Now you hear it, now you don't: L1 and L2 perception of regular past *–ed* in naturalistic input

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ABSTRACT

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Lauren Strachan

A growing body of literature shows that the simple past is difficult to perceive (Bell et al., 2015; Klein et al., 2003; Solt et al., 2003), yet all perception studies to date have used experimentally-manipulated input, and none have investigated the impact of contextual cues beyond temporal adverbials on perception of the regular past, nor whether second language (L2) exposure and use are related to more accurate perception. This study investigated whether L2 learners and native (L1) speakers of English perceive regular past *–ed* in naturalistic input, whether phonological context (easy allomorph [əd] or hard allomorphs [t, d]) impacts perception, and whether language exposure and use are related to increased confidence or perceptual accuracy. Eleven L1 speakers and 28 L2 learners (14 intermediate and 14 advanced) watched 64 clips from television sitcoms (32 with utterances in simple past and 32 with utterances in simple present), indicated whether they heard *–ed* or no ending, and rated their confidence on an 8-point Likert scale. Results indicated no difference between learner groups in present versus past perceptual accuracy, but significant difference in perception of simple past. L1 speakers perceived the present versus past more accurately than both learner groups, but advanced learners showed no difference from L1 speakers in perception of past. Confidence ratings increased with proficiency, and advanced learners showed higher confidence in their ability to perceive past over present. All groups perceived the perceptually easy

allomorph [əd] more accurately and with higher confidence than the two perceptually hard allomorphs [t, d]. A relationship was revealed between L2 learners' perception accuracy, age of onset, and amount of time studying English. Increased confidence was related to length of time studying English. Only self-reported listening proficiency was associated with accurate perception in perceptually hard contexts. Exploratory debriefing interviews revealed that context cues were often used to interpret tense by advanced learners and L1 speakers. Findings are interpreted within emergentist views of language acquisition and discussed in light of implicit learning ability. Pedagogical implications are considered.

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In dedication to my late father, John Richard Strachan. I love and miss you, Daddy!

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Chapter 1

Some second language (L2) morphology is easy to acquire, and some is difficult; yet why certain morphemes are particularly difficult is still unclear (DeKeyser, 2016; Housen & Simoens, 2016). For example, in one longitudinal study (Jia & Fuse, 2007), no L2 learners mastered simple past *–ed* (produced it at or above 80% accuracy) after five years of immersive exposure and use of English, and only three mastered third person *–s*. Five years of residence in an L2 context represents a substantial amount of time, so these morphemes must have been difficult for these learners. Yet all Jia and Fuse's participants mastered progressive *–ing*, some after only three months of exposure. Is *–ing* easier? Are third person *–s* and regular past *–ed* more difficult? There has been much debate in L2 acquisition research as to what constitutes "difficulty" in L2 learning.

Knowing what morphemes are late acquired might offer hints as to what makes a structure more or less difficult to learn. The "natural order of acquisition" of grammatical morphemes (e.g., Dulay & Burt, 1974; Krashen, 1975) states that morphemes are acquired by learners of English in the same order, regardless of their first language (L1). Many studies have looked at developmental sequences or sequences of acquisition, and most revealed that L2 morphosyntax is acquired in a relatively fixed order (for review, see R. Ellis, 2015). For example, R. Ellis analyzed four studies using the same dataset of L1 Spanish speakers in order to determine whether the acquisition of negation in L2 English shows evidence of a sequence of development. He concluded by defending the study of developmental sequences, "insofar as everything that we know about the nature of L2 (or L1) acquisition is that it is a gradual process and that to make sense of this process we need to consider the phases that characterize it" (p. 199).

Learner-focused acquisitional perspectives see the order of acquisition itself as a reflection of what is difficult or easy to acquire (e.g., third person *–s* is acquired late, thus it is difficult), yet do not offer explanation as to why morphemes are acquired early or late, failing to contribute to a definition of difficulty (e.g., Larsen-Freeman, 1975). Linguistic perspectives look to the linguistic nature of the functors as the source of difficulty (Collins, Trofimovich, White, Cardoso, & Horst, 2009; DeKeyser, 2016), focusing on number of transformations (Spada & Tomita, 2010) or markedness (Cardoso, 2007) as linguistic features that may contribute to difficulty. For example, Spada and Tomita defined "simple" structures as requiring fewer transformations to derive the correct form (e.g., regular past verb forms), and "complex" structures as requiring more transformations (e.g., *wh*-question forms). However, some "simple" structures remain stubbornly late acquired (Jia & Fuse, 2007), and some marked (rare, less common) features of language—such as prepositional stranding (*who did you give that to?*) in comparison to the more common pied piping (*to whom did you give that?*)—are often quickly learned if they are more frequent or salient in the L2 input (Bardovi-Harlig, 1987).

Goldschneider and DeKeyser's (2001) meta-analysis of determinants of the order of acquisition found five factors that, combined, explained 71% of the variance in the order of acquisition for various aspects of L2 morphology. These factors included perceptual salience, semantic complexity, morphophonological regularity, syntactic category, and frequency, with overall salience underlying all five. According to that meta-analysis, number of transformations does not contribute to a structure being easy or hard to learn, but instead its availability in input is what matters. This explanation takes a

more psycholinguistic view of difficulty; that is, it is the nature of the input as experienced by the learner that determines the order in which L2 morphemes are learned (Collins, 2009). Morphemes that are frequent are noticed and learned quickly. However, if a morpheme is underrepresented in input (infrequent), overshadowed by lexical items (redundant), or hard to perceive (lacking salience), it may be more difficult for learners to notice and experience on a regular basis, leading to later acquisition (Collins, 2009; DeKeyser, 2005). To illustrate this, Collins et al. (2009) created "opacity profiles" for three English grammatical forms whose acquisition profiles are well-known: two late-acquired (possessive determiners *his/her*, regular past *–ed*) and one early-acquired (progressive *–ing*). It was found that, compared to *–ing*, the two late-acquired forms were significantly less frequent, semantically more restricted, and perceptually less salient in teacher input in intensive L2 classrooms, which presumably represent some of the most advantageous learning contexts.

In terms of feature-related difficulty, DeKeyser (2005) asserts that the three main contributors to grammatical difficulty are complexity of form, complexity of meaning, and complexity of the form-meaning mapping, and further, the transparency of the form-meaning relationships to the learner interacting with linguistic input. The role of frequency depends on how straightforward the form-meaning mapping is; if the form is redundant or opaque (i.e., perceived as optional), it may not matter how frequent it is in input. Morpheme homonymy (third person *–s*, plural *–s*, and possessive *–s*), morpheme allophony (the [s], [z], and [əz] allomorphs of the three *–s* morphemes), and lack of phonological salience of a morpheme (simple past *–ed* has low sonority stops in all its allomorphs) contribute to form-meaning mappings that lack transparency for the L2

learner and increase difficulty (DeKeyser, 2005, 2016; Goldschneider & DeKeyser, 2001) and combined with low input frequency of certain morphemes (Collins et al., 2009), contributes to their late acquisition by L2 learners (e.g., Goldschneider & DeKeyser, 2001).

Simple past *–ed* is a morpheme that lacks form-meaning transparency, because the simple past has regular and irregular forms and its negatives and questions are formed with auxiliaries and not suffixation. It also lacks frequency. Collins et al. (2009) showed that the regular past comprised only 2% of the verb forms in classroom input to L2 learners. Research has shown that the simple past is anything but simple to acquire, not only for L2 learners, but also for L1 speakers (DeKeyser, 2005; Goldschneider & DeKeyser, 2001; Guo, Spencer, & Tombin, 2012; Magen, 2014; McDonald & Roussel, 2010). Besides low form-meaning transparency and insufficient input frequency (at least in classroom contexts), what makes simple past a difficult structure to acquire?

Grammatically, the simple past seems straightforward; in fact, it was classified as "simple" in Spada and Tomita's (2010) meta-analysis. Phonologically, however, the regular past is quite complex. While orthographically it requires the addition of graphemes that might constitute a syllable in speech, in speech only one of its three allomorphs ([t], [d], [əd]) is pronounced as such (i.e., [əd]). Moreover, the *–ed* suffix often creates consonant clusters, which are thought to be marked in the world's languages and therefore can be difficult for L2 learners to perceive and produce (Cardoso & Liakin, 2009; Solt et al., 2003). Further, depending on the phonological environment, the *–ed* suffix may be hard to perceive (Solt et al., 2003). Consider the phrase *she danced to the beat of a different drum.* The *–ed* in *danced* becomes /t/ and so only one /t/ is

articulated in *danced to* (/dænstə/), meaning that *danced to* and *dance to* sound very similar. Finally, /t/ and /d/ often interact with other sounds in their phonological environment, becoming palatalized in the presence of /j/ (*I asked you* might become /aɪæsktʃu/), or sometimes elided in the presence of /n/ (consider the quick articulation of *She wanted no part of it*). Phonologically, it could be said that the *–ed* suffix is represented unreliably in naturalistic input and lacks perceptual salience. Could learners' late acquisition of regular past *–ed* be attributed to perceptual difficulty? Whether or not *–ed* is perceived in naturalistic input by L1 and L2 speakers of English is the focus of this manuscript-based thesis study.

Chapter 2

Morphological Difficulty

Difficulty with the regular past tense for second language (L2) English learners is well documented (e.g., Jia & Fuse, 2007). It has been shown that both native-speaking (L1) children and L2 learners follow the "natural order of acquisition" of English grammatical morphemes, and in this hierarchy, the regular past tense is the second latest acquired morpheme, after third person *–s* (Goldschneider & DeKeyser, 2001). While over time the value or accuracy of the order has been questioned, its usefulness as a starting point for difficulty research continues to be recognized (DeKeyser, 2016). The acquisition order has been shown to be relatively immune to instruction, although instruction can help learners move through the learning sequence more quickly (e.g., Perkins & Larsen-Freeman, 1975). The presence of similar morphemes in the learners' L1s has also been shown to affect the order slightly, yet the simple past remains stubbornly late acquired (Jia & Fuse, 2007; Jiang, Novokshanova, Masuda, & Wang, 2011). While learning may take time, accurate perception and production of L2 morphemes is possible for learners from different L1 backgrounds (e.g., Hopp, 2009), offering hope for L2 learners and teachers and urging researchers to investigate possible factors which might aid learners in acquiring L2 morphology. Set within this context, the present study investigated L2 learners' perception of simple past *–ed* in naturalistic input, on the assumption that perception difficulties represent some of the most persistent challenges faced by learners in acquiring regular past in English.

The Past Tense Challenge

The English past tense is challenging for L1 and L2 speakers alike, and research with L1 speakers has yielded insight into the nature of this difficulty. For instance, McDonald and Roussel (2010) compared the past tense grammaticality judgement scores of L2 learners and L1 speakers under phonological processing stress (white noise) or lexical retrieval stress (time pressure), to determine the extent to which phonological or lexical processing affected regular and irregular past tense forms. Regular past production was found to be positively correlated with phonological ability in both groups, while irregular past production was positively correlated with lexical retrieval, suggesting that phonology, compared to lexical ability, is more closely linked to difficulty in processing regular past in both L1 and L2 speakers.

Robertson et al. (2012) focused on dyslexic and language impaired L1 speakers' perception and production of past tense. Compared to nonimpaired L1 speakers, both groups were nontarget in perception and production, which implied that phonological processing (which is compromised in dyslexia and specific language impairment) is essential to acquisition of past tenses. In addition, studies of hearing-impaired L1 children show that difficulty with perception of the regular past *–ed* may lead to difficulty in production. For example, phonological perception training (Bow, Blamey, Paatsch, & Sarant, 2004) and cochlear implants (Guo et al., 2013) facilitate hearing-impaired children's production of past tense. These findings make a strong case towards an "if you can't hear it, you can't say it" connection when it comes to morphology such as the regular past.

Much of the past tense difficulties of L2 learners mirror those of L1 speakers, and phonological explanations are often at the heart of these, particularly with respect to the perception of the past *–ed* (Beck, 1997; Magen, 2014). For example, Bell, Trofimovich, and Collins (2015) investigated the perception of *–ed* by L2 learners of English in three conditions: spoken English at conversational speed, spoken English at a slowed speed, and *–ed* in the presence or absence of temporal adverbials, such as *yesterday*. They also investigated the effect of perceptual context within each condition. The "easy" context was defined as *–ed* spoken as a separate syllable and followed by a vowel (e.g., as in *corrected a paper*), and the "hard" context was defined as *–ed* spoken as part of a consonant cluster or possibly coarticulated with the following consonant (as in *searched for gold* or *helped the lady*). Slowing down speech helped learners perceive *–ed* as accurately in difficult contexts as in easy ones; learners were also better at perceiving *–ed* when a congruent lexical adverb (such as *yesterday*) was in the sentence. Perceptual context further contributed to perception accuracy, such that the easier context was perceived even better when paired with a congruent adverb. However, L1 speakers did not reach ceiling performance in perception, confirming that in certain contexts perception of *–ed* is a challenge even for nonimpaired native speakers.

Why Is the Past Tense a Challenge?

Goldschneider and DeKeyser's (2001) meta-analysis investigating reasons behind the natural order of acquisition for morphology (Dulay & Burt, 1974; Krashen, 1978) identifies several factors that may explain why morphemes (functors, such as *–s*, *–ed*, or articles) are difficult to acquire. With respect to the regular past, the factors of perceptual salience, frequency, and redundancy (DeKeyser, 2005; Grause & Coppen, 2015), as well

as variables capturing learners' L2 exposure and use and the availability of discourse-level contextual cues, seem to be most relevant.

Perceptual Salience

Perceptual salience, which involves three subcategories (number of phones, syllabicity, and sonority), is an important contributor to morpheme learning difficulty (Goldschneider & DeKeyser, 2001). According to this definition, past *–ed* and its allomorphs have very low perceptual salience. Only one of the three allomorphs ([əd]) contains more than one phone; only one allomorph, again [əd], forms a syllable; and on the sonority hierarchy, stops (i.e., /t/ and /d/) are the least sonorous of the phonemes (Cardoso & Liakin, 2009). In a study focusing on salience of simple past, Solt et al. (2003) showed that L2 learners had more difficulty with [d] than [t], and with [t] than [əd], suggesting a hierarchy of perceptual difficulty (based on syllabicity) among the regular past allomorphs, with [əd] easier to hear because it is an extra syllable and with [t] better heard than [d] because the voiceless allomorph is more common (less marked).

In another study, Klein et al. (2003) tested the (Lexical) Aspect Hypothesis against the Perceptual Salience Hypothesis, which states that morphemes with more perceptual salience, such as [əd] compared to [t] or [d], will be better perceived. The Aspect Hypothesis (Bardovi-Harlig & Reynolds, 1995; Collins, 2002) looks at the order of acquisition of temporal morphology, like the past tense, in relation to verb meaning. When it comes to the past tense, for example, telic verbs (achievements, such as *they planted a tree*) are acquired in the past before atelics or states (such as *he jogged in the morning* or *she loved coffee*) (Collins, 2004; Wulff, Ellis, Römer, Bardovi-Harlig, & Leblanc, 2009). Klein et al. found no support for the Aspect Hypothesis, yet strong

support for the Perceptual Salience Hypothesis in production. For L2 speakers, there was no difference in how accurately they produced telic and atelic verbs in the past, yet there was a significant difference in production accuracy between the more salient [əd] and the other two, nonsyllabic (less salient) allomorphs. Put simply, perceptual salience likely contributes to past tense performance, perhaps more so than verb semantics.

Frequency

Frequency is considered a form of salience and necessary to acquisition, and it is thought that the more available a form is in input, the easier it is to learn. (Collins et al., 2009; Collins, White, Trofimovich, Cardoso, & Horst, 2012; DeKeyser, 2005; Ellis & Collins, 2009; Goldschneider & DeKeyser, 2001; Grause & Coppen, 2015). Yet the regular past is not very frequent. Collins et al. (2009) found that only 2% of the verbs in their corpus of elementary school teachers' classroom input were regular past, and only 58% of those regular verbs were in the 1,000 most frequent word list. Of the 15 most frequent verbs in classroom input, only one (*asked*) was regular, implying that if frequency in input contributes to salience (Grause & Coppen, 2015), then the regular past is not salient, at least not in the elementary classroom. In addition, only 22% of the regular verbs in the input analyzed by Collins et al. included the most salient allomorph [əd], and of those that did, the majority were not followed by vowels, which would constitute some of the more perceptually salient contexts for regular past.

Redundancy

Redundancy refers to the situation when the meaning of the structure encoded through morphology is also expressed elsewhere in the sentence, as in *last night we danced*, where the past tense suffix is redundant because *last night* encodes a time

reference. Learners can ignore morphology and still understand the sentence, making it possible that they often do not perceive past tense morphemes in the presence of overt lexical marking of time. For instance, both L1 and L2 speakers are influenced by temporal adverbs in tense judgement (Bell et al., 2015; Solt et al., 2003; Wulff et al., 2009), and adverbials such as *often* or *always* will prompt learners to use present more often than past, even though both are grammatically possible, for example, *I often walk to work*, *I often walked to work* (Bardovi-Harlig & Reynolds, 1995; Collins, 2002). Thus, it appears that L2 learners may overlook past tense morphology in favour of meaning-based markers of tense. However, such markers are not always present in the input, so it is unlikely that language users rely on them exclusively to perceive the simple past.

Language Exposure and Use

The role of a learner's background has been relatively well researched in morphological learning—particularly in terms of age of acquisition (AOA), or the age at which learning begins, and amount of language exposure and use—and may offer clues as to how difficult morphology is perceived or acquired. For example, Rispoli, Hadley, and Holt (2012) showed that, from the ages of 21 to 33 months, L1 children learned some morphemes at a faster pace (copula *be*), some more slowly (auxiliary *be*), and some simultaneously (auxiliary *do*, third person *–s*, and regular past *–ed*), suggesting that input frequency (i.e., amount of exposure to the morpheme) was a potential determinant of the sequencing and timing of learning. Blom and Paradis (2015) compared the acquisition of L2 morphology (English third person *–s*, simple past *–ed*) between typically developing and language impaired 4- and 5-year-olds with varying lengths of L2 exposure. Typically developing children saw increased accuracy in tense production with increased exposure

to English, but language impaired children did not. In a five-year longitudinal study of a group of 10 L1 Mandarin learners of English in New York, Jia and Fuse (2007) targeted six grammatical morphemes (regular and irregular past tense, third person singular *–s*, progressive *–ing*, copula *be*, and auxiliary *do*). While all other morphemes were mastered (produced at 80% accuracy) by at least some of the learners within the five years, no learner mastered the regular past during this time. The best predictor for the production of late-acquired morphemes, such as past *–ed*, was not AOA but amount of exposure to English outside of class, which suggests that exposure (as an index of input frequency and intensity) plays a role in L2 morphological learning.

Discourse-Level Cues

Apart from salience, redundancy, and frequency/exposure variables, the immediate sentential (discourse) context in which simple past occurs might provide cues that can either facilitate or hinder how reliably simple past is heard. For example, cues such as the use of the regular past form in a conditional sentence or the use of a third person subject with a regular past verb might cue listeners as to the presence or absence of morphology. As a rare exception of research targeting contextual cues and simple past, Luke and Christianson (2015) showed that *–ed* was more accurately predicted in a priming task by L1 speakers when the *–ed* formed a participle (as in *the potted tree grew tall*) instead of a verb (as in *we potted the tree last year*), implying that context may influence perception. Given that naturalistic input might confer some benefits to L2 learners (e.g., contextual support aiding perception) while also presenting some challenges (e.g., dealing with rapid conversational speech), it is important to examine the potential role of contextual cues in perception of simple past.

The Current Study

There is a growing body of research indicating that the difficulty of L2 learners and many populations of L1 users with the regular past tense in English is linked to perceptual issues, such that low perceptual salience of past tense forms, its low availability in input, its redundant nature, and learners' insufficient exposure to language outside instruction, make it difficult for learners to hear target forms in the input and, consequently, to acquire them (e.g., Bell et al., 2015; Collins et al., 2009; Klein et al., 2003). However, one important shortcoming of prior research is that it has relied exclusively on experimentally manipulated input. No studies to date have sought to determine the extent to which regular past *–ed* is perceived in nonmanipulated, naturalistic input. For example, Klein et al.'s (2003) perception study featured input created by the researchers (two-sentence stories, such as *Yesterday the man went to the station. He waited at the station for a train*), selected to ensure that *–ed* was always followed by a vowel, making it easier to perceive (see also Solt et al., 2003). In Bell et al. (2015), target sentences were unnatural, in that they contained only a short verb phrase recorded by a speaker in isolation (e.g., *searched for gold*, *waited in line*), and were then slowed down using speech-editing software, to carefully control for different lexical and phonological contexts as well as speed of delivery. In essence, most previous materials targeting the perception of regular past have not included natural input but were instead either created or manipulated to fulfill various experimental conditions. Further, the effect of temporial adverbs on past tense perception has been investigated (e.g., Bell et al.), but no studies to date have investigated the impact of other discourse-level cues (such as the past in a hypothetical conditional) on perception of *–ed.* In order to

understand the perceptual challenge underlying the learning of English regular past, it is important to target the input that learners are likely to encounter in real life (classrooms or naturalistic interactions).

Therefore, the current study investigated the perception of regular past *–ed* in naturalistic input by intermediate and advanced L2 learners and a comparison group of L1 speakers, focusing on one previously researched variable (Bell et al., 2015): easy or hard perceptual context (perceptual salience). Naturalistic input was defined as instances of past tense forms used in popular TV shows (sitcoms). Sitcoms were chosen, rather than dramas or television news, for example, because of their widespread availability, their popularity, and because many have been transcribed by viewers and the transcripts posted online. Thus, they were thought to be examples of accessible naturalistic media. Perceptual context was operationalized similarly to Bell et al.: easy (when the allomorph [əd] is used) or hard (when the allomorphs [t] or [d] are used), with all allomorphs followed by consonants. Thus, the chief objective was to investigate the perception of regular past *–ed* when researcher-created materials are replaced by naturalistic input. In light of previous research showing associations between L2 morphological learning and learners' language exposure and use (e.g., Jia & Fuse, 2007), this study also explored the relationship between L2 learners' perception of *–ed* and their background variables, such as amount of exposure to English, on the assumption that similar perception-exposure links should be evident with respect to learners' performance with naturalistic stimuli. As a final (exploratory) goal, this study examined what discourse-level cues, besides temporal adverbials, listeners may use to aid their perception of *–ed*, and to what extent

listeners may be aware of any such cues. The study addressed the following research questions:

1. How well do L2 learners and L1 speakers perceive English simple past in naturalistic input, compared to their perception of English simple present?
2. Does perceptual context (easy vs. hard) impact L2 learners' and L1 speakers' perception of *–ed*?
3. Which background variables, specifically those related to language use, might be associated with L2 learners' perception of simple past, particularly in perceptually hard contexts?
4. What, if any, context cues do L2 learners and L1 speakers use to aid their perception of simple past *–ed* in naturalistic input, and to what extent are they aware of the cues that might help or hinder their perception of simple past?

Method

Participants

The participants included 28 L2 learners and a comparison group of 11 L1 English speakers. The L2 learners were recruited from two levels of ESL classes (intermediate and advanced) at a private language academy in Vancouver, Canada. At this school, language level is determined through mock Cambridge English Main Suite exams administered every two months. These exams, which include the Cambridge Preliminary English Test (PET), the First Certificate Exam (FCE), and the Certificate of Advanced English (CAE), evaluate general proficiency in reading, writing, speaking, listening, and use of English (grammar and vocabulary) based on the Common European Framework of Reference (CEFR; Cambridge English Language Assessment, 2015). The L2 learners

were tested one day after completing the target tasks (see below). Based on these tests, there were 14 intermediate learners; they received passing or near-passing grades on the Cambridge PET (M = 71.9%, SD = 16.9), which corresponds to the CEFR B1 proficiency level (IELTS bands 4–5; British Council, 2015). The remaining 14 learners were categorized as advanced because they received passing or near-passing grades on the Cambridge FCE (M = 75.5%, SD =13.3) or low to passing grades on the Cambridge CAE (M = 58.8%, SD = 12.5), which align with the CEFR B2 or low C1 proficiency levels (IELTS bands 5–7).

The intermediate learners (eight females, M_{age} = 26.7 years, *range* = 17–29) spoke Spanish (5), Korean (2), French, Italian, Japanese, Portuguese, Russian, Thai, and Turkish (one each) as their L1s. They had resided in Vancouver learning English for an average of 70 days (16–226) and reported a mean of 8.6 years (0–16) as the amount of time studying English prior to their arrival in Vancouver. The advanced learners (nine females, M_{age} = 24.7 years, *range* = 18–51) spoke Portuguese (7), Spanish (2), Japanese (2), Czech, German, and Romanian (one each) as their L1s. They had resided in Vancouver for a mean of 57.3 days (10–162) and reported having studied English previously for a mean of 12 years (5–16).

The comparison group of 11 L1 English speakers included residents of Vancouver (8), Montréal (2), and Chicago (1). These participants (four females, M_{age} = 36.3 years, *range* = 27–58) were born in Canada (5), the United States (3), Ireland (2), and New Zealand (1) in monolingual English families (although one participant, a native of Toronto, reported speaking Swedish with her mother in the home). They reported being fluent in French (2), Spanish (2), Danish, Norwegian, and Swedish (one each) as L2s,

with all speakers having studied multiple languages. Eight L1 English speakers were ESL instructors in the language school where the learners were recruited; thus, they likely had a higher level of metalinguistic knowledge and a greater interest in language study in general, compared to the rest of the L1 speakers, who were practicing professions unrelated to the teaching and learning of languages.[1]

Four L2 learners (two intermediate, two advanced) and four L1 speakers were randomly selected for debriefing interviews (see below). The two intermediate learners were an 18-year-old Spanish speaker from Colombia (residence in Vancouver = 1.5 months, age of first exposure to English in Colombia = 10) and a 24-year-old Turkish speaker from Turkey (residence in Vancouver = 7 months; age of first exposure to English in Turkey = 22). The two advanced learners were a 21-year-old Portuguese speaker from Brazil (residence in Vancouver = 1 month; age of first exposure to English in Brazil = 5) and a 28-year-old Spanish speaker from Mexico (residence in Vancouver = 4 months; length of English study in Mexico = 3 years). Finally, the four L1 speaker participants were all ESL teachers: a 27-year-old Canadian male, a 48-year-old American male living in Canada for 9 years, a 32-year-old Canadian male, and a 33-year-old male from New Zealand living in Canada for 7 years.

Materials

The target materials included 64 authentic video clips from popular TV shows (e.g., *The Big Bang Theory*, *Friends*). The video clips (M_{length} = 3.2 seconds, *range* = 1.6–6.4) featured one sentence with at least one regular verb form in present or past

[1]Despite this difference in metalinguistic knowledge, the non-teacher participants did not perform any differently on the perception test or report a different level of confidence in their responses.

(M_{words} = 8.7, *range* = 3–17). Clips were edited to avoid the inclusion of temporal adverbials or other temporal markers, as well as other broader context cues which could indicate time reference. However, the sentences themselves were unedited, such that the speech was presented just as it was on television (see Appendix A). Of the 64 video clips, 32 featured simple past sentences as the target utterances, with 16 video clips targeting past tense sentences in perceptually easy contexts and 16 video clips targeting past utterances in perceptually hard contexts. In line with Bell et al. (2015) and Collins et al. (2009), perceptually easy contexts were defined as those instances of past tense where it was marked by the separate-syllable allomorph [əd] (e.g., *I hated that*; *I needed to relax*). Perceptually hard contexts were defined as ones where the past tense was marked by either [t] or [d], which are syllabified with a preceding syllable (e.g., *They told me I looked too midwest for the part*; *After you turned thirty*). All past tense verbs, regardless of the context, were followed by a consonant. To provide a performance baseline, the remaining 32 video clips featured present tense sentences (excluding those marked by 3rd person singular *–s*), also extracted from popular sitcoms (e.g., *You realize what you are*; *I wish you all the best*). The status of the verb forms in the original clips was determined by the author, who cross-checked the transcript of the episode (publically available online) with the audio, keeping in mind the use of the verb within the context of its sentence and the show as a whole.

Due to the variability of content in naturalistic input, using identical verbs across present and past sentences proved impossible. Thus, present and past verb forms were roughly matched for their corpus-based frequency of occurrence, based on the 51-million-word $SUBTLEX_{US}$ corpus of spoken American English (Brysbaert & New,

2009). Table 1 shows descriptive statistics for the target sentences across the 32 past (easy, hard) and 32 present sentences. The present and past sentences were matched in length, in terms of word length and clip duration, $t(62) < 1.89$, $p > .06$. However, the present verb forms were of higher frequency, compared to past forms, $t(62) = 2.13$, $p = .037$; nevertheless, corpus-based frequency of verbs in the easy and hard past contexts was comparable, $t(30) = .97$, $p = .340$.

Table 1

Summary of Descriptive Statistics (Means, Standard Deviations) for Video Clips

	Present (k = 32)	Past	
Measure		Easy (k = 16)	Hard (k =16)
Sentence length (words)	7.88 (2.85)	8.88 (3.01)	10.13 (4.70)
Length (seconds)	3.26 (1.02)	3.18 (1.00)	3.14 (1.35)
Frequency (per million)	364.67 (713.01)[2]	72.26 (124.73)	112.42 (108.91)

Each sentence was also separately coded for cues that listeners might use to help interpret a sentence as past or present. There were three potential morphosyntactic and three phonological context cues, summarized in Table 2. After the initial coding by the author, the sentences were independently recoded by another trained coder. The two coders reached intercoder reliability (Cohen's $\kappa = .90$) which exceeded the .70 benchmark for high agreement (Plonsky & Oswald, 2014). The few cases of

[2]One present verb form (*like*) was much higher in frequency than the rest. The *M* and *SD* values that exclude this outlier verb were 243.76 and 266.90, respectively.

disagreement (9/75) were reevaluated and the final code was determined by the first author.

Table 2

Summary of Coded Context Cues

Cue	Example	Interpretation
Morphosyntactic		
Conditional	*Normally if someone talked to me that way, I'd fire 'em*	Cue for past
Clause	*What's insane is how you refuse to get with the program*	Extra content may cue tense
3rd person subject in the past	*And then he seemed kinda down*	Lack of *–s* may cue past
Phonological		
/t/ or /d/ following	*You refused to go out with Chaz*	Potential coarticulation, making past hard to hear
/θ/ or /ð/ following	*I rented the wrong movie*	Potential coarticulation, making past hard to hear
Verb ends in affricate	*I even changed my facebook status*	Marked in coda position (Parker, 2003), making past hard to hear

From the full set of 32 target video clips featuring simple past, five were selected as prompts for in-depth debriefing interviews. These clips were chosen based on whether they contained discourse cues (listed in Table 2) that could aid listeners in, or distract

them from, perceiving simple past. The clips also ranged from offering less to offering more discourse context. The sentences spoken in the interview clips were the following:

- *I <u>hated</u> that* was chosen because it occurs in isolation, yet the verb appears in a perceptually easy context (separate-syllable allomorph [əd]).
- *But then we <u>ditch</u> those two* also lacks context. However, *but then* is typically used in past narrative, yet here it occurs in a narrative about the future. The verb ends in an affricate and is followed by /ð/, which creates a perceptual obstacle to hearing the past marker (Parker, 2003).
- *Until you <u>change</u> your mind* contains only some context, a time conjunction which used meaningfully in both present and past contexts, and a verb ending in an affricate (but not followed by /ð/).
- *Yeah, Joey said I <u>needed</u> to relax, so he gave me an antihistamine* contains three clauses, including some irregular simple past verbs, and features the target verb in a perceptually easy context (separate-syllable allomorph [əd]). Further, the speaker acts confused on screen, providing potential visual context.
- *Huh, normally if someone <u>talked</u> to me that way, I'd fire 'em* provides the most context. This sentence is a conditional, contains two clauses, and the subject is a third person relative pronoun, meaning that the verb would be marked by *–s* in the present. Yet the verb occurs in a perceptually hard context ([t] allomorph), compared to the previous context-rich clip, where the ending (*needed*) features a perceptually easy context.

Procedure

The L2 learners were tested after regular classroom instruction at their language school. They first completed a language background questionnaire (5 minutes, see Appendices B and C), then were given response booklets and performed the perception task (25 minutes). The perception task included 64 sentences assembled into one video sequence in random order, with a prerecorded female voice announcing the numbered position of each clip. All 64 sentences were listed in a response booklet. The base form of the verb was given next to the sentence (e.g., CHANGE: *Until you* X/ED *your mind*), and "X" and "ED" represented the two response alternatives. For each sentence, participants indicated whether or not they heard the simple past *–ed* by circling "X" (no ending) or "ED" (ending) and then estimated their confidence using an 8-point Likert scale (1 = *not confident at all*, 8 = *very confident*). Before the 64 target clips, six additional practice clips were played to allow participants to become familiar with the procedure.

Participants saw each clip twice with an interval of 3 seconds between the first and the second playback. They were instructed first to read each sentence as they watched the clip for the first time, then to watch the clip again and circle ED or X depending on whether they heard *–ed* or no ending, and then to estimate how confident they were in that choice.[3] The response booklets were then collected for analysis, and the four selected L2 learners took part in individual debriefing interviews, which were recorded and subsequently transcribed. These learners were asked why they gave the answers they

[3]For each sentence, participants also chose whether the sentence was present or past (by circling PRESENT or PAST) and rated the confidence associated with this choice. Because the results based on these responses were similar to those associated with X/ED judgments (which directly tapped into perception of past morphology, compared to metalinguistic judgments of past versus present), these data are not reported further.

did for the five clips described above. Interviews were semi-structured around open-ended questions (e.g., *Tell me why you chose the answer you did*, *why do you feel so confident?*), and interviewees were given the option to listen to the clip again. The same procedure was followed with the L1 speaker group, with the exception that they were tested at two different times in two locations (eight speakers in Vancouver, three in Montréal). Following the perception test, four L1 speakers (all in Vancouver) participated in debriefing interviews, which followed the same procedure.

Analysis

The X/ED decisions were tallied for each clip, separately within the groups of intermediate and advanced L2 learners as well as L1 speakers, by assigning the value of 1 to each decision if it matched the original coding of each sentence (i.e., present sentence marked as X, past sentence marked as ED) and the value of 0 to each decision when it mismatched the original coding (i.e., present sentence marked ED, past sentence marked X). The raw scores were then converted to proportion scores, based on the total number of items in each category: present (32) and past (32), with separate scores calculated for simple past in perceptually easy (16) and hard (16) contexts. The confidence ratings were tallied similarly according to participant group. Missing data, where participants failed to produce an answer, accounted for 8.2% of all X/ED decisions and 3.8% of all confidence ratings. However, nearly all missing data were from L2 learners (205/206 of missing X/ED judgments, and 91/94 of missing confidence ratings), suggesting that the task was more difficult for L2 learners than L1 speakers. Debriefing interviews were transcribed and coded using a top-down approach, whereby

categories were identified (e.g., mention of context, mention of phonology) and frequency of statements in each category tallied for the three groups of participants.

Results

Global Analysis

The first research question asked how well L2 learners and L1 speakers perceived English simple past in naturalistic input, compared to their perception of English simple present (see Table 3 for summary statistics). For this analysis, two-way ANOVAs were carried out, with group (intermediate and advanced L2 learners, L1 speakers) as a between-subjects factor and tense (present, past) as a within-subjects factor. The ANOVA targeting perception accuracy revealed only a significant main effect of group, $F(2, 36) = 15.18$, $p < .0001$, $\eta_p^2 = .46$, with no significant main effect of tense, $F(1, 36) = .28$, $p = .60$, $\eta_p^2 = .01$, or significant two-way interaction, $F(2, 36) = 2.59$, $p = .09$, $\eta_p^2 = .13$. Follow-up (Bonferroni corrected) comparisons targeting the group factor showed that L1 speakers outperformed both intermediate ($p < .0001$) and advanced ($p < .0001$) learners, but that the two learner groups performed similarly ($p = .29$). The ANOVA targeting confidence ratings revealed a significant main effect of group, $F(2, 35) = 47.19$, $p < .0001$, $\eta_p^2 = .73$, a significant main effect of tense, $F(1, 35) = 5.77$, $p = .022$, $\eta_p^2 = .14$, and a significant two-way interaction, $F(2, 35) = 5.40$, $p = .009$, $\eta_p^2 = .24$. Follow-up (Bonferroni corrected) comparisons exploring the significant interaction showed that L1 speakers were significantly more confident than both advanced and intermediate learners ($p = .036$), and that advanced learners were significantly more confident than intermediate learners ($p < .0001$) in their perception of present and past tense. However,

only the advanced learners were significantly more confident in their perception accuracy of simple past, compared to simple present ($p < .0001$).

Table 3

Descriptive Statistics (Means, Standard Deviations) for Overall Perception of Simple Present and Past

	Simple present		Simple past	
Group	Accuracy	Confidence	Accuracy	Confidence
Intermediate (n = 14)	0.65 (0.23)	5.27 (0.82)	0.59 (0.28)	5.33 (0.83)
Advanced (n = 14)	0.59 (0.24)	6.61 (0.69)	0.78 (0.09)	7.00 (0.55)
L1 speakers (n = 11)	0.87 (0.09)	7.71 (0.28)	0.83 (0.08)	7.60 (0.34)

Thus, with respect to the overall perception of simple present and past, L1 speakers (83–87% correct) were more accurate than both L2 learner groups (59–78% correct), which did not differ between each other, and the perception of present and past in naturalistic input was equally difficult for all groups involved. While accuracy rates did not differ between the two learner groups, confidence ratings were associated with L2 proficiency, such that L1 speakers were significantly more confident in their perception, followed by advanced learners and then intermediate learners. Only advanced learners reported more confidence in their perception of simple past compared to simple present, although this increased confidence was not reflected in accuracy rates.

Perception of Simple Past

The second research question asked whether the perceptual context impacted participants' perception of simple past as it occurred in perceptually easy versus perceptually hard contexts (see Table 4 for summary statistics). For this analysis, two-way ANOVAs were carried out, with group (intermediate and advanced L2 learners, L1 speakers) as a between-subjects factor and perceptual context (easy, hard) as a within-subjects factor. The ANOVA exploring perception accuracy revealed a significant main effect of group, $F(2, 33) = 8.22$, $p < .001$, $\eta_p^2 = .33$, and a significant main effect of context, $F(1, 33) = 23.54$, $p < .0001$, $\eta_p^2 = .42$, but no significant two-way interaction, $F(2, 33) = 1.08$, $p = .35$, $\eta_p^2 = .06$. For the group factor, follow-up (Bonferroni corrected) comparisons showed that there was no difference between L1 speakers and advanced L2 learners ($p = .068$), but that both these groups outperformed intermediate L2 learners ($p < .019$). For the context factor, all groups were more accurate in their perception of simple past in easy than in hard contexts ($p < .0001$). The ANOVA targeting confidence ratings revealed a significant main effect of group, $F(2, 35) = 46.27$, $p < .0001$, $\eta_p^2 = .73$, and a significant main effect of context, $F(1, 35) = 21.19$, $p < .0001$, $\eta_p^2 = .38$, but no significant two-way interaction, $F(2, 35) = .48$, $p = .63$, $\eta_p^2 = .03$. For the group factor, follow-up (Bonferroni corrected) comparisons showed that L1 speakers were significantly more confident in their responses than both advanced and intermediate learners ($p < .037$), and that advanced learners were significantly more confident than intermediate learners ($p < .0001$). For the context factor, all groups were more confident in their responses when simple past occurred in easy than in hard contexts ($p < .0001$).

Table 4

Descriptive Statistics (Means, Standard Deviations) for Perception of Simple Past in Easy and Hard Contexts

	Perceptually easy		Perceptually hard	
Group	Accuracy	Confidence	Accuracy	Confidence
Intermediate (n = 14)	0.70 (0.10)	5.52 (0.89)	0.63 (0.19)	5.14 (0.85)
Advanced (n = 14)	0.86 (0.10)	7.12 (0.56)	0.71 (0.13)	6.89 (0.61)
L1 speakers (n = 11)	0.93 (0.05)	7.83 (0.23)	0.75 (0.18)	7.50 (0.23)

To sum up, L1 speakers and advanced L2 learners (71–93% correct) perceived simple past at comparable accuracy levels, both outperforming intermediate L2 learners (63–70% correct). All groups were similarly influenced by the context in which the verb occurred, detecting simple past more accurately when the verb occurred in a perceptually easy context (e.g., *I hated that*) than when it occurred in a hard context (e.g., *I booked the restaurant*). While accuracy rates did not distinguish the groups, their confidence ratings did, such that L1 speakers were significantly more confident in their perception of simple past, followed by advanced learners and then intermediate learners, and all groups were more confident in their perception of past in perceptually easy than hard contexts.

Language Exposure and Use

The third research question asked which L2 learner background variables, especially those related to language use, might be associated with their perception of simple past, particularly in perceptually hard contexts. To address this question, Pearson correlations (two-tailed) were carried out using the entire sample of L2 learners (n = 28)

to determine possible relationships between their perception accuracy or confidence and several learner background variables, including age variables (age at test, age of arrival, age when English instruction began), amount of time studying English, proficiency self-ratings (speaking, reading, writing, listening), amount of time speaking English in different contexts (at home, work, school), and overall percentage of time spent in English in Vancouver (speaking, reading, writing, listening).

Accuracy for past in a perceptually easy context correlated with age at which learners started studying English (r= –.46, p = .02) and with amount of time studying English (r = 46, p = .04), so that an earlier age at the time when instruction began and greater lengths of instruction were associated with higher perception accuracy. Accuracy for past in a perceptually hard context was associated only with self-reported listening proficiency (r = .42, p = .04), such that higher listening proficiency was linked to greater accuracy. In terms of rated confidence, confidence judgments for past in perceptually easy (r = .52, p = .01) and hard (r = .50, p = .02) contexts correlated with amount of time studying English. Confidence judgments for past in a perceptually hard context were additionally associated with self-reported amount of English spoken at school (r = .41, p = .04). In all cases, more extensive language study and use were linked with greater confidence in perception of past. All associations were of medium strength (.40 < r < .60), according to Plonsky and Oswald's (2014) guidelines.

Debriefing Interviews

The final (exploratory) research question asked what, if any, sentential context cues are used by L1 and L2 speakers of English to aid their perception of simple past in naturalistic input, and to what extent they are aware of such cues. This question was

addressed through analyses of debriefing interviews. In general, interviewees seemed to rely on context in their perception of *–ed*, with L1 speakers (30 statements by four interviewees) and advanced learners (10 statements by two interviewees) mentioning context more often than the intermediate learners (two statements by two interviewees). L1 speakers also mentioned phonology more often (23 statements) than advanced (five statements) and intermediate (five statements) learners.

I hated that. This clip contained virtually no context cues, and presented difficulty for all interviewees, despite the past tense marking being perceptually easy (separate-syllable allomorph [əd]). Both intermediate learners indicated there was no ending, and their answers and confidence ratings were inconsistent with those of the advanced learners and L1 speakers. Both advanced learners and most L1 speakers mentioned a lack of context as being a reason why they were struggling to hear the ending, yet the intermediate learners seemed to rely entirely on their perception skills.

But then we ditch those two. Here the potential cue (*but then*) did not indicate tense but instead signaled a continuation of narrative; it was not much help to the interviewees, as seven of the eight interviewees thought the sentence contained a past marker. All L1 speakers, except one who correctly thought the past tense marker was absent, mentioned *but then* as a reason why they chose past, thus misinterpreting this sentence. An affricate is present in the coda here, and it is followed by /ð/, which may have caused confusion phonologically.

Until you change your mind. Again, this clip provided a cue (*until*), but not necessarily one that helped make decisions about tense, as this cue can be meaningfully used in both present and past utterances. Yet this clip was not as challenging for the

interviewees as the one above. Only one intermediate learner of the eight interviewees incorrectly heard a past tense marker. While two of the L1 speakers noted that grammatically it was possible for the sentence to be past, both advanced learners and all L1 speakers mentioned that *until* indicated for them a future meaning. Further, unlike the verb in the previous sentence, *change* contains an affricate in the coda followed by a palatal [j], likely aiding in perception. Yet only one interviewee reported relying solely on perception to help him make his decision.

Normally if someone talked to me that way, I'd fire 'em. There was much more context provided in this clip, compared to previous sentences. The utterance is a hypothetical conditional sentence, with a second clause containing a (reduced) *would*. All interviewees, with varying confidence, correctly perceived the past tense marker. Confidence increased with proficiency level, with the L1 speakers being the most confident. All L1 speakers mentioned that the sentence was a hypothetical conditional (reflecting their metalinguistic knowledge), and both advanced learners mentioned the presence of *if* or *would* as helping them make their decision.

Yeah, Joey said I needed to relax, so he gave me an antihistamine. This sentence arguably provided the most context compared to the four previous sentences, although some confusion could have arisen because this is reported speech and L1 speakers are often inconsistent in their reporting of verbs as past. All but one interviewee correctly heard the past tense ending. The intermediate learners had the lowest confidence, and were uncertain when asked if they wanted to change their answer. The advanced learners and L1 speakers were not as confident with this clip as with the previous one; when asked if they would change their answer, most talked through the context of the clip

before confirming that the target verb was in the past, and one L1 speaker indeed changed his mind, stating that he did not hear the *–ed* after all.

Discussion

The current study examined L2 learners' and L1 speakers' perception of simple past *–ed* in naturalistic input, investigating the effect of perceptual difficulty, which was operationalized as the occurrence of *–ed* in easy or hard perceptual contexts. The study further sought to explore which learner background variables were linked to perception and what contextual cues learners attend to when interpreting tense in naturalistic input. Results showed that L1 speakers perceived *–ed* more accurately than intermediate and advanced L2 learners, and that confidence in perception of *–ed* increased with proficiency. Furthermore, all participants were influenced by perceptual context, with simple past perceived better in perceptually easy than hard environments. Several learner background variables showed associations with greater perception accuracy and higher rated confidence. Taken together, the findings suggested that *–ed* is often hard to perceive in authentic input and that learners' amount of L2 exposure and their ability to interpret context may aid in the perception of *–ed*.

Perception of Simple Past

The first research question asked how well participants perceived *–ed* in naturalistic input, compared to their perception of simple present. With respect to perception of past versus present (i.e., detecting the presence or absence of *–ed*), the results were identical for past and present forms: There was no difference between L2 learner groups, but L1 speakers were overall significantly more accurate than L2 learners. This study is likely among the first to compare L1 and L2 perception of present

and past verb forms. Both Solt et al. (2003) and Klein et al. (2003) either did not include or did not report perception accuracy for both present and past, and Bell et al. (2015) combined present and past perception rates into a single score, based on the assumption that perception of *–ed* also involves the ability to detect its absence. The finding of no difference in perception accuracy for present and past forms suggests that tuning perception to detect the presence of a low-salience morpheme is just as demanding as detecting its absence in naturalistic input, although L1 speakers (83–87% accuracy) outperformed L2 learners (59–78% accuracy).

It is noteworthy that L1 speakers were far from ceiling performance in their perception of present or past (at 83–87% correct), indicating that detection of *–ed* in brief video clips is difficult for native and nonnative speakers alike. This result for L1 speakers mirrors the findings of Bell et al. (2015), where L1 speakers outperformed L2 learners in perception accuracy yet failed to reach 100% accuracy, but contrasts with the findings by Klein et al. (2003) and Solt et al. (2003), where L1 users perceived *–ed* at ceiling. This difference in findings may be due to the phonetic environments where *–ed* occurred, as in the latter two studies, past tense verbs were always followed by a vowel, and always presented with discourse cues (irregular past verbs, temporal adverbials), likely making the ending salient. In contrast, Bell et al. used a conversational speech rate to present sentences varying in perceptual difficulty, and the current materials included brief authentic video clips, which ostensibly made the task especially challenging.

In terms of overall rated confidence, L1 speakers were more confident than both L2 learner groups. However, only advanced learners were more confident in their judgments when *–ed* was present (past forms) than when it was absent (present forms),

and advanced learners were overall more confident than intermediate ones, which implies that advanced learners were aware of the difficulty associated with perceiving *–ed*. In fact, higher-level learners have been shown to be aware of their difficulties with L2 morphology. Rodríguez Silva and Roehr-Brackin (2016) compared difficulty ratings for 13 grammar targets by applied linguists, university English teachers, and L2 learners. The best predictor of functor difficulty for learners, as measured through implicit and explicit knowledge tests, was learners' own difficulty ratings. The confidence ratings in this study thus likely revealed learners' proficiency-linked awareness of the *–ed* perceptual challenge, although this awareness was dissociated from (and most likely preceded) learners' actual perception accuracy.

Perceptual Context

The second research question examined the impact of perceptually easy and hard contexts on the perception of simple past. For all participants, perception of *–ed* was facilitated when the past tense marker occurred in a perceptually easy than hard context, with all groups also being more confident in their ability to perceive easy over hard endings. A similar difference in perception of *–ed* in easy and hard contexts—defined in perceptual (i.e., presence of a vowel making *–ed* easier to hear) or phonological (i.e., difference in sonority between [əd] and [t]/[d] allomorphs) terms—was found in Bell et al. (2015) for both L1 and L2 users, as well as in Klein et al. (2003) for L2 learners and in Solt et al. (2003) for L2 learners at high and low proficiency.

Unlike the overall comparison of present versus past forms, analyses of *–ed* detection accuracy as a function of perceptual context showed that L1 speakers and advanced L2 learners did not differ in their *–ed* perception (regardless of perceptual

context), yet both were more accurate than intermediate learners (see also Solt et al., 2003). According to Goldschneider and DeKeyser (2001), a perceptually salient morpheme is composed of more individual sounds, contains a vowel, and has high sonority. Klein et al. (2003) found that the syllabicity of *–ed* was a better predictor of past tense accuracy than the verb's aspect (telic vs. atelic), and the current findings showed that [əd] is easier to perceive than [t] and [d], adding support to Goldschneider and DeKeyser's definition of morpheme salience. However, because only 22% of past tokens are realized as a salient morpheme ([əd]) in classroom discourse, out of a total of 9% of past verb forms (Collins et al., 2009), this more salient morpheme is lacking in learner input, which likely contributes to its late acquisition. Moreover, L2 learners do not always accurately perceive *–ed* even in perceptually easy contexts, where learners' accuracy was in the 70–86% range. When it comes to *–ed* in perceptually easy environments, L1 speakers do not appear to perform at ceiling either (at 93% correct). Regular past, then, may be even less perceptible in everyday input than originally thought.

Language Exposure and Use

The third research question asked which language background variables were associated with L2 learners' perception of simple past. With respect to *–ed* occurring in a perceptually easy context, there was a relationship between L2 learners' perception accuracy, the age at which they had begun studying English, and the amount of time they had been learning English. Increased confidence in perceiving *–ed* in this context was also related to the length of time learners spent studying English. All together, these associations point to overall amount of study and use of English as being beneficial to

learners' ability to perceive regular past, and may add support to Jia and Fuse's (2007) finding that amount of exposure day-to-day predicts the acquisition of difficult L2 morphemes (see also Blom & Paradis, 2015; Rispoli et al., 2012). In essence, increased exposure to the L2 (through time devoted to the study or an earlier and thus longer exposure) enables learners to accrue the needed evidence to reliably identify *–ed* in naturalistic input, in agreement with emergentist views of language learning and use (N. C. Ellis, 2007).

The only variable associated with learners' perception of *–ed* in perceptually hard contexts, which is particularly problematic, was self-reported listening proficiency. This finding confirms prior claims that L1 and L2 learners' challenges with English past morphology are confined to the perceptual/listening domain (e.g., Magen, 2014; McDonald & Roussel, 2010). In addition, Fracasso, Bangs, and Binder (2016) recently revealed an association between morphological awareness and listening comprehension for a group of adult L1 students working on their basic literacy skills, with morphological awareness defined as the ability to identify, reflect on, and manipulate the morphological structure of words. This link between language users' awareness of morphology and their comprehension skills points to a morphological basis of listening comprehension. Put differently, language users' ability to interpret spoken discourse is tied to their ability to detect morphology, with the consequence that the past challenge may be as much (if not more) to do with accurate listening comprehension of oral discourse as it is with accurate perception of auditory forms.

Discourse Cues

The fourth (exploratory) research question asked broadly whether discourse context cues were used by listeners to aid the perception of simple past and whether listeners were aware of such cues. Participants' responses to debriefing questions revealed that perception of *–ed* in naturalistic input was linked to a range of contextual cues, with learners showing sensitivity to and awareness of such cues. L1 speakers and advanced L2 learners mentioned contextual cues (grammatical, lexical, phonological) to a comparable extent, and made reference to them more frequently than intermediate learners. For instance, all interviewees were sensitive to conditionals as cues for past (e.g., *Normally if someone talked to me that way, I'd fire 'em*). All interviewed participants also struggled to hear *–ed* in *Joey said I needed to relax so he gave me an antihistamine* (which arguably contained substantial context and featured a perceptually easy single-syllable allomorph), showing sensitivity to reported speech as being a potential cue for past, even though it was unreliable, as simple past is used in reported speech inconsistently (Parrott, 2000). The interviewees also had difficulty perceiving *–ed* when there was no context provided (e.g., in *I hated that*).

While L1 speakers and advanced learners correctly perceived *–ed*, they did so with difficulty and low confidence, citing lack of context to explain their difficulty. Thus, even a perceptually easy ending is unreliable in the absence of any further discourse context. In fact, it has been argued that English simple past nearly exclusively relies on its context for interpretation (Ehrlich, 1990) and that it may not have any meaning other than a speaker's subjective relationship with the content (Pennington, 1988). Reported speech and content-poor utterances are good examples of when language users determine

the temporal frame of an utterance based on their subjective interpretation of discourse rather than prescriptive grammar rules or presence or absence of morphological markers.

Bell et al. (2015) reported that listeners perceived *–ed* more accurately when temporal adverbs were congruent than when they were incongruent with verb forms. In this study, at least one clip created an "incongruent adverb" context for listeners (e.g., *But then we ditch those two*, where *but then* was interpreted as a past instead of a future tense marker). One L1 speaker noted that "the only reason to use the present simple would be to… talk about habit or repeated action," and two others mentioned the present just not "making sense" to them in this context. In fact, all but one L1 speaker misinterpreted the context which for them was a more reliable cue of temporality than morphology. In essence, listeners do rely on contextual cues, perhaps quite extensively at times, to interpret ambiguous utterances, especially when morphological markers are perceptually difficult to resolve. Thus, the perceptual challenge of simple past in English is not restricted purely to perception but likely involves an integration of various contextual cues as part of sense-making in speech comprehension.

Pedagogical Implications

Meta-analyses have shown that explicit grammar teaching is more effective than implicit instruction (Norris & Ortega, 2000; Spada & Tomita, 2010), and if regular past lacks salience in naturalistic input (Bell et al., 2015, Collins et al., 2009), teachers may have to make past tense morphology more distinct for their students in aural input. Studies investigating the effectiveness of enhanced input in the L2 classroom have almost exclusively focus on written input (e.g., Benati, 2005; Lee, 2007). One exception was Wong's (2001) study comparing textual enhancement in written and aural form.

That study saw L2 learners had more difficulty attending to form in aural input than in written, implying enhanced aural input may be of benefit to learners. Teachers may consider adding considerable authentic listening practice to their past tense lessons, as well as aural input that deliberately includes regular past forms in easily perceptible environments: more [əd] allomorphs, *–ed* followed by vowels, and *–ed* followed by pausing (Collins et al., 2009). Teachers may further focus on connected speech phenomena, especially for stops in coda positions, to improve learners' awareness of the processes that might interfere with the perceptibility of *–ed*. Finally, teachers might draw learners' attention to the many uses of the simple past (e.g., hypotheticality, politeness, reported speech) and encourage learners to interpret overall context in input materials to determine temporal reference, rather than focusing exclusively on morphology, in a combination of meaning- or task-based and explicit instruction (R. Ellis, 2006).

Limitations and Future Directions

The nature of the input selected introduced some limitations. First, it can be argued that since TV sitcoms are scripted, rehearsed and directed, they do not constitute true naturalistic input. Perception studies that use authentic speech samples may have different results. Further, because the input targeted here was language from popular TV shows, it lacked multiple controls for pronunciation and fluency properties of verb forms. For instance, some forms may have been spoken more quickly or more slowly, and some may have been more or less clearly articulated. While based on authentic speech, these findings also cannot be generalized beyond the current definition of easy versus hard perceptual contexts (i.e., [əd] vs. [t] and [d] allomorphs, all followed by a consonant). Thus, future studies might use more nuanced operationalizations of

perceptual difficulty, for instance, in terms of palatalization, flapping, and other assimilatory or dissimilatory phonetic processes that affect alveolar stops, to understand phonetic influences on perception of *–ed*. Finally, the target utterances were derived exclusively from American TV shows, and all but two speakers had American accents, so it would be important to see how simple past is perceived in different dialects of English.

In terms of listener-specific variables, the language background questionnaires did not ask in detail how much and when learners used English before and after their arrival in Canada, which is a limitation. This study also has little to say about the relationship between adult L2 learners' perception and production, which is an understudied issue. Therefore, a more detailed look at learners' perception and production skills (and the interaction between the two) across several proficiency levels would be beneficial in order to fully understand the learning challenges associated with L2 morphology. Moreover, this study did not control for learner L1, and different L1 groups may be more or less comfortable perceiving consonant clusters or stops in coda position (e.g., Cardoso, 2011). Finally, while the content of the debriefing interviews was revealing, the interviews themselves were brief and exploratory and lacked the rigor of a qualitative study. To understand how language users interpret morphology in context, research using think-aloud procedures or relying on more detailed interview protocols is warranted.

Conclusion

The current study contributes to clarifying the challenge associated with the acquisition of English simple past morphology by showing that*–ed* is frequently hard to perceive for both L1 speakers and L2 learners in rapid, conversational naturalistic input.

The current findings also support experiential, emergentist views of language development by revealing a link between learners' use and exposure to the L2 and their success in perception of L2 morphology. All in all, this study adds to a growing body of research that shows that English regular past is not just infrequent in learner input (Collins et al., 2009) but that it is also difficult to perceive (e.g., Bell et al., 2015), and that the perception challenge likely encompasses both finegrained phonetic perception and higher-order comprehension of spoken discourse.

Chapter 3

The current study revealed that the regular past in English is difficult to perceive in naturalistic input for L2 learners and L1 users alike, thus suggesting that lack of perceptual salience is a contributing factor to its late acquisition by L2 learners. The current findings further indicate that learners' exposure to input over time and their overall proficiency in the comprehension of spoken discourse are correlated with their increased accuracy in perceiving past tense. These findings are consistent with emergentist theories of language learning, which view the language learner as compiling evidence and calculating probabilities based on frequency and usage (N. C. Ellis, 2007; Ortega, 2009). The more learners interact with the L2, the more evidence they can gather about its rules and functions, as these are structural regularities that are "figured out" from long-term experience with L2 input (N. C. Ellis, 2002). That the simple past is better produced (e.g., Jia & Fuse, 2007) and perceived (the current study) by those who have been learning longer adds empirical evidence towards experience-driven learning of L2 morphology. Finally, debriefing interviews indicated that successful perceivers of past tense relied on context cues, pointing to the idea that listeners interpret discourse-level contextual cues, rather than rely solely on accurate perception skills, to decode temporal morphology in naturalistic input.

While the findings of the current study offer insight into how L1 and L2 users interact with and learn from naturalistic input, pedagogically, an explicit approach to infrequent and difficult to perceive morphology appears to be most suitable (DeKeyser, 2005, 2016). Indeed, naturalistic, experience-driven learning often presents a challenge, especially (as shown in the current findings) when perceptual difficulties are taken into

consideration. Housen and Simoens (2016) emphasize that the conditions under which learning takes place will affect the salience, frequency, and transparency of a morphosyntactic target. Those learning in naturalistic contexts, where teachers are not manipulating the input addressed to learners, may experience certain morphosyntactic targets infrequently, especially when the targeted feature is already nonsalient in naturalistic input. Rodríguez Silva and Roehr-Brackin (2016) also add that the learning challenge for L2 learners is not restricted to the complexity of a given metalinguistic rule but is rather determined by the nature of its form-meaning mapping, its perceptual (non)salience, or lack of frequency. Input-driven learning happens over time, requires great exposure to input, and is likely rooted in similarity-based processing, when the learner gradually becomes aware of the subtleties of a given morphosyntactic target and its interaction with other grammar features (N. C. Ellis, 2007; Kaufman et al., 2010; Rodríguez Silva & Roehr-Brackin, 2016). While explicit learning draws on learner aptitude to an extent (e.g., Yalçin & Spada, 2016), experience-driven learning relies on amount of exposure, the characteristics of the features to which learners are being exposed—including their phonological salience—and potentially individual differences in intuitiveness, processing speed, and openness to experience (Kaufman et al., 2010). It is not surprising, therefore, that learning some L2 morphology from experience alone—in the absence of explicit teaching—is a difficult task for L2 learners (e.g., Jia & Fuse, 2007).

Nevertheless, in the current study, advanced L2 learners and L1 speakers indicated that they relied on context cues to help them perceive *–ed* when it was less salient. Studies in statistical or probabilistic learning have investigated the role of implicit

learning, defined as the ability to deduce linguistic structure from input containing multiple exemplars (e.g., Conway, Bauernschmidt, Huang, & Pisoni, 2010) in naturalistic language learning. For example, Mack, Clifton, Frazier, and Taylor (2012) looked at the effect of usage-based preferences on L1 users' speech restoration of expletive *it*. Usage-based preferences refer to the use of optional grammatical items in specific contexts, for example, in sentences like *it seems difficult* versus *'seems difficult*, where the second utterance (with an omitted *it*) is more likely to occur when the evaluation of the situation is immediate and personal, compared to contexts where speakers give their utterance some thought or when they express the judgement of someone else (as in *it seemed difficult*, *it seems difficult to him*). The speech restoration method involves replacing parts of a sentence with white noise and having listeners repeat what they (think they) heard. Mack et al. replaced *it* in sentences similar to those shown above with white noise in both immediate and nonimmediate as well as personal and impersonal contexts. Listeners reported hearing or not hearing *it* in line with usage preference, that is, they did not hear *it* in personal and immediate contexts but reported hearing *it* in nonimmediate and impersonal contexts. This suggests that usage preferences, which could be broadly construed as the use of discourse cues, affect L1 listeners' processing of perceptually ambiguous spoken language. These findings are consistent with those of the current study, where advanced L2 learners and L1 users reported using context cues to help them hear *–ed* in perceptually difficult contexts. Moreover, Conway et al. (2010) found that implicit learning ability was correlated with listeners' ability to predict upcoming vocabulary in statistically frequent contexts, despite perceptual ambiguity. Their participants "heard" more predictable vocabulary even when

the word itself was rendered imperceptible in input. The authors concluded that implicit learning reflects a sensitivity to the predictability of language, and suggest that implicit learning is important to the ability to perceive language in perceptually ambiguous contexts.

Traditional explicit instruction of L2 tense and aspect, including the simple past, often involves presentation of metalinguistic rules of meaning, form, and use, followed by controlled and free practice of the form with corrective feedback (e.g., Harmer, 2001; Scrivener, 2005; Yalçin & Spada, 2016). The current study shows that comprehension of the simple past in input involves more than understanding its pedagogical rules, and that proficient users of English draw on an ability to interpret discourse cues likely developed over years of exposure to naturalistic input. Explicit grammar teaching in L2 contexts, and especially instruction based on simplified rules of tense morphology, relies on the availability of the target forms in naturalistic input to be reinforced outside instruction, yet it is clear that there is not sufficient supply of regular past in naturalistic input, either in frequency or in perceptual salience (Collins et al., 2009). Determining usage preferences and common discourse cues for tense morphology and teaching them alongside more traditional pedagogical rules may serve to speed up these slow-to-emerge, implicitly learned probabilities.

Further, meta-analyses have shown explicit instruction to be more effective than implicit instruction (Norris & Ortega, 2000), no matter whether the language is simple or complex (Spada & Tomita, 2010). Teachers can manipulate the frequency and salience of morphology in the input in order to increase learners' exposure to it. Many studies have looked at the effect of enhanced input, where the salience of a form is increased in

learner input. For example, Benati (2005) compared processing instruction—instruction that encourages learners to attend to form (i.e., verbal morphology in this case) to help them avoid relying on meaning (i.e., context or time adverbials) to interpret input—against traditional and meaning-output instruction. He found that attending to form increased learners' comprehension of the feature, but not their production of it, indicating that enhancing the properties of language in input (in terms of the frequency and salience of forms) is beneficial to the learner, at least in terms of comprehension. Yet other studies have found that textual enhancement of form in meaning-based input has a detrimental effect on reading comprehension (Lee, 2007), or no effect on comprehension or form learning (Winke, 2013). In addition, Wong (2001) showed that attending to form in aural input was more difficult for L2 learners than in written input, and no studies to date have systematically looked at textual enhancement treatments that help learners perceive morphology that lacks phonological salience in listening. Enhancing forms that are infrequent or lacking salience in input appears to be the best way to address perceptual difficulties for learners, but the available data are inconsistent, and studies in the aural mode are generally lacking.

To summarize, the current study has yielded empirical evidence that the regular past lacks perceptual salience in naturalistic input. This, combined with its lack of frequency (Collins et al., 2009) and its opaque form-meaning mapping (DeKeyser, 2005, 2016), likely contributes to L2 learners' difficulty with the learning of the English regular past. This study further supports emergentist and probabilistic theories of language learning that see morphological acquisition as a gradual process that involves exposure to large amounts of naturalistic input as well as learner sensitivity to patterns of

language use in that input. Thus, because the English regular past is nonsalient in input, its accurate perception is a complex phenomemon, and current methods of instruction do not entirely capture this complexity. A better understanding of this phenomenon is key to helping learners with this difficult aspect of L2 English learning.

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Appendix A. Sentences in perception materials

Past Easy Context

But I hated getting dirty
Yeah, Joey said I uh, needed to relax so he gave me an anti-histamine
Maybe I just wanted to make myself feel better
I attempted to cajole her
I invented the game of cups as a way to give Joey money
I rented the wrong movie
No one invited me
We're really glad you decided to meet our guy
I trusted you with my email address and you—
Her grandson Judd reported she went out for bagels and never came back
The "mrow", that sounded to me like an African civet cat
Wait, I just decided to just ditch my plans
I just expected so much more out of you
He started playing the most amazing game and I—
I don't care that you rejected my advances
He responded to a riot at a gym without backup

Past Hard Context

I even changed my facebook status
Huh. Normally if someone talked to me that way, I'd fire him.
They told me I looked too Midwest for the part
Played to perfection, Charles!
And then he seemed kinda down
You called me
Well first of all, I would like to say that you both performed very well
You refused to go out with Chaz
I know, but you know what, it would make me feel better if Louis apologized to me
If you got married after you turned 30 you'd pay for it yourself
Oh good, I used that right
I'm sorry, you tried to build your own CAT scanner
Mitchell and I agreed that I would be in charge of the wedding
Not everybody. No, as a matter of fact one of the guys in break room asked me to lunch
I booked the restaurant from our first date
Sorry, sorry! Once I changed the earrings I had to change the shoes.

Present

In India we just call them Untouchables
Good people, you know, they start playing these games

What's insane is how you refuse to get with the program
I wish you all the best
Until you change your mind
Yeah, well, just apologize to him ok?
And we in return, agree not to violate the interity of the internal hardware
We remind you that this is a non-smoking flight so—
But then we ditch those two
You open the best bottle of wine
Try less teeth
It's like uh, in a way you-you complete me
And I correspond with people like a grown-up
We call him the vulture
We crack the case
If I scream right up until you say "action"
You seem to know a lot about fashion
You sound like a little girl
Well, I hope you find something to do
Casey, I miss you!
Now, I assume the saucer card came up when you played last
OK, so now after you receive the doubling bonus
Because I really believe that you have good judgement
Oh, I remember laughing
What do you say we play a little uh, foosball for money
Ok, just promise me that you won't do anything stupid
I really appreciate your offer to let me move in and everything, but…
Because he knows that we enjoy the silliness
Soldiers talk about that moment when they shut off
You realize what you are
I like the old sheriff
Dad, you seem to forget that I raised three children

Appendix B. Language Background Questionnaire L1 participants

1. Your name: _____ 2. Gender: M F
1. What's your date of birth (MM/DD/YY)? _____
2. Where did you grow up? (MM/DD/YY) _____
3. Is your hearing okay, as far as you know? YES NO
4. What is your first language (i.e., your mother tongue)? _____
5. Your mother's dominant language: _____ 9. Your father's dominant language: _____
6. What languages were commonly spoken in your home when you were growing up?

   _____
7. Other languages you speak fluently: _____
8. Have you studied any other language besides English? YES NO
9. If yes, which languages and for how long? _____
10. List any countries you have lived in for more than six months: _____
11. What is your highest level of schooling (e.g., high school, BA degree)?

    _____

Appendix C. Language Background Questionnaire L2 participants

1. Your name: _____ 2. Gender: M F
2. What's your date of birth (MM/DD/YY)? _____
3. How old were you when you arrived in this country? _____ (years)
4. What was your date of arrival Canada? (MM/DD/YY)_____
5. Is your hearing okay, as far as you know? YES NO
6. What is your first language (i.e., your mother tongue)? _____
7. Your mother's dominant language: _____
8. Your father's dominant language: _____
9. What languages were commonly spoken in your home when you were growing up?

_____

10. Other languages you speak fluently: _____
11. At what age did you begin to study English? _____
12. How long did you learn English before coming to this country (in years and months)? _____
13. Have you studied any other language besides English? YES NO
14. If yes, which languages and for how long? _____
15. List any countries you have lived in for more than six months: _____
16. What was your highest level of schooling prior to arriving in this country (e.g., high school, BA degree)? _____
17. Are you currently taking any ESL classes? Which one(s)? _____
18. Please rate how well you speak, listen to, read, and write **English** by using the scales in the box below.

1 = extremely poor 9 = extremely fluent

Speaking	**Listening**	**Reading**	**Writing**
1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9

19. What percentage of time do you spend speaking/listening to English in Vancouver (e.g., 30%)?

a. at home: _____
b. at school: _____
c. at work (if applicable): _____

20. Please indicate how often you use English in the following situations (circle one):

a) with friends:

never 1-2 times/month a few times/month a few times/week everyday

b) with teachers

never 1-2 times/month a few times/month a few times/week everyday

c) with classmates:

never 1-2 times/month a few times/month a few times/week everyday

d) working (if applicable):

never 1-2 times/month a few times/month a few times/week everyday

e) socializing:

never 1-2 times/month a few times/month a few times/week everyday

21. Please indicate the percentage of time approximately that you use the following languages each week. Circle the appropriate percentage for each skill.

English

Speaking	0%	10	20	30	40	50	60	70	80	90	100%
Listening	0%	10	20	30	40	50	60	70	80	90	100%
Reading	0%	10	20	30	40	50	60	70	80	90	100%
Writing	0%	10	20	30	40	50	60	70	80	90	100%

Your first language (mother tongue): _____

Speaking	0%	10	20	30	40	50	60	70	80	90	100%
Listening	0%	10	20	30	40	50	60	70	80	90	100%
Reading	0%	10	20	30	40	50	60	70	80	90	100%
Writing	0%	10	20	30	40	50	60	70	80	90	100%

Another language (if applicable): _____

Speaking	0%	10	20	30	40	50	60	70	80	90	100%
Listening	0%	10	20	30	40	50	60	70	80	90	100%
Reading	0%	10	20	30	40	50	60	70	80	90	100%
Writing	0%	10	20	30	40	50	60	70	80	90	100%