal with topics over which learners have little/no control (e.g., issues of processing, issues of innateness, issues of input, and age).
White argues UG principles are necessary to account for this distribution; input alone does not provide appropriate information. In 1, the meaning is *You want to see X* and in 3 the meaning is *You want X to feed the dog*. In (3), but not in (1), the question is about an element (*X*) that is placed between *want* and *to*, effectively blocking contraction. In (1), *want* and *to* are adjacent, thereby allowing contraction given that no intervening element blocks it. The blocking of contractions when the elements are not adjacent stems from underlying principles and cannot be discerned readily from the input alone. On the other hand, O’Grady, Nakamura, and Ito (2008) counter this explanation and argue from a usage-based perspective that it is a matter of processing and not a matter of UG.

Another important construct from child language learning is what is referred to as evidence of which there are essentially two types: positive and negative. The first refers to the language the learner is exposed to (input) and the second refers to information about the language that informs the learner that the language form she or he has used is incorrect. It is well known that in child language learning negative evidence (or information about well-formedness) is not a sufficient explanation in that correction does not occur regularly and when it does occur, the child is often more focused on meaning and does not react to form correction, carrying on using the original form.

When it comes to adult L2 learning, the situation is less clear. Not only is there an innate language system that may have guided second language learners through the learning of their L1, there is also an intact language system in play. In other words, learning a new language is in some sense more complex than learning a first language as multiple systems have to be taken into account. Basic questions are the following: 1) Does the innate language faculty that children use in constructing their native language grammars remain operative in second language acquisition? And 2) What is the starting point of acquisition? The L1 or an innate system? Or, is it data from exposure to the L2? Over the years, there have been opposing views, one which argues that child and adult language learning are fundamentally different (e.g., Bley-Vroman, 1989, 2009), and one that argues that the innate language faculty is operative in both L1 and L2 learning. Arguments in favor of the idea that the two learning processes are different, known as the *Fundamental Difference Hypothesis*, point to well-accepted differences in outcomes (child language learning in normal circumstances is complete; adult L2 learning is not). This is supported by the pervasive phenomenon of fossilization (Han, 2014; Long, 2007). Second, as noted above, the starting point is different in that L2 learners have a fully-developed linguistic system at the outset (see discussion below). A third argument relates to personal and social factors that come into play. For example, motivation and attitude toward the target language and target language community may influence the extent to which language learning is successful. This is not the case for child language learning where motivation, for example, is not a relevant factor. The claim is that adult L2 learners do not have access to UG. Instead, what learners know of language universals is
constructed through their native language (NL) and not through direct access to UG. Bley-Vroman (2009) introduces an interesting construct, that of patches. This refers to the areas of our L1 that we may be unsure of, possibly stemming from differences between actual use and prescriptive grammar. Included in this category might be the lie/lay distinction in English. English native speakers (NSs) often hesitate when needing to produce utterances with these vocabulary or grammatical uncertainties. NSs have few patches, whereas language learners have many. Bley-Vroman argues that this may be a quantitative difference, although not a fundamentally different one.

A UG approach to language learning takes the opposite view and argues that L2 learners do have access to UG and that UG, in fact, constrains L2 grammars (White, 2003). An important question concerns the relationship between the L1 and UG. There is not unanimity on the interface of these two systems (and more systems when multiple languages are known). Suffice it to say that positions vary along the lines of which of the two languages serves as the base. Meisel (2011), however, argues that there are three possible knowledge sources that influence learning and can be argued to be the starting point: 1) L2 input, 2) UG, and 3) L1. One position is that L1 is the starting point with full access to UG when the L1 is insufficient. This assumes that L1 and L2 learning are different and also accounts for incomplete knowledge of the L2 as the end result. Other positions advocate a starting point as an intact innate language faculty which serves as the starting point for learning. L1 and L2 learning are fundamentally the same and the endpoint and the paths taken should be the same for both. Differences in the end result are based on performance issues rather than knowledge issues (competence), as discussed below. (See Meisel, 2011, for a review of these various positions).

Another way of looking at acquisition, while still maintaining the basic roles of UG and the L1, is to differentiate between lexical and functional categories. Briefly, lexical categories are nouns, adjectives, verbs, and adverbs. Functional categories serve particular functions (e.g., articles, possessives, plurals, tense markers, case markings, gender markers, complementizers [if, whether, that]). Functional categories represent a fixed set of words in a language, whereas lexical categories can be added to frequently, for example, with new technology (blogs, email, twitter, motherboard).

If one accepts the difference between these two types of linguistic categories, one can postulate that the learning of functional categories may not be L1 dependent and, instead, come from the input. Consider grammatical gender or grammatical categories as examples. English does not have grammatical gender so there is nothing from the L1 that will guide a learner in learning a language with grammatical gender or there is nothing, for example, that will guide an English speaker in learning the various categories in Bantu languages (Spinner 2013; Spinner and Thomas, 2014).

Current research is concerned with such questions as: is lexical learning the starting point for learning with the learning of functional categories being much later? Some have argued that only those features that are available to L2 learners
are those in the L1 (e.g., Hawkins and Chan, 1997). As a result, there is a syntactic
deficit in the L2 linguistic representation. Others (e.g., Prévost and White, 2000)
have argued that there is no syntactic deficit; rather, the issue is a mapping one,
namely the inability to map intact representations onto L2 surface morphology
(see Lardiere, 2012). Slabakova (2013) points out that while there is no consensus
on the starting point of acquisition, research emphases and approaches have moved
beyond this particular debate.

Slabakova, in trying to account for differences in learning success of different
parts of language, proposed the Bottleneck Hypothesis (2012). The bottleneck is in
the acquisition of inflectional morphology and formal features. Slabakova points out
that “inflectional morphemes carry the features that are responsible for syntactic and
semantic differences among languages of the world, so it is logical that once these
morphemes and their features are acquired, the other linguistic properties (word
order, interpretation, etc.) would follow smoothly” (2012, p. 140).

With regard to article acquisition, Ionin, Ko, and Wexler (2004) propose the
Fluctuation Hypothesis to account for article acquisition. According to Ionin, et al., this
hypothesis states that “L2 learners have full access to UG principles and parameter-
settings” and “L2 learners fluctuate between different parameter-settings until the
input leads them to set the parameter to the appropriate value” (p. 16).

Yet another view is that of Sorace’s Interface Hypothesis (2011). When learning
structures that involve an interface between syntax and another cognitive domain
(syntax-semantics, syntax-pragmatics, and syntax lexical-semantics interfaces), one
encounters greater difficulty than when acquiring non-interface structures. This
accounts for the lack of success that most learners have in reaching native-competence
in an L2. But, not all interfaces are created equal, with some (e.g., syntax-pragmatics)
resulting in greater non-convergence with L1 grammars (i.e., less success) than
others (e.g., syntax-semantics). This may be due either to less automatic processing
(L2 learners have knowledge representations that are less developed than those of a
native speaker) or to “less efficient access to these representations” (2011, p. 17).

In general, L1 and L2 are both similar and different. Constraints on acquisition
based on UG features guide acquisition and may lead to successes. On the other
hand, L1 and L2 convergences and conflicts also guide acquisition and result in
interlanguage grammars that reflect both UG and L1 (or other L2s) features.

Because of the highly complex nature of learner languages and because of their
ever-changing nature, it is not surprising to find little conclusive evidence of why L2
learning is in part successful and why it is not (why do French learners of English
continue to say I am eating slowly my dinner even in late stages of learning?).
Formal linguistic approaches provide a theoretical basis to help tease apart the
various factors involved. Ongoing debates reflect definitional aspects (what is meant
by starting point?) and issues of falsification (e.g., how does one account for theoretical
predictions not being realized?)
In sum, within the general formal framework known as Universal Grammar, we have seen a number of hypotheses proposed that relate to how second languages are learned and why, in most cases, learning does not have the same result as primary language learning. In particular, we examined the Fundamental Difference Hypothesis which states that learning a first and a second are fundamentally different processes.

We have also seen numerous other explanations put forward, such as issues relating to 1) the starting point, 2) the role of the L1, 3) inflectional morphology (Bottleneck Hypothesis), 4) lexical versus functional categories, 5) the interface between syntax and other cognitive domains (Interface Hypothesis), and 6) specific category accesses (articles, as in the Fluctuation Hypothesis). We next consider one more basic issue to an understanding of second language learning and that has to do with differences in knowledge types, namely, implicit and explicit.

## 2 Knowledge types

The distinction between implicit and explicit knowledge relies on awareness of language with the former characterized by a lack of awareness of what one knows and the latter by conscious knowledge (see DeKeyser, 2003; N. Ellis, 2005; Godfroid et al. 2015). How knowledge of one type or the other comes to be may depend, in part, on the learning context (natural versus classroom). It is clear that native and fluent speakers of a language have implicit knowledge of language and use language on a daily basis without awareness of how they are using language. With specific reference to success and non-success, the ability that learners have to access and use implicit knowledge may be a major factor. Thus, part of understanding how second languages are learned is an understanding of what can and cannot be learned implicitly. For example, Leung and Williams (2012) found that some form-meaning connections (e.g., animacy) can be learned implicitly, whereas others cannot be so readily learned implicitly (in their case learning a form that dealt with the relative size of objects).

## 3 Processing approaches

Another significant area of research can be found in the area of processing. A layperson’s view of language learning involves learning vocabulary items, learning how to pronounce words, and learning how to string words together. As noted in the previous section, in this view the constraints on learning are due primarily to learners’ abilities and inabilities to acquire the grammar of the language given the facts of their native language or constraints imposed by an innate language
faculty. However, learning a language also involves processing language in real time. As discussed in the previous section, differences in outcomes can be attributed to a different knowledge base (i.e., competence) between the L1 and the L2. Another way to think about outcomes is to consider processing differences. One possibility is that the processing mechanisms in place are the same, but that the cognitive burden of processing an L2 results in what appears to be different modes of processing. A second way to think about this is that processing an L1 is fundamentally different than processing an L2.

According to the Shallow Structure Hypothesis (Clahsen and Felser (2006a, b, in press), L2 learners have less detailed syntactic representations making comprehension difficult and often incomplete. Because learners’ syntactic representations are not complete, they rely on other parts of language (e.g., lexical, pragmatic) to facilitate comprehension. In other words, L2 processing tends to rely on meanings rather than on structures (see also Felser and Roberts, 2007). Opponents make the argument that learners do have access to the same structural representations as native speakers (Omaki and Schultz, 2011; Aldwayan, Fiorentino, and Gabriele, 2010). An intermediary position comes from Sorace (2006). In her view, shallow processing may be limited to less proficient learners and not include so-called near-native speakers whose syntactic representations are native-like.

Another contributing factor to learner success (or lack thereof) is the ability/ inability of non-native speakers (NNS) to parse a string of sounds or even words on a printed page, which reflects the computation of syntactic structures. Recent research has begun to investigate this through a variety of methods, but one prominent methodology is eye-tracking (see special issue 2013 of Studies in Second Language Acquisition). Eye-trackers measures eye gaze during reading or watching something. As Godfroid et al. (2015) note, “the point of gaze serves as an index of overt attention (Wright and Ward, 2008) that can be used to make inferences about participants’ corresponding covert attentional processing, or mental focus” (p. 273). This assumes that there is an eye-mind link (Reichle, Pollatsek, and Rayner 2006, 2012); where one focuses one’s gaze reflects thought processes. Research using this methodology involves presenting individuals (learners or NSs) with ambiguous or ungrammatical sentences and measuring eye movements. When individuals spend longer on particular words or go back to reread certain parts of a sentence, this constitutes evidence for sensitivity to that particular part of a sentence. For example, if someone were to read the following sentence: The man walked to the store because she thought it was a nice day, presumably there would be some hesitation and possibly rereading once an individual (NS or learner) came to the word “she”. This would be evidence of sensitivity to a mismatch between the noun phrase ‘the man’ and the pronominal form ‘she’ which refers to the noun phrase subject. Keating (2009) looked at gender agreement in Spanish and found that native and advanced learners of Spanish were able to detect incongruous noun-adjective agreement (looking longer and looking
back [regressing] to a previous word), but that L2 learners were able to detect incorrect agreement only when the noun adjective pairs were adjacent, but not across syntactic boundaries. Spinner, Gass, and Behney (2013a, b) similarly investigated gender agreement, this time using Italian as the foreign language. They used eye-tracking to understand what learners look for to determine gender, finding that learners used article gender as well as noun endings in making this determination.

According to Processability Theory (Pienemann, 1999, 2007; Pienemann and Keßler, 2012) production and comprehension of second language forms can take place only if those forms can be handled by the linguistic processor. If one can understand how the processor works, we can make predictions about how learning progresses. Essential to this approach is a Processability Hierarchy which informs the processor as it checks grammatical information with a sentence. If one utters a sentence in a language with noun-adjective agreement, the processor will check to see if the various parts of a sentence match (agreement of nouns and adjectives and other parts of a sentence where gender must agree – for example, some past participles). If a learner has not developed appropriate procedures (e.g., procedures for monitoring relevant grammatical elements), matching cannot take place.

Spinner (2013) in a series of studies investigated Processability Theory from the perspectives of production and reception. Using a trajectory of ESL involving a sequence of development that includes past, possessive, plural, objective pronoun, possessive pronoun, adverb, Wh-copula, copula, verbs with particles (e.g., turn off), 3rd singular, auxiliary, and tag questions. ESL learners were presented with production (one-on-one conversation) and receptive (audio grammaticality judgment test) tasks. What she found was that Processability Theory predicted the order of emergence in a production task, but did not predict the order in a receptive task. She suggests “that the acquisition of processing procedures may proceed differently in production than in reception (p. 734).

In what follows, I deal briefly with two constructs that have recently entered the second language literature: 1) attention and 2) working memory.

### 3.1 Attention

In 2001, Schmidt in a discussion of the noticing hypothesis claimed that attention “appears necessary for understanding nearly every aspect of second and foreign language learning” (p. 6). Underlying this hypothesis is the idea of noticing a gap. Schmidt and Frota (1986) suggested that “a second language learner will begin to acquire the target like form if and only if it is present in comprehended input and ‘noticed’ in the normal sense of the word, that is consciously” (p. 311, emphasis added). The idea presented here is that learning requires a learner to be actively involved or attending to L2 forms in order for learning to take place (see Robinson, Mackey, Gass, and Schmidt, 2012 for an overview). While most believe that attention and noticing are important constructs, it is important to note that there is a debate
that centers around how much and the type of attention necessary for learning (Godfroid, Boers, and Housen, 2013) and what the prerequisites are for learning. Gass, Svetics, and Lemelin (2003) investigated the construct of attention from the perspective of different parts of the grammar (lexicon, morphosyntax, syntax). Learners were placed into a focused attention group or into a non-focused attention group. Learning occurred in attention and non-focused attentioned conditions. However, there was a difference in learning depending on the part of language on which attention was focused. Focused attention was most beneficial for syntax and least for the lexicon. Additionally focused attention had a greater effect in early stages of learning. A possible explanation comes from the fact that with a greater knowledge of language may come a greater ability to self-focus one’s attention.

Awareness is another related construct that appears in the literature in tandem with attention. Leow and his colleagues (Leow, 2001; Rosa and Leow, 2004) showed an association between awareness of a form and the learning of that form. Mere noticing was less important than awareness at the level of understanding. Noticing in and of itself is a complex construct, as noted by Godfroid, Boers, and Housen (2013) who provide an overview of the constructs of noticing, attention, and awareness. A question that is central to research in this area is the determination of noticing: How do we know if something has been noticed? Research methodologies and techniques have become more sophisticated over the years. Eye-tracking methodology is one measure that has been used to understand when something has been noticed. As noted above, the assumption is that eye movements reflect moment-to-moment processing. Godfroid, Boers, and Housen, (2013, p. 489) state “... overt attention (as manifested by the exact eye location) and covert attention (mental focus) are tightly linked.” Recent studies come from Godfroid, Boers, and Housen (2013) and Spinner, Gass, and Behney (2013a, b) who used eye-tracking methodology to determine noticing for vocabulary acquisition in the former and gender agreement in the latter.

One cannot ignore the important concept of working memory (WM) as a factor that impacts learning across individuals, yielding greater and lesser successes. A basic assumption is that individuals vary in their ability to carry out simple and complex tasks, such as those governed by WM (e.g., remembering a sequence of telephone number digits long enough to dial them).

According to Williams (2012, p. 427), WM “refers to a temporary storage system that lies at the core of complex cognition...WM can be regarded as a system that is used for the temporary maintenance of task-relevant information while performing cognitive tasks.” Briefly, there are two components of WM: 1) storage and 2) manipulation of information. The most commonly used model in SLA research is that of Baddeley and Hitch (1974) who posited two systems (see also Baddeley, 2003a, 2003b): the phonological loop and the visuo-spatial sketch pad. A frequent real-life task is the need to remember something when one does not have anything other than memory to rely on (e.g., remembering an address, phone number, shopping
list). In this instance, one uses the storage part of WM, the overall controller and coordinator; it focuses attention on some things, inhibits others, and is the manager when multi-tasking is involved.

Conway, Kane, Bunting, Hambrick, Wilhelm, and Engle (2005) see working memory as “a multicomponent system responsible for active maintenance of information in the face of ongoing processing and/or distraction” (p. 770). One’s ability to maintain information is the result of domain-specific storage (with processes of rehearsal) and “domain-general executive attention” (p. 770). With L2 learning, there are numerous competing demands, for example, watching a video, listening, and even reading (when captions or subtitles are involved), as discussed in an eye-tracking study by Gass, Winke, and Ahn (2015). In these situations, an individual’s working memory capacity (WMC) might be expected to come into play.

In general, “WM is a multi-component system comprising domain-specific storage systems and a domain-general executive component (Williams, 2012, p. 428).” Williams goes on to say that the differences in the models can be seen in the way Baddeley’s model emphasizes storage, whereas as Conway et al. emphasize the executive functioning of WM. Given the fundamental importance of WM in carrying out cognitive tasks, one would imagine that differences in successful learning of an L2 (a complex cognitive task) might be impacted by individual differences in working memory capacity. Phonological short term memory capacity has been shown to impact vocabulary and syntax. Papagno and Vallar (1992) and Service and Craik (1993) found a relationship between phonological short term memory capacity and the ability to repeat known and novel words. Similar results have been found in Service and Kohonen (1995) and Williams and Lovatt (2003). Although it is to be noted that in naturalistic language learning situations (as opposed to laboratory studies), the results are not so clear-cut (see, for example, Masoura and Gathercole, 2005 and French and O’Brien, 2008). WMC has also been linked to general oral fluency (O’Brien, Segalowitz, Freed, and Collentine, 2007) and to general language performance (Kormos and Sáfár, 2008).

Grammar is another area where WMC is related to learning. This is due to the fact that when learning a second language, we receive input that we must maintain actively in memory (storage) in order to determine meaning and syntactic analysis (manipulation). It is likely that the better an individual is at doing this, the better s/he is at learning a second language. Evidence from this comes from laboratory studies (N. Ellis and Schmidt, 1997; Williams and Lovatt, 2003) using an artificial language and an immersion program study (French and O’Brien, 2008).

Finally, Gass, Winke, and Ahn (2015) found evidence of video-based comprehension and WMC. In their study, participants watched a video with captions and were

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4 Despite the importance of methodological issues, a discussion of how one determines WMC (either the language of the test or the specific methodology used) is beyond the scope of this chapter (see Gass & Lee, 2011 and Conway et al., 2005).
therefore subjected to two forms of visual input (pictures from video and captions) and oral input. They found that L2 learners with high WMC performed better on a free recall test than those with low WMC (see also Alptekin and Erçetin, 2011). In other words, high WMC individuals were better able to handle the competing demands of watching, listening, and reading.

4 Input and age

In the previous sections, discussions surrounding success and non-success have emphasized linguistic and psycholinguistic issues, that is knowledge and processing. In this section, I consider other topics in the field that have been used to account for why there is differential success in learning a second language: reduced input and age. Before embarking on that discussion, I bring in what are referred to as usage-based models of language learning. In some sense this could be categorized as a formal approach (it deals with language form), but I have opted to include it in this section because meaning and use are crucial to an understanding of this concept. It differs significantly from UG in that it is not a theory that relies on innatism. Rather, it is highly input-dependent. In its simplest form, it relies on extracting patterns from the input which, in turn, is heavily dependent on the effect of frequency on development. Linguistic structures emerge from the patterns of the input and not from an innate language faculty.

4.1 Input

Throughout this chapter, input has been assumed as an essential part of language learning; without it language learning cannot take place. In a foreign language environment, it is clear that input is limited and full exposure to a language is not possible. For example, in a classroom context, one does not hear a range of vocabulary or even grammatical structures (see Muñoz, 2008). For usage-based accounts in which frequency of occurrence guides learners into making linguistic generalizations, reduced exposure to language is an issue that can account for reduced success (see Slabakova, 2013 for a discussion of input and usage-based interpretations).

An issue that has not received much attention has to do with orthographic differences (Hamada and Koda, 2008) and the resultant effect on input. Winke Gass, and Sydorenko (2013) found that orthographic differences (e.g., English speakers learning Spanish versus English speakers learning Chinese) yielded comprehension and vocabulary-learning differences when engaged in a video-based listening activity with and without captions. The order in which videos were watched (captioned video prior to non-captioned video or vice versa) made a difference depending on the L2. L2 learners learning languages with scripts close to English (Spanish, Russian) benefit
more from watching first a video without captions followed by watching the same video with captions. On the other hand, where script differences were more profound (Arabic and Chinese), the reverse order yielded better vocabulary learning and greater comprehension. Even in a situation where there is reduced input (e.g., a classroom), an ideal situation for literate adults is to have multi-modal input. When the script is different, a processing burden results with learners not having the benefit of input from the written source. Thus, input in classroom contexts is limited not only in that there is limited exposure to the L2, but even when exposure exists, not all second languages are the same, with writing systems causing limited access in some instances.

### 4.2 Age differences

The issue of ultimate success based on the age of initial exposure and learning to a second language has continued across the ages (see Herschensohn, 2007; Montrul, 2008). It is a significant theoretical as well as applied issue given the perceived importance of early language programs, although DeKeyser (2012, p. 455) notes that “‘earlier is better’ when it comes to L2 learning, does not necessarily imply that ‘earlier teaching is better’”. As Andringa (2014) puts it “[o]ne of the most fundamental issues in the field of SLA concerns the (non) existence of a critical period for language learning: Can late second language learners ever achieve natielike levels of mastery in the L2?” (p. 566). As with other areas of L2 research, the jury is still out, with arguments on both sides of the issue.

The debate is often softened to include the following variations: age affects learning or there is a sensitive period for language learning such that late learning is less likely (as opposed to not being possible). Still other approaches maintain that late learning is possible, but the underlying mechanisms of getting to that final point are different (e.g., explicit learning takes over in late learning because the ability to learn implicitly atrophies (DeKeyser, 2000; see also DeKeyser, 2012, for a useful review of critical period research).

In what follows, I highlight a few seminal studies that have investigated these issues. Johnson and Newport’s (1989, 1991) considered age of arrival in light of ultimate proficiency. These studies suggest that age (16 in their studies) effects indeed affect ultimate learning. Coppieters (1987) in his study on intuitions found that native and near-native speakers of French have different intuitions about French even though the latter are virtually indistinguishable from native speakers in performance. Birdsong’s (1992) study was similar to that of Coppieters in that he investigated judgments of near-native speakers, finding that some learners performed within the same range as native speakers.

In a more recent study, Abrahamsson and Hyltenstam (2009) argue that many of the previous studies in which it is suggested that late learners can achieve native-like competence are problematic in two ways: 1) the structures investigated are too
basic and do not allow for a more sophisticated investigation of L2 knowledge and/or 2) data have not been analyzed in sufficient detail. In their study, Abrahamsson and Hyltén-Cavallius investigated late learners of Swedish (native speakers of Spanish) whose age of arrival in a Swedish context was between 1 and 47 years. They first identified participants who were judged by NSs of Swedish listeners to be NSs of Swedish. Only a small number who started after age 12 were perceived to be NSs of Swedish, whereas a majority of those before that age were judged to be NSs of Swedish. A further look at those who were judged to be NSs through cognitively demanding and complex tasks revealed that none performed within the same range as NSs of Swedish. Their strong conclusion is that “nativelike ultimate attainment of a second language is, in principle, never attained by adult learners and, furthermore, is much less common among child learners than has previously been assumed” (p. 250). There are other studies, such as Montrul and Slabakova (2003), White and Genesee (1996), and van Boxtel, Bongaerts, and Coppen (2005) where nativelike attainment of complex structures by late learners was indeed possible.

DeKeyser, Alfi-Shabtay, and Ravid (2010) collected data from speakers of the same native language (Russian) learning two second languages in different contexts (English in the U.S. and Hebrew in Israel). Despite the different languages being learned (English is morphology poor; Hebrew is morphology rich), the results paralleled one another. In learning grammar, there is a decline in ability to learn language based on age (until age 18). After that, aptitude is a better predictor and age can be factored out as a predictor variable. In other words, as in other studies, there is a rapid decline until a plateau is reached (the age of plateau differs from study to study). One can conclude from this study that the critical period hypothesis is supported.

Another consideration relates to the domain of language under investigation. In an interesting study Granena and Long (2013) found different correlations between age of arrival in a context of a second language on the one hand and phonology, lexicon and morphosyntax, on the other. In particular, in a study of Chinese advanced speakers of Spanish, Granena and Long investigated attainment based on age of arrival in three areas: 1) pronunciation, 2) lexical and collocational knowledge, and 3) syntax and morphosyntax. Their results showed that the decline in performance (as a function of age of arrival) was greatest for phonology, next for lexical and collocational knowledge and the last for syntax. When compared to their native speaker control group, none of the learners performed in the native speaker range for a) pronunciation, when they arrived after five, b) lexis and collocation after 9, and c) morphosyntax after 12.

They also investigated length of residence as a factor, finding that it did relate to lexicon and collocations, but not to pronunciation and morphosyntax. Finally, they considered the role of aptitude as a factor in predicting success of learning. Aptitude was not a factor in the youngest-arriving groups, but did play a role in L2 learners
arriving in the target language environment between the ages of 16 and 29, but only for pronunciation and lexis/collocation, not for morphosyntax. The authors conclude that there is not a single sensitive period for language learning; rather, there are multiple sensitive periods depending on language domain. This is certainly consistent with other studies that have looked at differences in language domains for perceptions of feedback (Mackey, Gass and McDonough, 2000) and for the role of attention (Gass et al, 2003).

There are numerous reasons why there is a lack of agreement amongst studies. For example, different measures are used to determine nativelike competence, different structures are used, different statistical analyses are applied to data, native speaker variation is excluded (DeKeyser, 2013), and different language domains are investigated. An important variable highlighted in Andringa (2014) is the comparison group. Who is a native speaker? In a review of the literature, Andringa found that in general there is little information about who the native speaker controls are against whom learners are being measured. In his study, Andringa found that there were differences depending on whether the sample was representative or non-representative, the latter being highly educated speakers: “the incidence NNSs falling within the NS range is affected by the selection of the NSs” (p. 591). There is no definitive answer to any of these questions that may account for why results differ. However, it is something that must be included in any consideration of whether there is a critical period or not.

5 Learning sign language and learning an L2 by hearing impaired

The term second-modality acquisition (M2A) is commonly used to refer to SLA of sign language. The questions posed are quite similar to those asked in the L2 literature. And, some of the same theoretical perspectives are taken in this area of research. One area of divergence is the Cognitive Phonoogy model by Rosen (2004) in which non-linguistic issues are explored. In particular, he proposes two error sources: inaccurate perception of sign formulation and poor motor dexterity. In contrast, Chen Pichler (2011) has argued for inclusion of language-specific features such as markedness and transfer in models of M2A.

Two studies point to language differences (ultimate attainment) and processing differences. An interesting study by Thompson, Emmorey and Kluender (2009) used an eye-tracker to investigate eye movements as a way of articulating complex agreement of verbs, but not all verbs. The construct of agreement was able to be learned by late proficient learners, but the subtleties (only used for a subset of verbs) was not learned. Although, sign language data are not frequently used to support arguments of critical age, it is clear that this study suggests that proficient signers are not able to reach native-like abilities.
Considering how learning takes place and how learners process visual information, Emmorey, Thompson and Colvin (2009) compared eye gazes of native signers and hearing beginner signers of American Sign Language. An eye-tracker was used to determine eye gaze while the participants watched native signers perform two narratives (a story and a spatial description). Although both groups fixated primarily on the signer’s face, learners often looked at the signer’s mouth (as opposed to eyes) and hands. The authors attribute these differences not to difficulty with linguistic complexity or processing but to the need for beginning signers to attend to mouthing.

Berent (2009) argues that there are parallels between hearing-impaired and non-hearing impaired SLA. The constraints available through UG in non-hearing impaired SLA also appear to hold for second-modality acquisition. From a totally different perspective comes a study by Schönström (2014) who examined handwritten data from deaf learners of Swedish as an L2 within the framework of Processability Theory. She was interested in written development of an L2 by hearing and non-hearing individuals. Her data, from 11- and 16-year-old children, show that both groups of learners follow similar trajectories predicted by Processability Theory. Thus, this study shows how data from hearing-impaired individuals can be used to support theoretical linguistic constructs. More important for the purposes of this chapter is that developmental paths are similar and, hence, are not the source of differential successes between hearing and non-hearing learners of an L2.

6 Conclusion

This chapter has looked at differential successes in L2 learning. In so doing, it has considered only those areas that impact learning over which learners do not have the ability to monitor or change in any significant way. Namely, we have considered linguistic principles, processing constraints, and input. And, we have also considered issues that are part of an individual’s profile (e.g., working memory, age). Finally, we have gone outside of what might be referred to as ‘mainstream’ SLA to include learning of an L2 by hearing-impaired individuals. We acknowledge that this summary has been selective in what it was able to cover. Nonetheless, it has highlighted some of the main areas of L2 research that impact ultimate success of learning.

References


