

# Kick the Ball or Kicked the Ball? Perception of the Past Morpheme *-ed* by Second Language Learners

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**Abstract:** Explanations for the well-documented second language (L2) learning challenge of the English regular past include verb semantics (Bardovi-Harlig, 2000), phonetic properties (Goad, White, & Steele, 2003), and frequency factors (Collins, Trofimovich, White, Cardoso, & Horst, 2009). Difficulty *perceiving* past-tense morphology (i.e., hearing *-ed* in the input) has received less research attention. In this study, we explored the roles of three perceptual factors (phonological environment, speech rate, semantic clues) among 106 L2 learners and 81 English speakers of a similar age. Experiment 1 was a forced-choice auditory identification task contrasting perceptually ‘*easy*’ ([əɪ] + vowel) and ‘*hard*’ ([t] or [d] + consonant) regular past contexts at normal conversational speed. Experiment 2 contrasted easy and hard contexts at a slowed-down speech rate. Experiment 3 included time adverbials that matched or mismatched the tense marker (e.g., *walked the dog now* vs. *walked the dog yesterday*). The L2 learners behaved at just above chance at normal conversational speed in both contexts, and slowing speech down helped them in easy contexts only. The English speakers were more accurate in easy than in hard contexts regardless of speech rate. Both L2 learners and English speakers also relied on adverbials at the expense of the phonetic cue to past morphology (*-ed*). Implications of these findings for the roles of input and frequency in L2 learning, and for pronunciation teaching (i.e., setting reasonable learning goals) are discussed.

**Keywords:** Frequency, morphology, regular past, second language learning, speech perception

**Résumé :** Le défi que représente l’apprentissage du passé régulier en anglais langue seconde (AL2) est bien documenté. Les explications portent sur la sémantique verbale (Bardovi-Harlig, 2000), les propriétés phonétiques (Goad, White et Steele, 2003) et les facteurs de fréquence (Collins, Trofimovich, White, Cardoso et Horst, 2009). En revanche, la difficulté à percevoir la morphologie du temps passé (à savoir, entendre la terminaison en *-ed* de l’énoncé) a reçu moins d’attention de la part des chercheurs. Dans cette étude, nous avons analysé le rôle joué par trois facteurs de perception (l’environnement phonologique, la vitesse d’élocution, les indices sémantiques) chez 106 apprenants d’AL2 et 81 locuteurs de l’anglais du même groupe d’âge. L’expérience 1 consistait en

une tâche d'identification auditive à choix forcé opposant, à une vitesse de conversation normale, des contextes où le passé régulier était « facile » ([æd] + voyelle) ou « difficile » ([t] ou [d] + consonne) à percevoir. L'expérience 2 opposait des contextes faciles et difficiles avec une vitesse d'élocution réduite. L'expérience 3 comprenait des adverbies de temps qui correspondaient ou non au temps du verbe (p. ex. *walked the dog now* et *walked the dog yesterday*). À la vitesse de conversation normale, les apprenants ont réagi un peu mieux qu'aléatoirement dans les deux contextes, et la diminution de la vitesse d'élocution les a aidés seulement dans les contextes faciles. Les anglophones étaient plus précis dans les contextes faciles que dans les contextes difficiles, peu importe la vitesse d'élocution. Les apprenants comme les anglophones se fient aux adverbies plutôt qu'à l'indice phonétique de la morphologie du passé (-ed). Les conséquences de ces résultats sur le rôle de l'énoncé et de la fréquence dans l'apprentissage de la L2 et dans l'enseignement de la prononciation (c'est-à-dire l'établissement d'objectifs d'apprentissage raisonnables) sont présentées.

**Mots clés :** fréquence, morphologie, passé régulier en anglais, apprentissage d'une langue seconde, perception de la parole

It has often been noted that the “simple” past in English is a misnomer when one considers its acquisition by second language (L2) learners. It is indeed relatively simple in form, achieved by adding *-ed* to the base form of the majority of verbs, but this simplicity does not extend to the ease with which it is mastered by L2 learners for several reasons. First, although most English verbs are regular (i.e., marked with *-ed*), many of the most frequent verbs are irregular. Some of these irregular verbs are among the most common words in the English language (e.g., *do/did*, *go/went*, *have/had*). In fact, of the 100 most common verbs, over half (56) are irregular (Rundell & Fox, 2002). Thus, verbs in the past form, when heard and used by learners both in and outside the classroom, will often not be marked with *-ed*. Furthermore, past forms in general may not be experienced as frequently as other verb forms. In research investigating frequency of verb forms in the input in English-as-a-second-language classrooms in French-speaking regions of Quebec, Canada, it was found that only 9% of the conjugated verb forms were marked for past, and of these, 75% were irregular (Collins, Trofimovich, White, Cardoso, & Horst, 2009). Thus, from a frequency perspective, the input is skewed toward the irregular past forms, which are arguably often more phonologically salient given the difference between the base and past forms (e.g., *go/went*, *take/took* vs. *close/closed*, *arrive/arrived*) (McDonald & Roussel, 2010). Moreover, in interrogative and negative sentences, English uses auxiliaries to mark the past,

which leaves the lexical verb unmarked (e.g., *He walked* to school vs. *He didn't walk to school* vs. *Did he walk to school?*), thus compounding the frequency problem.

Redundancy also plays a role in the *-ed* challenge. Adverbials often situate an utterance in the past (e.g., *yesterday, last year, two years ago, when I was young. . .*), so past morphology may not need to be processed to comprehend the temporal reference (Cadierno, 1995). VanPatten's (1996, 2004a) Lexical Preference Principle offers an explanation for this phenomenon, as it states that learners will process lexical items before grammatical items when both encode the same semantic information. Indeed, as soon as an event is situated in the past, attention to (past) morphology is only important to understand time shifts, which can also be achieved through the use of time adverbials (e.g., *She didn't phone the company so could you do it now/this morning/later on. . .?*). The association between adverbials and their temporal meaning can even result in errors perceiving and producing the past (Bardovi-Harlig, 2000). For example, both Bardovi-Harlig and Reynolds (1995) and Collins (2002) found evidence that a preference for present tense forms where past tense would be expected was triggered by the presence of "sometimes" and "often," words that in learners' minds are more closely associated with current events than remote (past) actions.

Another potential challenge is perceptual saliency, or the ease with which a structure (in this case, the morpheme *-ed*) is heard by individual listeners. Indeed, a possible lack of perceptual salience has frequently been offered as an explanation for acquisition patterns of the regular past (e.g., Bayley, 1994; Collins et al., 2009; Goad, White, & Steele, 2003; Lardiere, 2003; Wolfram, 1985). Furthermore, in a study designed to understand different determinants of the natural morpheme acquisition order, which includes the English regular past as a later-acquired morpheme (e.g., Dulay & Burt, 1974), Goldschneider and DeKeyser (2001) found that perceptual salience was one factor contributing toward explaining the order of acquisition. It is important to note, however, that the possible role of perceptual salience was not directly investigated in any of these studies as there were no measures of listeners' actual perception of the target forms.

Based on the above-mentioned studies, there are several reasons *-ed* could be perceptually problematic. In relation to its pronunciation, first, it is phonologically complex as it consists of three allomorphs: [əd], [t], and [d]. Therefore, in auditory input, three different speech forms express one function. Second, only one of the allomorphs ([əd]<sup>1</sup>) is pronounced as a separate syllable added to the verb (e.g., *waded, insisted*). The other two allomorphs ([t], [d]) are pronounced as part of the preceding syllable (e.g., *asked, obeyed*). Furthermore, the pronunciation

of *-ed* varies depending on the surrounding environment. For example, when [t] or [d] is added to a voiceless or voiced consonant, the resulting consonant cluster may be reduced so that [kɪst] (*kissed*) becomes [kɪs] (Wolfram, 1985). The subsequent sound can also have an effect on the pronunciation of *-ed*. Labov (1969) documented that the past *-ed* morpheme is more likely to be deleted when followed by a consonant rather than a vowel (e.g., the *-ed* in *walked through* is more frequently deleted than the *-ed* in *walked in*).

Researchers who argue that *-ed* poses a perception challenge have tended to provide indirect evidence in support of this claim. For example, some research (e.g., Wolfram, 1985) has looked at non-target-like production of *-ed* in speech samples from learners of English to infer potential perceptual difficulties that might explain performance. Other studies (e.g., Collins et al., 2009) have examined target-like speech directed at classroom language learners, examining various language-related phenomena of the regular past that may render it difficult to perceive (e.g., the initial sound of the word following the past tense form). However, very little research has examined the accuracy with which L2 learners perceive *-ed*, and whether accuracy is affected by pre-identified variables such as phonetic environment, speech speed, or redundant lexical cues. Such research is important as actual analyses of learner perception can confirm whether predictions of learning difficulty based on linguistic descriptions hold true. The findings can inform our understanding of the actual difficulties that learners experience when confronted with the *-ed* past, and their relative importance for perception of the form.

To the best of our knowledge, Solt et al.'s (2003) study was the first published research that investigated how the three regular past allomorphs ([əd], [t], [d]) may affect learner perception of *-ed*, thereby providing a learner-centred analysis of learning difficulty. The researchers investigated whether beginner and advanced learners of English perceived and produced the regular past morpheme in a target-like manner, and whether they were more accurate with the separate syllable [əd] allomorph than with [t] and [d]. The participants were 68 adult L2 learners from a wide variety of language backgrounds (divided into high- and low-proficiency groups) and 19 first language (L1) speakers of English, all of whom completed a perception task and a perception/production task. The perception task presented 18 regular verbs in short sentences (e.g., *The girl walked in the park*) that one researcher, playing the role of a teacher, read aloud. Another researcher, playing the role of a student, repeated the sentence either with or without the regular past morpheme. Within the test, each verb was repeated correctly and incorrectly once by the researcher playing the role of the

student. The participants were instructed to indicate whether the two utterances matched (i.e., whether the student had correctly repeated the teacher's sentence). The perception/production test required the participants to listen to two sentences. The first sentence included a time adverbial and an irregular past verb form to situate the context in the past (e.g., *Last year the young man had a good job*). The second sentence included a regular past verb form (e.g., *He worked in a big store* [note that the participants only had aural input]). The participants then had to fill in the regular past verb form in writing (i.e., *He \_\_\_\_\_ in a big store*).

The perception results showed a significant effect for proficiency: L1 speakers outperformed high-proficiency L2 learners, who in turn performed better than low-proficiency L2 learners. There were significant differences between all three allomorphs ([əd] > [t] > [d]) for the high-proficiency learners, and between [əd] and both [t] and [d] for the low-proficiency learners. On the perception/production test, the L1 speakers and the high-proficiency learners behaved similarly overall, but the high-proficiency learners were significantly more accurate with [t] than [d], while the L1 speakers showed no such difference. The low-proficiency learners were significantly less successful and performed differently across the three allomorphs ([əd] > [t] > [d]). Taken together, these results demonstrate that perceiving *-ed* is challenging for learners of English and accuracy is affected by the type of allomorph. When other linguistic cues situate the utterance in the past, high-proficiency learners reach target-like accuracy as evidenced in their perception/production test scores. This suggests a reliance on cues other than the final *-ed* morpheme for comprehending past temporality. However, the presence of time adverbials did not appear to help the low-proficiency learners' perception, as they still struggled to mark *-ed*, which was interpreted as being due to the demands of the task: these low-level learners found the task too difficult to benefit from the time adverbial.

The results from Solt et al. (2003) leave several unanswered questions. First, the two tasks that were employed were controlled tasks with in-built repetition that resembled L2 classroom tasks, and as such, the scores for both the L1 and L2 speakers may be higher than when *-ed* is pronounced in normal speech. It is therefore important to investigate listeners' perceptual difficulty with regular past in tasks where *-ed* is pronounced regularly and without repetition. Second, the findings demonstrated that time adverbials appear to be more beneficial for advanced learners when producing *-ed*, but whether time adverbials affect the perception of *-ed* was not investigated in a controlled manner. The perception of *-ed* may indeed be dependent on

the availability of lexical cues to past, and manipulating adverbials allows this issue to be addressed. Third, Solt et al. investigated the perceptual difficulty of *-ed* in relation to the three different *-ed* allomorphs only. However, there are several other factors that might make past forms more or less perceptible to listeners. Two such factors are the rate of speech and the surrounding phonological context of the target forms. There is evidence that slowing down the rate of speech may positively influence L2 learners' speech perception (McBride, 2011; Zhao, 1997). The surrounding environment and thus the subsequent sound may also affect perception of the allomorphs—for example, the presence of a vowel rather than a consonant (*walked around* vs. *walked the dog*) (Collins et al., 2009).

The present study set out to address these issues by considering the following variables: (a) context (easy [past + *ed* pronounced [əd] + vowel] as in *waited in line* vs. hard [past + *ed* pronounced [t] or [d] + consonant] as in *walked the dog*), (b) speech rate (normal vs. slowed down), and (c) availability of a time adverbial cue such as *yesterday*, which is either congruent (*walked the dog yesterday*) or incongruent (*walked the dog now*) with the past tense marking. In addition, the performance of L2 learners in all conditions was compared to that of a group of English speakers of similar age, with the overall goal of determining the relative difficulty of perceiving *-ed* by L2 learners. The research questions addressed were as follows:

1. How do a group of L2 francophone learners of English and a comparison group of English speakers perceive the regular past at normal conversational speed in easy and hard contexts?
2. Does slowing down speech rate increase the accuracy with which the simple past is perceived in easy and hard contexts?
3. Do time adverbials (*yesterday*, *now*) influence the perception of past in easy and hard contexts?

## Method

### *Participants*

The participants included two groups of children: 106 francophone L2 learners of English (L2 listeners) and 81 English speakers (English listeners). The L2 listeners (aged 11–12 years) came from two Grade 5 and two Grade 6 classes in different French-medium schools located in francophone neighbourhoods in the greater Montreal area of Quebec, a French-speaking province of Canada. Of the 106 children, 60 came from monolingual francophone households while the remaining 46 spoke at least one other language at home (e.g., Romanian, Arabic, Spanish, Vietnamese). However, all had done their entire elementary

schooling in French, which is the language of school instruction and the only official language in Quebec. At the time of the study, the learners were enrolled in an intensive English as a second language program<sup>2</sup> in which they were exposed to approximately 400 hours of classroom instruction over a 5-month period. The instruction followed a theme-based approach and focused on the development of speaking and listening skills, although explicit teaching of the past morpheme *-ed* occurred. At the time of the study, the L2 listeners had completed approximately 200 hours of the program and were at a low-intermediate level of proficiency.

A group of 81 English listeners of a similar age was recruited to serve as a comparison group for the L2 learners. The intent here was not to imply that English speakers' performance should be the goal for L2 learners. Rather, English speaker data were obtained to determine benchmarks against which L2 performance can be evaluated. The English speakers (aged 12–13 years) were Grade 7 students from three intact classes in an English-medium school located in the greater Toronto area of Ontario, an English-speaking province of Canada. All speakers were English dominant (self-reported and confirmed by their teachers): 16 children came from monolingual English homes; 65 children had another home language (e.g., Hindi, Punjabi, Tamil, Arabic). This ethnic diversity reflects the ethnic and linguistic characteristics of residents in large metropolitan areas such as Toronto and Montreal ([Statistics Canada, 2011](#)), and thus represents an ecologically valid comparison group for the L2 listeners from Montreal. All 81 of the English-speaking children were following regular Grade 7 instruction at the time of the study.<sup>3</sup>

#### *Materials (Perception Tests)*

The materials were created from a set of 32 three-word phrases, each consisting of a frequent regular verb followed by a noun phrase or an infinitival complement (e.g., *correct a paper, loved to dance*). Frequent verbs are defined here as verbs used in written and oral narratives by L2 learners with the same learning profile as those in the present study ([Collins & White, 2011](#)). The 32 phrases were organized into two sets, one with the verbs in the base form (present), the other with the verbs in the past form (for a total of 64 three-word phrases).<sup>4</sup> In each set, half of the phrases featured verbs in perceptually easy contexts, the other half targeted verbs in perceptually hard contexts. Following previous literature ([Collins et al., 2009](#); [Labov, 1969](#); [Solt et al., 2003](#); [Wolfram, 1985](#)), easy contexts were defined by a combination of two criteria: the past forms of verbs had to be marked by the [əd] allomorph (*correct, want*), and the following word (usually a determiner)

had to begin with a vowel (*correct/corrected a paper, want/wanted every ice-cream*). In hard contexts, the past forms of verbs had to be marked by either the [t] or [d] allomorphs (*help, love*), with the following word beginning with a consonant (*help/helped the lady, love/loved to dance*). Thus, the past tense forms in the easy contexts featured both a separate syllable morpheme<sup>5</sup> (*correc-ted*) and a vocalic context that favours the release of the verb-final stop (*corrected a paper*). In contrast, the past tense morphemes in the hard contexts could be either co-articulated with the following consonant or reduced as part of consonant cluster reduction processes (*searched for gold, helped the lady*). It is important to note that there are several additional factors that may affect the pronunciation of the simple past morpheme. For example, *-ed* is more likely to be fully pronounced if the preceding sound is a glide (e.g., *died*) (Solt et al., 2003). However, in the present study, we were only interested in easy and hard contexts as defined above.

In addition, a comparable set of control materials was created with a unique set of 16 three-word phrases with verbs in the progressive form (*kissing each cheek, surprising my family*). It seemed likely that both participant groups would have little difficulty detecting the *-ing* morpheme perceptually because it is an early-acquired form that is always encoded as an intact syllable, even when phonologically modified, for example via n-develarization: *goin'* (Collins et al., 2009). Thus, performance on these control items was intended to serve as a way to determine if the participants had understood and were performing the task as intended.

All phrases were digitally recorded as part of a longer list by a male native speaker of North American English (age 29) using a Plantronics (DSP-300) microphone. The speaker was instructed to speak at a regular conversational speed. The phrases were subsequently saved individually in a digital format and normalized for peak amplitude; they were not edited in any other way and were thus representative of the acoustic-phonetic variability found in regular conversational English speech.

The recorded phrases were organized into three tests. The first test included the original phrases spoken at a normal conversational speed (henceforth, conversational test). The second test contained the phrases slowed down by 30% using a time expansion algorithm of the *Cool Edit 2000* (Johnston, 1999) speech-editing software (henceforth, slowed speech test). The phrases were slowed synthetically to ensure (a) a 30% slow down for each phrase in Test 2, and (b) identical input between Test 1 and Test 2 save speech speed. The algorithm modified the audio signal by uniformly lengthening all speech by 30% without altering the original pitch contour. Pilot testing, conducted before the

study, revealed that phrases that were time-expanded by more than 30% sounded unnatural. Therefore, utterances expanded by 30% sounded natural but, as intended, were perceptibly slower than the original, unmodified stimuli. The conversational and slowed speech tests each contained 48 three-word phrases (items) with 16 verbs in the present form (8 easy context, 8 hard context), 16 verbs in the past form (8 easy context, 8 hard context), and 16 progressive control verbs. In both tests, participants listened to each phrase, then marked whether they had perceived *-ed*, *-ing*, or nothing. The third and final test comprised 32 three-word phrases that followed the same structure as the above tests but excluded the progressive items. Each phrase also included the adverbial *now* or *yesterday*, which was digitally added at the end of the phrase (henceforth, adverbial test). Half of the items on this test included an adverbial that was congruent with the morphology (e.g., *wait in line now*, *used the dictionary yesterday*) while the other half included an adverbial that was incongruent with the morphology (e.g., *listened to music now*, *cheat on exams yesterday*). Participants listened to each phrase, then marked whether they had perceived *-ed* or nothing. The progressive verbs were excluded from this test as the objective was to investigate whether the participants relied on adverbials at the expense of morphology for simple forms only. This test, therefore, consisted of only 32 items.

Within each test, all items were randomized, then recorded onto a CD. Pilot testing led to the decisions to leave a 6-second gap between the end of one item and the subsequent item and to record an item number (spoken by a different speaker) to help orient the listeners. Across the tests, each verb appeared equally often in different verb forms and in easy and hard contexts. Sample items from each test are provided in the Appendix.

#### *Procedure*

The three perception tests, which took approximately 30 minutes in total to complete, were administered in one session to a full class during regular class time. The tests were always administered in the same order so that the participant groups could be matched for effects of prior exposure: the conversational test was given first, followed by the slowed speech test, then the adverbial test. Between tests, the participants listened to an audio-recorded short humorous story narrated by a native speaker of English to provide a break and to maintain participant interest. The two stories contained verbs in the past tense, but none of them were included in the perception tests. The instructions for each test were printed in English in separate response booklets distributed to each student, and were also given orally and visually (on

the blackboard) by the experimenter before the beginning of each test. The participants were told that they would hear several short phrases and were asked to listen carefully to the first word, which was always a verb, and to decide whether they heard the *-ed* ending (as in *waited* or *dropped*), the *-ing* ending (as in *waiting* or *dropping*), or no ending (as in *wait* or *drop*) by circling the correct answer (*-ED*, *-ING*, *-X*) in the response booklet. Thus, each of the three perception tests was a forced-choice identification task. The response booklet for each test contained 12 rows of response alternatives on each page printed in a large font (*-ED*, *-ING*, *-X* for the first two tests and *-ED*, *-X* for the adverbial test), for a total of 48 items for the conversational and slowed speech tests and 32 items for the adverbial test. To ensure the participants had understood the instructions, a four-item practice session was conducted before each test. The practice session simulated the real test and demonstrated that the *-ed* responses did not need to be fully phonetically realized. In other words, completion of the practice session ensured that the participants understood that the *-ed* response did not need to be fully enunciated for it to be chosen. After the practice test, any remaining questions about the procedure were clarified. The audio tracks for practice sessions, perception tests, and humorous stories were played to participants using a high-quality CD player (e.g., SHARP Executive Mini System or equivalent), with volume adjusted to a comfortable level before testing.

#### *Data Analysis*

The dependent variable used in all analyses was perceptual identification rate, or the accuracy with which the participants correctly perceived the verb ending. In the conversational and slowed speech tests, perceptual identification rates were calculated for present/past tokens in easy and hard contexts. In the adverbial test, perceptual identification rates were computed for present/past tokens in easy and hard contexts, separately for congruent and incongruent adverbials. A single identification rate was computed for present and past tokens because accurate perception of past-tense morphology involves not only accurate identification of past tokens (*-ED* response) but also accurate identification of present tokens (*-X* response); in other words, one needs to detect when the *-ed* occurs and when it does not occur. In all cases, identification rates were defined as the total number of correct responses divided by the total number of verb tokens in each category. For all statistical tests reported below, the alpha level for significance was set at .05. The effect sizes reported below are partial eta squared ( $\eta_p^2$ ), calculated by dividing the effect sum of squares by the effect sum of squares plus the error sum of squares. For *t*-tests,

**Table 1.** Perceptual identification rates (standard deviations) for the preliminary analysis comparing Grade 5 and 6 participants

Condition	Grade 5	Grade 6
Conversational speech		
Easy	.56 (.16)	.58 (.19)
Hard	.57 (.12)	.55 (.11)
Slowed speech		
Easy	.63 (.13)	.64 (.14)
Hard	.51 (.12)	.52 (.13)
Congruent adverbial		
Easy	.93 (.15)	.85 (.18)
Hard	.81 (.23)	.73 (.26)
Incongruent adverbial		
Easy	.33 (.29)	.42 (.24)
Hard	.25 (.28)	.35 (.28)

effect sizes are reported as  $r$ . A Bonferroni procedure was applied to adjust the level of significance for all tests of simple main effects.

## Results

### *Preliminary Analyses*

Prior to comparing perception accuracy between the two listener groups, three preliminary analyses were performed. The first two analyses examined whether particular background characteristics of the participants affected their perception accuracy. We first compared the performance of the L2 listeners from Grade 5 ( $n = 57$ ) to the performance of the L2 listeners from Grade 6 ( $n = 49$ ). L2 instruction for learners starting intensive EFL in Grade 5 and Grade 6 is the same, but due to age differences, it is possible that these two cohorts differed in their perception accuracy (see [Table 1](#) for summary statistics). Independent-samples  $t$ -tests, conducted to compare the Grade 5 and 6 L2 listeners, revealed no differences,  $t(104) < 1.81, p > .07$ .

In both listener groups, there was a proportion of children who spoke at least one other language at home, in addition to French (for listeners from Quebec) or English (for listeners from Ontario). In the next analysis, we therefore compared the performance of children that spoke only English or French to children that spoke a language other than English or French in the home, separately within the groups of L2 listeners and English speakers (see [Table 2](#)). These analyses revealed no significant differences for either mono- and multilingual L2 listeners in Montreal,  $t(104) < 1.70, p > .09$ , or the mono- and multilingual English listeners in Toronto,  $t(79) < 1.40, p > .16$ . Therefore, in all

**Table 2.** Perceptual identification rates (standard deviations) for the preliminary analysis comparing monolingual and multilingual participants

Condition	L2 listeners		English listeners	
	Monolingual	Multilingual	Monolingual	Multilingual
Conversational speech				
Easy	.59 (.17)	.57 (.18)	.87 (.14)	.88 (.08)
Hard	.57 (.10)	.56 (.14)	.68 (.13)	.69 (.10)
Slowed speech				
Easy	.63 (.13)	.64 (.14)	.82 (.10)	.83 (.10)
Hard	.50 (.13)	.53 (.11)	.66 (.11)	.67 (.10)
Congruent adverbial				
Easy	.91 (.16)	.87 (.17)	.88 (.22)	.98 (.05)
Hard	.79 (.24)	.76 (.25)	.83 (.16)	.79 (.17)
Incongruent adverbial				
Easy	.33 (.26)	.42 (.29)	.67 (.20)	.63 (.23)
Hard	.28 (.28)	.33 (.29)	.47 (.27)	.38 (.23)

further analyses, the data were analyzed for the entire groups of 106 L2 listeners and 81 English listeners.

The third preliminary analysis focused on the participants' perception of the control progressive *-ing* morpheme to ensure they had completed the tests as intended. As expected, both participant groups showed high identification rates for the *-ing* morpheme: 98–99% correct ( $SD = .04-.05$ ) for the English listeners and 86–89% correct ( $SD = .11-.13$ ) for the L2 listeners. English listeners were overall significantly more accurate than L2 listeners in the conversational test,  $t(185) = 6.37$ ,  $p < .001$ ,  $r = .42$ , and this difference remained significant in the slowed speech test,  $t(185) = 8.15$ ,  $p < .001$ ,  $r = .51$ . However, the *-ing* identification rates were high overall ( $\geq 86\%$  correct). These rates, along with the researcher's (first author's) observation that the participants successfully completed each practice session demonstrated that all participants understood task directions and performed the tests as intended.

#### *Conversational Speech*

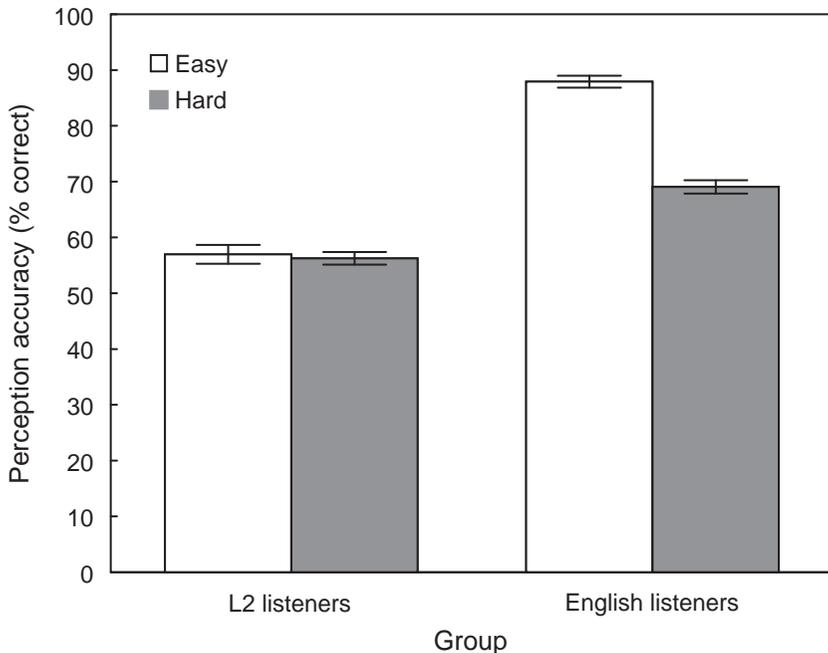
Table 3 summarizes the accuracy data for present/past tokens in the conversational test. These data were analyzed using a two-way repeated-measures analysis of variance (ANOVA), with group (L2 listeners, English listeners) as a between-subjects factor and context (easy, hard) as a within-subjects factor. This analysis revealed a significant main effect for group,  $F(1, 185) = 208.38$ ,  $p < .001$ ,  $\eta_p^2 = .53$ , a significant main effect for context,  $F(1, 185) = 67.76$ ,  $p < .001$ ,  $\eta_p^2 = .27$ , and a significant two-way interaction,  $F(1, 185) = 58.02$ ,  $p < .001$ ,  $\eta_p^2 = .24$ . In other words, on the conversational test, English listeners and L2 listeners had significantly different scores. Furthermore, both groups of listeners

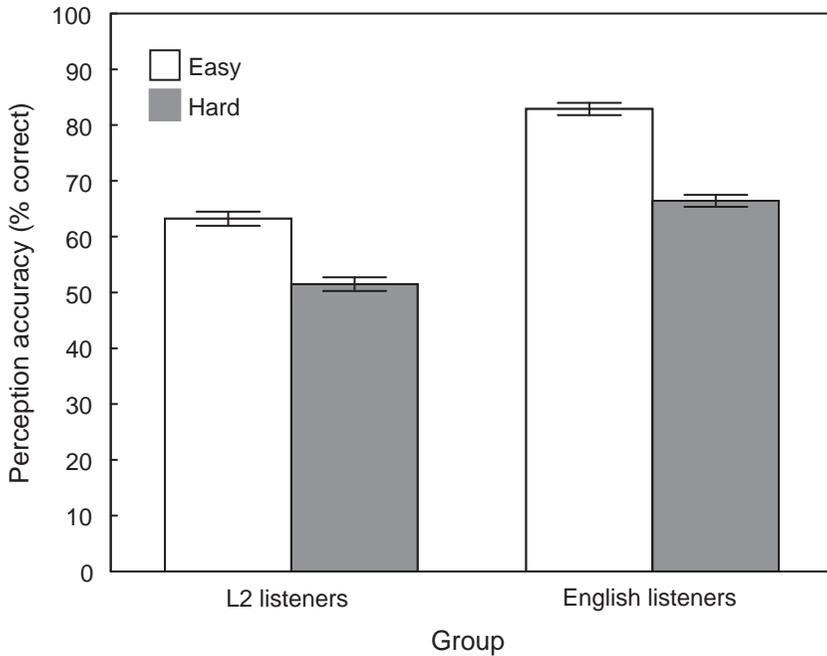
**Table 3.** Perceptual identification rates (standard deviations) for present/past tokens in the conversational and slowed speech tests as a function of context

Group	Conversational speech		Slowed speech	
	Easy	Hard	Easy	Hard
L2 listeners	.57 (.17)	.56 (.12)	.63 (.13)	.52 (.12)
English listeners	.88 (.10)	.69 (.11)	.83 (.10)	.66 (.10)

were significantly more accurate at perceiving *-ed* in easy contexts than hard contexts. Finally, the English listeners were significantly more accurate than the L2 listeners in both easy and hard contexts.

The significant interaction, which is depicted graphically in [Figure 1](#) (with accuracy rates expressed as percentage correct), was examined further. As [Figure 1](#) shows, English listeners were overall more accurate than L2 listeners, which was consistent with the significant main effect of group ( $p < .001$ ); they also showed an effect of context,  $t(80) = 14.81$ ,  $p < .001$ ,  $r = .86$ , perceiving the *-ed* morpheme more accurately in the easy than in the hard context. In contrast, L2 listeners did not show an effect of context,  $t(105) = .40$ ,  $p = .69$ , demonstrating poor accuracy in

**Figure 1:** Perception accuracy in easy and hard contexts for present/past verb tokens spoken at a normal conversational speed. Brackets enclose  $\pm 1$  SE.



**Figure 2:** Perception accuracy in easy and hard contexts for present/past verb tokens embedded in slowed speech. Brackets enclose  $\pm 1$  SE.

both contexts (about 60% correct). These findings suggest that perception of past in conversational speech, in the absence of contextual or lexical cues, is challenging for all listeners, especially L2 learners.

#### *Slowed Speech*

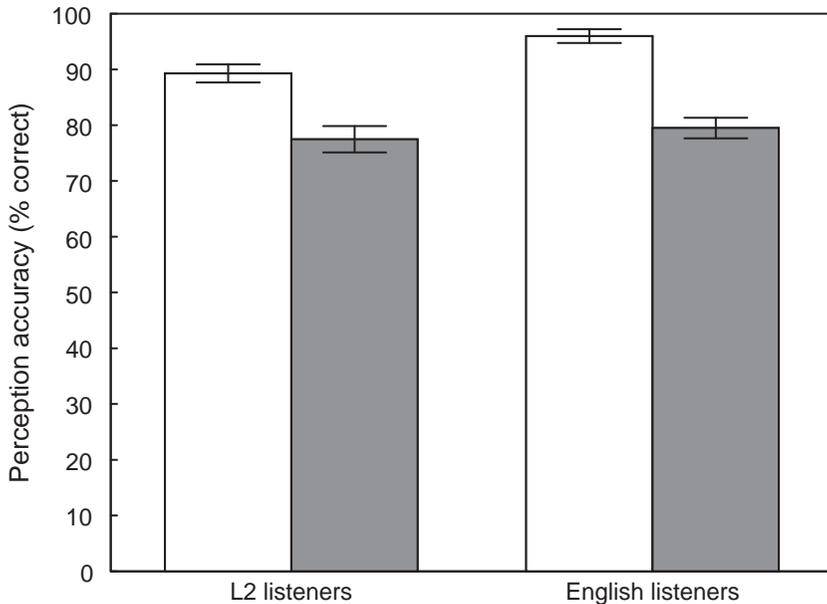
The accuracy data for present/past tokens in the slowed speech test (summarized in [Table 3](#)) were analyzed using a repeated-measures ANOVA with the same factors as above. This analysis revealed a significant main effect for group,  $F(1, 185) = 166.83, p < .001, \eta_p^2 = .47$ ; a significant main effect for context,  $F(1, 185) = 168.73, p < .001, \eta_p^2 = .48$ ; but no significant two-way interaction ( $p > .05$ ). The participants' accuracy rates from this test are plotted in [Figure 2](#). As this figure shows, English listeners overall outperformed L2 listeners ( $p < .001$ ), and both groups perceived the *-ed* morpheme more accurately in the easy than in the hard context ( $p < .001$ ). However, a comparison of the participants' performance in the conversational and slowed speech tests (see [Table 3](#) and [Figures 1](#) and [2](#)) indicated that slowing speech down had limited benefits, in that it was only beneficial for the L2 listeners, and only in the easy context,  $t(105) = 3.55, p = .001, r = .33$ .

**Table 4.** Perceptual identification rates (standard deviations) for present/past tokens in the adverbial test as a function of context

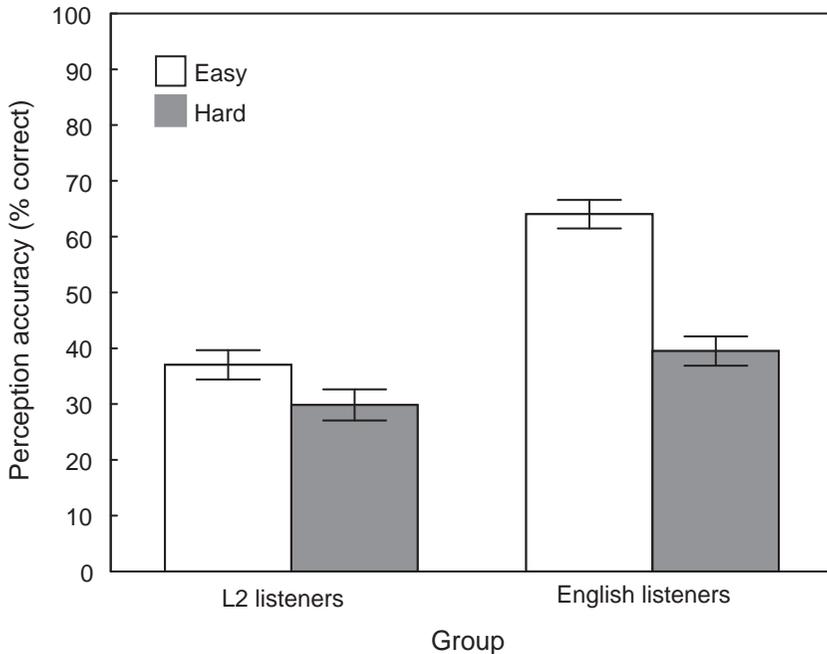
Group	Congruent adverbial		Incongruent adverbial	
	Easy	Hard	Easy	Hard
L2 listeners	.89 (.17)	.77 (.24)	.37 (.27)	.30 (.29)
English listeners	.96 (.11)	.80 (.17)	.64 (.23)	.40 (.24)

### *Time Adverbials in Conversational Speech*

**Table 4** summarizes the accuracy data for present/past tokens in the adverbial test. These data were analyzed in two repeated-measures ANOVAs, separately for present/past tokens with congruent and incongruent adverbials. As in previous analyses, group (L2 learners, English speakers) served as a between-subjects factor and context (easy, hard) as a within-subjects factor. For congruent adverbials, the ANOVA revealed a significant main effect only for context, with morphology being more easily perceived in the easy context than in the hard context,  $F(1, 185) = 97.37, p < .001, \eta_p^2 = .35$ . There was no significant main effect for group or a significant interaction ( $p > .05$ ). These data are depicted graphically in **Figure 3**. Thus, when time adverbials



**Figure 3:** Perception accuracy in easy and hard contexts for present/past verb tokens spoken at a normal conversational speed with congruent time adverbials. Brackets enclose  $\pm 1$  SE.



**Figure 4:** Perception accuracy in easy and hard contexts for present/past verb tokens spoken at a normal conversational speed with incongruent time adverbials. Brackets enclose  $\pm 1$  SE.

were congruent with present/past tokens, both L2 listeners and English speakers performed similarly, perceiving the *-ed* morpheme more accurately in the easy context (89–96% correct) than in the hard context (77–80% correct).

In contrast, for incongruent adverbials, the ANOVA revealed a significant main effect for group,  $F(1, 185) = 26.45$ ,  $p < .001$ ,  $\eta_p^2 = .13$ ; a significant main effect for context,  $F(1, 185) = 123.61$ ,  $p < .001$ ,  $\eta_p^2 = .40$ ; and a significant two-way interaction,  $F(1, 185) = 36.93$ ,  $p < .001$ ,  $\eta_p^2 = .17$ . This significant interaction, which is plotted in [Figure 4](#), was explored further. As this figure shows, L2 listeners' perception of the *-ed* morpheme was essentially below chance (which was 50% in a two-alternative identification task), regardless of the context. This was also true for English listeners' perception in the hard context; their accuracy rates in this context were no different from those of L2 listeners ( $p > .05$ ). Only in the easy context did English listeners attain above-chance identification (64% correct). Thus, when time adverbials were incongruent with present/past tokens, both L2 learners and English speakers were largely unsuccessful at making correct

perceptual identification decisions based on morphological marking. This implies that L2 learners and, to a large degree, English speakers of a similar age tend to rely on lexical adverbials (when those are available) to help in the perception of the *-ed* morpheme in normal conversational speech.

### Discussion

The research questions asked how low-intermediate English L2 learners and English speakers of a similar age perceive the regular past at normal conversational speed, and whether slowing down speech rate and manipulating time adverbials affect perception. At normal conversational speed, L2 learners perceived *-ed* with the same degree of accuracy (60% correct) in phonetic environments that made the morpheme more salient (easy contexts) and less salient (hard contexts). Slowing down speech helped them to perceive *-ed* in easy contexts only. The English speakers perceived *-ed* accurately in easy contexts (88% correct) but had more difficulty in hard contexts (69% correct); slowing down speech had no effect. When an adverbial cue that matched the verb was included at normal conversational speed, both groups were more accurate than when no adverbial was present, and this accuracy was dependent on context (easy vs. hard) for both groups. When an incongruent adverbial was added, performance by both groups was significantly negatively affected.

#### *L2 Learners and the Perceptual Salience of the Regular Past*

The present study demonstrates that the perception of *-ed* is challenging for L2 learners of English. In normal conversational speed, *-ed* was heard only just over half of the time. Collins et al. (2009) showed that learners may not receive very much aural input of regular past tense in language classrooms, and if they then only detect the past-tense morpheme in half of the examples contained in the input, the opportunities for learning are infrequent. It is also important to highlight that the learners in the present study were halfway through a 400-hour intensive English program, and, as noted above, were at a low-intermediate level at the time of data collection. Learners with lower proficiency or with the limited exposure that characterizes many typical classroom contexts for L2 language learning (short periods over a long amount of time) may have even more difficulty perceiving the regular past morpheme as they have even fewer opportunities to hear it. Indeed, Solt et al.'s (2003) finding that lower-proficiency learners performed worse on all measures relative to higher-proficiency learners demonstrates that proficiency plays a role in perceptual salience.

These perceptual findings have implications for future research focused on effective approaches to teaching the *-ed* form of the past tense. It may be that asking learners to produce the *-ed* at early stages of learning is less important than giving them opportunities to perceive it in different contexts. An additional issue is the point at which improved perceptual ability translates into improved productive ability, and the degree to which complementary production practice may be helpful and/or needed. Research focused on these issues would inform the ongoing debate concerning the importance of both comprehension and production practice for language development (DeKeyser & Sokalski, 1996; Trofimovich, Lightbown, Halter, & Song, 2009; VanPatton & Cadierno, 1993).

Based on the present findings that document differences in perception between easy and hard contexts, future research is needed to understand whether there are also differences between the perceptual difficulty of [t] and [d]. Solt et al. (2003) found that L2 learners, in general, heard past tense [t] with more accuracy than [d]. Furthermore, the pronunciation of regular verbs ending in [t] or [d] is not constant. When the preceding segment is vocalic (a vowel as in *lied*, or a liquid as in *yelled*), the final morpheme is more likely to be pronounced. In the present study, analyses of this type were not possible, as the choice of verbs was driven by their familiarity to our sample of learners to better ensure that all lexical content of utterances was known. However, it could be that perception difficulties are far more nuanced than the simple distinction employed in the present study between easy and hard contexts. For example, the easy context in this study was defined by a combination of a separate-syllable morpheme [əd] followed by a vowel (as in *waited in line*), but it is unclear whether *-ed* might be harder to detect when a separate-syllable morpheme [əd] is followed by a consonant (as in *weighted the categories*). In addition, the perceptual difficulty of *-ed* may also depend on the lexis employed. Verbs that are more frequently employed in the past simple than in the present simple may be easier to perceive in the input regardless of the surrounding environment. Clearly, future research needs to focus on developing and fine-tuning a difficulty hierarchy with respect to the perceptual difficulty of *-ed* in English.

The finding that slowing down speech only helped L2 learners hear *-ed* in easy contexts is interesting in light of a common observation that speakers frequently slow down speech when interacting with learners. This result contrasts with the overall findings in favour of slowing down speech to improve message comprehension (Griffiths, 1990; Jensen & Vinther, 2003; McBride, 2011; Zhao, 1997). Previous research has demonstrated that slowing down speech appears to

contribute more to bottom-up processing (e.g., [Jensen & Vinther, 2003](#)), which refers to the decoding of acoustic input, word recognition, and parsing, than to top-down processing, which refers to the use of general world knowledge and contextual information for message comprehension. Our findings clarify these previous results by showing that slowed speech may be of little benefit if the target form is realized in a phonological context that favours reduction or indistinct articulation (e.g., the hard contexts in the present study) and that excludes other lexical or contextual details. In future studies, therefore, it is important to determine whether slowed speech can help learners acquire morphology when included in meaningful, classroom-based listening comprehension activities.

The present study demonstrated that L2 learners rely heavily on adverbial cues. When adverbial cues were congruent with verbal morphology, they were able to accurately identify *-ed* nearly 80% of the time. However, incongruent adverbial cues led to chance performance. This adds more evidence that L2 learners process meaning before, and possibly at the expense of, form when both lexis and morphology encode the same semantic information ([Doughty & Williams, 1998](#); [Sato, 1986](#); [VanPatten, 1996, 2004a](#)). However, further research is needed to clarify the role of incongruent adverbials in the perception of the allomorphs. In hard contexts (as defined in this study and/or in terms of allomorph reduction or transition based on the surrounding phonological environment), participants may imagine they have not perceived *-ed* due to the incongruent adverbial. Likewise, in easy contexts, the inclusion of the incongruent adverbial may lead participants to ignore what they would have otherwise perceived. In other words, the inclusion of incongruent adverbials, rather than an overall reliance on meaning over form, may have played a role in the findings.

The finding that L2 learners rely heavily on adverbial cues raises several questions concerning the teaching of verbal morphology, including whether input in L2 materials should force the processing of *-ed* by removing lexical cues to past temporality. Input processing research conducted by VanPatten and colleagues (e.g., [VanPatten, 2004b](#)) has demonstrated that encouraging learners to attend to certain aspects of form as part of learning materials can positively impact their language development ([VanPatten & Cadierno, 1993](#)). For example, [Benati \(2005\)](#) found that Greek and Chinese learners of English were significantly better at comprehending regular past tense verbs when taught using processing instruction (instruction that emphasizes the processing of morphosyntactic cues as part of learning activities) rather than when taught using meaning-based output instruction or traditional instruction, which do not always require that the past tense

verbal morphology be processed for task completion. It appears, then, that instruction that emphasizes the perceptual/acoustic properties of past-tense morphology in English (ideally through meaningful activities) would be beneficial in helping learners improve their perception of *-ed*. What needs to be clarified in further research is how the relative perceptual difficulty of contexts (e.g., easy, hard) can interact with adverbial cues to help learners acquire the past.

The present study did not investigate frequency factors, but the results have important implications for frequency-based research and pedagogy. In usage-based accounts of L2 acquisition, the frequency of forms and the reliability of their cues in the input are believed to be key factors in explaining the processes of acquisition (e.g., Collins & Ellis, 2009; Valdman, 2002; Wulff, Ellis, Römer, Bardovi-Harlig, & Le-Blanc, 2009). However, if forms are not perceived in the input, or are perceived with varying degrees of difficulty, their raw frequency as documented by analyzing learner-directed speech may overestimate the quantity of encounters they have with different language features. The results from the present study highlight that frequency information should be interpreted alongside perceptual information from a learner perspective to more accurately document the quantity and the quality of input that learners receive. In terms of pedagogy, ensuring certain language features are frequently present in classroom input may be insufficient, and educators should be aware that frequent exposure does not automatically translate into frequent opportunities for learning, which may be particularly so at lower proficiency levels.

#### *English Speakers and the Perceptual Salience of the Regular Past*

The present study's results demonstrate that perceiving the *-ed* is challenging for both English speakers and L2 learners. English speakers were included to establish a performance baseline against which L2 learners' scores could be compared. However, our findings with respect to the English speakers' performance are interesting, as they demonstrate that the cohort of English-dominant speakers tested in this study also find *-ed* difficult to perceive when it is pronounced as [t] or [d] and is followed by a consonant. Furthermore, when another, more perceptible cue for temporality is available (in the present study, an adverbial time marker), this cue is used rather than the *-ed* morpheme. These findings demonstrate that the perceptual difficulty of this form can also be experienced by fluent speakers of English in some contexts.

The finding that perceptual salience affects English speakers' performance highlights the importance of including a comparison group to understand reasonable performance expectations for L2 learners

with our measure. In the present study, the L2 learners perceived *-ed* accurately 56% of the time in hard contexts and 57% of the time in easy contexts. Comparing this to a perfect score of 100% (or 95% and above) does not seem to be realistic because English speakers scored 69% in hard contexts and 88% in easy contexts. In fact, the L2 learners were only slightly less accurate than the English speakers in hard contexts. Seen from this vantage point, the finding that English speakers have difficulty perceiving *-ed* in certain contexts provides a useful benchmark for both teachers and researchers to consider when assessing L2 learners' performance or setting goals for their perception and use of regular past forms. In addition, a better understanding of what cues native speakers use to assign a past tense meaning in a context where the form may be difficult to perceive may provide further guidance on the type of practice and practice contexts that could be beneficial for L2 learners.

### Conclusion

The study reported here addresses the challenge of the regular past for L2 learners. Detecting *-ed* in auditory input appears to be challenging for learners in speech experienced at a normal conversational speed, and slowing down speech has limited benefits; in our study, it helped only in the easier-to-perceive phonological contexts. Furthermore, learners tend to process adverbial cues for past at the expense of *-ed*, as highlighted in chance performance when adverbial cues mismatch past morphology. The findings also demonstrate that English speakers cannot always accurately perceive past *-ed*, particularly in hard contexts. Like L2 learners, they also rely on adverbial cues over verbal morphology, but tend to do so to a lesser degree. Taken together, these findings call for future studies focusing on the perceptual challenge of *-ed* and other morphemes from a learner-centred perspective. Ultimately, gaining a clear understanding of the relationship between the perceptual *-ed* challenge in connected discourse can further our knowledge of how best to teach it.

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### Notes

1. The past morpheme as a separate syllable can be pronounced /əd/ or /ɪd/ depending on the speaker's accent. The audio for the present study was

recorded by a male speaker of standard North American English who pronounced the past morpheme as /əd/. As such, this form has been used throughout this paper.

2. As there were few opportunities for exposure to English outside of class, English could be considered a foreign rather than a second language.
3. There is an age difference between the L2 listeners (Grades 5 and 6) and the English listeners (Grade 7). However, this study did not aim to investigate differences in perception between these two groups of listeners. Rather, the study aimed to further understanding of how L2 listeners perceive *-ed* under different conditions. The L1 data provided benchmarks only and, as such, we do not believe the age difference to be problematic for the interpretation of the results.
4. Although a larger sample of target items would have been preferable, the final set of 64 target phrases was constrained by several factors. First, the number of common verbs marked by a separate syllable in the past (/əd/) is limited. Second, all verbs presented to L2 learners needed to be familiar to them (verbs were chosen based on their use by students of intensive programs in oral and written narratives). Finally, the listening tests needed to be manageable in length so that they could be administered to school-age listeners within regular class time.
5. The morpheme itself is not a separate syllable, but when preceded by a /t/ or /d/, this sound plus the morpheme becomes a separate syllable.

## References

- Bardovi-Harlig, K. (2000). *Tense and aspect in second language acquisition: Form, meaning, and use*. Oxford, UK: Blackwell.
- Bardovi-Harlig, K., & Reynolds, D.W. (1995). The role of lexical aspect in the acquisition of tense and aspect. *TESOL Quarterly*, 29(1), 107–131. <http://dx.doi.org/10.2307/3587807>
- Bayley, R. (1994). Interlanguage variation and the quantitative paradigm: Past tense marking in Chinese English. In S. Gass, E. Cohen, & E. Tarone (Eds.), *Research methodology in second language acquisition* (pp. 157–181). Hillsdale, NJ: Erlbaum.
- Benati, A. (2005). The effects of processing instruction, traditional instruction and meaning-output instruction on the acquisition of the English past simple tense. *Language Teaching Research*, 9(1), 67–93. <http://dx.doi.org/10.1191/1362168805lr154oa>
- Cadierno, T. (1995). Formal instruction from a processing perspective: An investigation into the Spanish past tense. *Modern Language Journal*, 79(2), 179–193. <http://dx.doi.org/10.1111/j.1540-4781.1995.tb05430.x>
- Collins, L. (2002). The roles of L1 influence and lexical aspect in the acquisition of temporal morphology. *Language Learning*, 52(1), 43–94. <http://dx.doi.org/10.1111/1467-9922.00177>

- Collins, L., & Ellis, N. (Eds.) (2009). Input and second language construction learning: Frequency, form, and function [Special issue]. *Modern Language Journal*, 93.
- Collins, L., Trofimovich, P., White, J., Cardoso, W., & Horst, M. (2009). Some input on the easy/difficult grammar question: An empirical study. *Modern Language Journal*, 93(3), 336–353. <http://dx.doi.org/10.1111/j.1540-4781.2009.00894.x>
- Collins, L., & White, J. (2011). An intensive look at intensity and language learning. *TESOL Quarterly*, 45(1), 106–133. <http://dx.doi.org/10.5054/tq.2011.240858>
- DeKeyser, R., & Sokalski, K. (1996). The differential role of comprehension and production practice. *Language Learning*, 46(4), 613–642. <http://dx.doi.org/10.1111/j.1467-1770.1996.tb01354.x>
- Doughty, C. & Williams, J. (Eds.). (1998). *Focus on form in classroom second language acquisition*. Cambridge, UK: Cambridge University Press.
- Dulay, H., & Burt, M. (1974). Natural sequences in child second language acquisition. *Language Learning*, 24(1), 37–53. <http://dx.doi.org/10.1111/j.1467-1770.1974.tb00234.x>
- Goad, H., White, L., & Steele, J. (2003). Missing inflection in L2 acquisition: Defective syntax or L1-constrained prosodic representations? *Canadian Journal of Linguistics*, 48(3), 243–263. <http://dx.doi.org/10.1353/cjl.2004.0027>
- Goldschneider, J.M., & DeKeyser, R.M. (2001). Explaining the “natural order of L2 morpheme acquisition” in English: A meta-analysis of multiple determinants. *Language Learning*, 51(1), 1–50. <http://dx.doi.org/10.1111/1467-9922.00147>
- Griffiths, R. (1990). Speech rate and NNS comprehension: A preliminary study in time-benefit analysis. *Language Learning*, 40(3), 311–336. <http://dx.doi.org/10.1111/j.1467-1770.1990.tb00666.x>
- Jensen, E.D., & Vinther, T. (2003). Exact repetition as input enhancement in second language acquisition. *Language Learning*, 53(3), 373–428. <http://dx.doi.org/10.1111/1467-9922.00230>
- Johnston, D. (1999). *Cool Edit 2000* [Computer software]. Phoenix, AZ: Syntrillium Software.
- Labov, W. (1969). Contraction, deletion, and inherent variability of the English copula. *Language*, 45(4), 715–762. <http://dx.doi.org/10.2307/412333>
- Lardiere, D. (2003). Second language knowledge of [+/-Past] vs. [+/-Finite]. In J. M. Liceras, H. Zobl, & H. Goodluck (Eds.), *Proceedings of the 6th Generative Approaches to Second Language Acquisition Conference (GASLA 2002): L2 Links* (pp. 176–189). Somerville, MA: Cascadilla Press.
- McBride, K. (2011). The effect of rate of speech and distributed practice on the development of listening comprehension. *Computer Assisted Language Learning*, 24(2), 131–154. <http://dx.doi.org/10.1080/09588221.2010.528777>
- McDonald, J.L., & Roussel, C.C. (2010). Past tense grammaticality judgement and production in non-native and stressed native English speakers. *Bilingualism: Language and Cognition*, 13(04), 429–448. <http://dx.doi.org/10.1017/S1366728909990599>

- Rundell, M., & Fox, G. (2002). *Macmillan English dictionary for advanced learners*. Oxford, UK: Macmillan.
- Sato, C. (1986). Conversation and interlanguage development: Rethinking the connection. In R.R. Day (Ed.), *Talking to learn: Conversation in second language acquisition* (pp. 23–45). Rowley, MA: Newbury House.
- Solt, S., Pugach, Y., Klein, E.C., Adams, K., Stoynezhka, I., & Rose, T. (2003). L2 perception and production of the English regular past: Evidence of phonological effects. In A. Brugos, L. Micciulla, & C. Smith (Eds.), *Proceedings of the 28th Annual Boston University Conference on Language Development* (pp. 553–564). Somerville, MA: Cascadilla Press.
- Statistics Canada. (2011). *Linguistic characteristics of Canadians*. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2011/rt-td/index-eng.cfm>
- Trofimovich, P., Lightbown, P., Halter, R., & Song, H. (2009). Comprehension-based practice: The development of L2 pronunciation in a listening and reading program. *Studies in Second Language Acquisition*, 31(04), 609–639. <http://dx.doi.org/10.1017/S0272263109990040>
- Valdman, A. (Ed.). (2002). Introduction [Special issue on frequency effects in SLA]. *Studies in Second Language Acquisition*, 24(02). <http://dx.doi.org/10.1017/S0272263102002012>
- VanPatten, B. (1996). *Input processing and grammar instruction*. Norwood, NJ: Ablex.
- VanPatten, B. (2004a). Input processing in second language acquisition. In B. VanPatten (Ed.), *Processing instruction* (pp. 325–335). Mahwah, NJ: Erlbaum.
- VanPatten, B. (2004b). *Processing instruction: Theory, research, and commentary*. Mahwah, NJ: Erlbaum.
- VanPatten, B., & Cadierno, T. (1993). Explicit instruction and input processing. *Studies in Second Language Acquisition*, 15(02), 225–243. <http://dx.doi.org/10.1017/S0272263100011979>
- Wolfram, W. (1985). Variability in tense marking: A case for the obvious. *Language Learning*, 35(2), 229–253. <http://dx.doi.org/10.1111/j.1467-1770.1985.tb01026.x>
- Wulff, S., Ellis, N., Römer, U., Bardovi-Harlig, K., & LeBlanc, C. (2009). The acquisition of tense-aspect: Converging evidence from corpora, cognition, and learner constructions. *Modern Language Journal*, 93(3), 354–369. <http://dx.doi.org/10.1111/j.1540-4781.2009.00895.x>
- Zhao, Y. (1997). The effects of listeners' control of speech rate on second language comprehension. *Applied Linguistics*, 18(1), 49–68. <http://dx.doi.org/10.1093/applin/18.1.49>

## Appendix

### *Sample items from the conversational and slowed speech tests*

adopted a baby	easy past
intimidated a witness	easy past
noted all names	easy past
wanted every ice-cream	easy past
returned their book	hard past
kissed the boy	hard past
continued through life	hard past
smiled for fun	hard past
insult our friends	easy present
waste each piece	easy present
inject an arm	easy present
kid around school	easy present
pass the salt	hard present
realize the error	hard present
search for gold	hard present
serve more people	hard present
believing a lie	progressive
surprising all people	progressive
playing their piano	progressive
laughing for hours	progressive

### *Sample items from the adverbial test*

pretended at home yesterday	easy past	congruent
corrected a paper yesterday	easy past	congruent
protected each student now	easy past	incongruent
rated up five now	easy past	incongruent
helped the lady yesterday	hard past	congruent
tried to win yesterday	hard past	congruent
pitched the ball now	hard past	incongruent
remembered my birthday now	hard past	incongruent
list all items now	easy present	congruent
wait in line now	easy present	congruent

bat it wide yesterday	easy present	incongruent
cheat on exams yesterday	easy present	incongruent
dream during class now	hard present	congruent
marry three times now	hard present	congruent
kick the ball yesterday	hard present	incongruent
watch two movies yesterday	hard present	incongruent