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Competing Cues: A Corpus-based Study of the English Tense-Aspect in Second Language Acquisition

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1. Introduction

Current work on the acquisition of tense and aspect has its roots in the morpheme order studies of the 1970s. These studies looked at the acquisition of verb morphology by L2 learners of English in terms of the accuracy of tense-aspect inflections in obligatory contexts (Dulay & Burt, 1972; Bayley, 1994; Larsen-Freeman, 1975). Although these studies often identified universal orders across learners, they failed to provide an explanation for the observed orders. One exception is the analysis by Goldschneider and DeKeyser (2005) that tried to explain the natural order of six grammatical forms by taking account of the interaction of the five factors of perceptual saliency, semantic complexity, morphophonological regularity, syntactic category, and frequency. This analysis concluded that saliency is the most important of the five factors. However, for each of the six grammatical forms that were analyzed, there were other factors that could have played a possibly more important role in influencing their order of acquisition.

Klein (2009) categorized temporal devices into two categories: macro-level devices (tense, grammatical aspect, lexical aspect, temporal adverbials, syntactic structure, discourse structure) and micro-level devices (morphological inflection, phonological saliency). In the present study, we focus on the effects of four of these factors — morphological inflection, lexical aspect, and phonological saliency. The device of *morphological inflection* in English refers to the distinction between regular verbs and irregular verbs.

Lexical aspect refers to the aspectual properties of verbs or verb phrases. The most widely adopted categorization of the lexical aspect in the studies of tense-aspect acquisition is Vendler's (1967) classification system. Vendler (1967) classified verbs and verb phrases into four categories with respect to the temporal properties they encode: states, activities, accomplishments, and achievements. Both states and activities are classified as atelic verbs, whose semantic feature does not include an ending point. In contrast, both accomplishments and achievements are categorized into telic verbs, whose semantic feature encodes an inherent ending point.

The term *phonological saliency*, which often is used interchangeably with *perceptual saliency*, refers to how easy it is to hear or perceive a given structure (Goldschneider & DeKeyser, 2005). Typically, phonological saliency is treated as a factor influencing listeners' processing of input. Dulay and Burt (1978) pointed out that "perceptual saliency is an input factor that has not as yet been

precisely defined” (1978, p. 73). This same difficulty persists today, although there is an ongoing recognition of the importance of this factor. The coding scheme designed by Goldschneider & DeKeyser (2005) was one of the first efforts to systematically operationalize perceptual saliency. They decomposed perceptual saliency into three subfactors: the number of phones in the functor (phonetic substance), the presence/absence of a vowel in the surface form (syllabicity), and the total relative sonority of the functor. Yet, phonological saliency can also be considered as a factor influencing speakers’ language production such as in tense-aspect acquisition studies (Wolfram, 1985; Bayley, 1994). These various analyses lead to the proposed Phonological Saliency Hypothesis (PSH) that will be discussed in the next section.

2 Literature Review

2.1 Aspect Hypothesis

Within the study of second language acquisition of tense-aspect marking, the bulk of recent research has focused on the evaluation of the impact of the Aspect Hypothesis (AH). This hypothesis predicts a relationship between grammatical and lexical aspect. Lexical aspect is typically characterized in terms of the four-way Vendler classification discussed earlier. In the languages that have been examined, grammatical aspect is coded for either perfectivity (perfective-imperfective) or tense (present-past). The Aspect Hypothesis describes these general development trends in the tense-aspect first and second language acquisition (Bardovi-Harlig, 2000; Ayoun & Salaberry, 2008):

1. Learners will initially restrict past or perfective marking to achievement and accomplishment verbs (those with an inherent end point) and later gradually extend the marking to activities and then states, with states being the last category to be marked consistently.
2. In languages with an imperfective marker, imperfective past appears much later than perfective past and then is initially restricted to states and activity predicates, then extended to accomplishments, and finally to achievements.
3. Progressive marking is initially restricted to activity predicates, and then extends to accomplishments and achievements.
4. Progressive marking is not incorrectly overextended to states.

So far the most robust cross-linguistic evidence is available for the predicted association between telics (achievements and accomplishments) and perfective markings. L2 learners of English (Bardovi-Harlig, 1998; Bardovi-Harlig & Berstrom, 1996), French (Bardovi-Harlig, 1996), Japanese (Shirai & Kurono, 1998) and Spanish (Andersen, 1991) have been shown to mark past morphology more robustly with achievement verbs and accomplishment verbs than with activity and state verbs. In some studies, however, the predictions of the Aspect Hypothesis have not been supported. Perhaps the strongest counter-evidence comes from the naturalistic L2 learners in the European Science

Foundation corpus (Dietrich et al., 1995) who showed no systematic relation between grammatical marking and lexical semantics. Also, sampling from EFL instructed learners, Ayoun & Salaberry (2008) showed that state verbs were used most frequently in the past tense, contrary to the first prediction of the AH listed above. Additionally, Rohde (1996) reported that German child learners produced *-ing* on both atelic and telic verbs.

Faced with this inconsistent pattern of results, researchers began to consider the possibility that different data analysis methods in AH studies could yield drastically different results. The two major analytical schemes that have been used in this area are the type/token frequency coding scheme and the obligatory context coding scheme. Under the type/token frequency coding scheme, the verbs in learner data are classified *a priori* into different lexical aspectual groups. This judgment of aspectual class is independent of the actual use of verb tense in the learner data (Shirai, 1991). Under the obligatory context coding scheme, the usage of each verb in the learner data is judged as either correct or incorrect according to native speakers' intuition. Comajoan (2006) applied both coding schemes to analyze the same set of learner data and demonstrated that they could lead to different results regarding AH testing. Comajoan's obligatory context analysis of preterite and imperfect forms showed that morphology was used appropriately in almost all contexts regardless of lexical aspect, whereas his frequency analysis provided support for AH. However, Bardovi-Harlig and Bergstrom (1996) demonstrated that both coding schemes led to the confirmation of AH in their learners' performance.

Summarizing, we see that the picture arising from tests of the AH is not as clear as we might wish it to be. The only clear evidence in support of the AH is the early association between perfective and telic verbs. Beyond that, we still need more empirical studies that make use of triangulated data analysis methods to investigate the tense-aspect acquisition by more diverse learner groups.

2.2 Phonological Saliency Hypothesis

The first application of the Phonological Saliency Hypothesis (PSH) to L2 acquisition was conducted Wolfram (1985). He proposed that (a) that irregular verbs would show more tense marking than regular verbs; and (b) that the phonetic shape of the past tense of the verb and the following phonological environment will further determine the likelihood of its exhibiting past tense. Based on oral interviews from Vietnamese learners, Wolfram (1985) found that, among the irregulars, saliency defined as the relative distance between the past and non-past forms influenced their appropriate use. He identified this order of acquisition for past tense marking: (1) suppletives (*be*), (2) internal vowel change with suffix (*sleep/slept*), (3) internal vowel change (*come/came*), and modal (*will/would*), and (4) replatives (*have/had*). As we can see, PSH's prediction covers both morphological inflection (regular vs. irregular) and phonological representation (the ending phonemes).

Bayley (1994) collected oral personal narratives from 20 Mandarin Chinese learners of English in California. These data showed that both phonological saliency and the semantics of verbs are relevant to the acquisition of tense marking. Bayley (1994) found that ‘the more salient the phonetic difference between the past and present tense forms of the verb, the more likely a past-reference verb is to be marked for tense’ (p. 170). He observed the following order of acquisition: (1) suppletive (*be*), (2) internal vowel change with suffix change (*sleep/slept*), (3) internal vowel (*sing/sang*), (4) change in final segment (*send/sent*), and (5) weak syllabic (*pat/patted*). This acquisitional order is generally in line with the developmental order proposed by Wolfram (1985). More importantly, Bayley (1994) found that, although phonological constraints determined the likelihood that a verb would be inflected for the past, the tendency for achievements and accomplishment verbs (telics) to be marked in simple past held regardless of regularity. This seems to suggest that lexical aspect is a stronger factor than phonological factor in predicting L2 learning pattern.

A study by Tajika (1999) contradicts Bayley’s findings. Tajika tested adolescent Japanese learners of English in an instructional setting by asking them to produce three oral past tense narratives. Three factors were found to be important—discourse type, grounding, and sentence structure (e.g., matrix/independent clauses, subordinate clauses)—but neither lexical aspect nor the phonological saliency of verbs turned out to be significant factors in the past tense marking rate of these learners.

Summarizing the PSH studies, we observe that these studies predicted a hierarchy of past tense marking based on their phonological saliency in the learners’ oral production. However, PSH studies suffer from a few limitations. First, these studies only focused on past tense markings and relied on obligatory context coding scheme as the data analysis method. Second, the developmental order inferred in PSH studies suffered from limitations that they were based on very few instances of the target forms (Bardovi-Harlig, 2000). Studies with a larger sample size are needed to strengthen the power of its predictions.

2.3 Theoretical Framework: The Unified Model

These results suggest that attempts to account for the order of acquisition of tense-aspect marking that only pay attention to lexical aspect will be incomplete. In particular, we believe that a fuller account must examine the roles of morphological inflection and phonological saliency, in addition to lexical aspect. In order to characterize the interaction of these four factors, we adopt the framework of the Unified Model (MacWhinney, 2008). The Unified Model argues that processing is based on the competition between cues deriving from the arenas of phonology, morphosyntax, lexicon, syntax, and mental model interpretation. Different cues carry different cue strengths, and these cue strengths change across the process of language learning. The cue with the greatest cue strength is the dominant cue in the selection of markings in

production and the selection of interpretations in comprehension. In the present study, we operationalize cue strength as a cue's capability of contributing to the accuracy rate in the performance in the obligatory context.

3. Research Questions

- (1) Does the acquisition of English tense-aspect marking by advanced Chinese EFL learners follow the prediction of the Aspect Hypothesis and Phonological Saliency Hypothesis?
- (2) What is the interaction between lexical aspect, morphological inflection and phonological saliency?

4. Methodology

The present study is a corpus analysis of oral narrative data taken from the Spoken and Written English Corpus of Chinese Learners (SWECCL 1.0) (Wen, Wang & Liang, 2005). SWECCL is the first large-scale oral and written corpora of English majors in China. The selected oral narrative data is a collection of the National Test for English Majors (TEM Level 4) in China over a span of seven years (1996-2002). The students included in this study are second-year English majors. The oral narrative task in the TEM Level 4 is a story retelling task, in which students are given some time to read a piece of narrative text and then to retell the story when the reading material is taken away. The reading materials are narrated in the simple past except for one verb identified in the simple present form. Since story retelling requires students to faithfully represent the original texts, we decide on the simple past as the default obligatory context of all verb usages.

We transformed the corpus to CHAT format and used the software CLAN and BBEdit for data analysis. For lexical aspect, we adopted the diagnosis test of classifying lexical aspect of verbs (Shirai, 1991). For morphological inflection, we coded two categories based on the predictions of the Phonological Saliency Hypothesis (PSH): regular and irregular verbs. Regulars and irregulars are coded separately for phonological saliency. Regular verbs were classified into two categories: syllabic verbs and non-syllabic verbs. The syllabic verbs refer to verbs whose ending phoneme of the past marking is pronounced as /ɪd/ (e.g., *decided*, *started*), whereas the non-syllabic verbs refer to verbs whose ending phoneme of the past marking is pronounced as /d/ (e.g., *opened*, *closed*) or /t/ (e.g., *passed*, *finished*). According to PSH, since the syllabic verbs bear a vowel in its past marking, they are phonologically more salient than the non-syllabic verbs and therefore more likely to show past marking in the performance. Irregular verbs are classified into three categories ranking from the more phonologically salient past marking to the less salient one: (1) Internal vowel change plus suffix change (e.g., *sleep-slept*); (2) Only internal vowel change (e.g., *come-came*); (3) Others (e.g., *send-sent*, *go-went*). Finally, to calculate the

accuracy use of past tense markings, we adopt Pica's (1983) scoring method of Target-Like Use (TLU):

$$TLU = \frac{n \text{ correct suppliance in obligatory contexts}}{(n \text{ obligatory contexts}) + \frac{(n \text{ suppliance in nonobligatory contexts})}{2}}$$

Altogether, 1,142 student files and 20086 tokens are coded for lexical aspect and appropriateness of use. To carry out detailed statistical analysis, we randomly selected 117 student files and divided them (median division) into two proficiency groups based on the accuracy rate of past tense marking of each student file, since we want to see if the two proficiency groups manifest similar or different behavioral patterns. We will report results from both the 1142-file data 117-file corpora.

5. Results

5.1 Research Question One: AH and PSH Testing

5.1.1 Aspect Hypothesis (AH) Testing

We found that, among all the 1142 student files, the advanced Chinese EFL learners' tense markings across the four lexical aspects are compatible with the prediction of the Aspect Hypothesis (Table 1). First, based on token frequency, (1) past tense morphology is predominantly associated with achievements, and (2) progressive aspect is more associated with activity verbs. These findings reinforce the AH especially with its prediction of the progressive marker -ing. Second, based on the accuracy rate of the obligatory context, we find that achievement verbs show the highest accuracy rate (64.3%) among the four lexical aspects.

Table 1: Tense markings across four lexical aspects

	States	Activities	Accom	Achievements	Total
Past	2353	961	417	8068 (68.38%)	11799
-ing	34	425 (53.80%)	16	315	790
-s	190	85	8	303	586
Base	2179	609	268	3855	6911
Total No.	4756	2080	709	12541	20086
Accuracy	49.5%	46.2%	58.8%	64.3%	59%

Among the 117 sampled files, using the accuracy rate of obligatory context, we found that lexical aspect was a significant factor in interpreting the learner data (see Table 2). Telic verbs (accomplishment and achievement verbs) show a significant higher accuracy rate of past tense marking than atelic verbs (state and activity verb) (p-value= .0001). Even with a significant group effect (p-value= .0001), both groups performed significantly better with telic verbs than atelic verbs. But there is no interaction effect between aspect and group (p-value= .294). In order to make sure that the significant difference between telics and atelics is not due to frequency effect, we applied the Kucera and Francis (1967) word frequency list and calculated both the stem frequency and inflected frequency of all the coded verbs. We found that the mean frequencies (stem frequency=455.1; inflected frequency=354.5) of the coded state verbs in the study are more than twice the numbers of the achievement verbs (stem frequency=147.0; inflected frequency=159.4). Thus frequency is not an important factor in predicting learner performance in our study.

Table 2: Output of factorial two-way ANOVA (117 sample files) – Aspect

Tests of Between-Subjects Effects

Dependent Variable: Accuracy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.888 ^a	3	.296	21.234	.000	.217
Intercept	17.816	1	17.816	1277.566	.000	.847
Group	.186	1	.186	13.335	.000	.055
Aspect	.677	1	.677	48.543	.000	.174
Group * Aspect	.015	1	.015	1.107	.294	.005
Error	3.207	230	.014			
Total	21.789	234				
Corrected Total	4.096	233				

a. R Squared = .217 (Adjusted R Squared = .207)

5.1.2 Phonological Saliency Hypothesis (PSH) Testing

5.1.2.1 Morphological Inflection: Regulars vs. Irregulars

Based on the PSH prediction, the accuracy rate of irregular verbs' past tense marking should be higher than that of the regular verbs. This is confirmed in our analysis of the total 1142 files with the mean accuracy rates of the irregulars and regulars as 61.6% and 53.6% respectively. In the 117 files analysis, two-way factorial ANOVA result (Table 3) shows a marginally significant effect of

morphological inflection ($p = .059$). Although there is a significant group effect ($p = .001$), both the high and low proficiency groups show better performance with the past tense marking of irregular verbs than regular verbs.

Table 3: Output of two-way ANOVA (117 sample files) – Morphology

Tests of Between-Subjects Effects

Dependent Variable: Accuracy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.248 ^a	3	.083	4.818	.003	.059
Intercept	17.816	1	17.816	1039.140	.000	.819
Group	.186	1	.186	10.846	.001	.045
Regularity	.062	1	.062	3.607	.059	.015
Group * Regularity	.000	1	.000	.018	.895	.000
Error	3.943	230	.017			
Total	21.884	234				
Corrected Total	4.191	233				

a. R Squared = .059 (Adjusted R Squared = .047)

5.1.2.2 Phonological Saliency: Regular verbs and Irregular verbs

5.1.2.2.1 Phonological Saliency: Within the Regular Verbs

Based on the PSH's prediction, the regular verbs with syllabic phoneme ending /ɪd/ (e.g., *decided*) should perform better in terms of past tense marking than those with non-syllabic phoneme endings /d/ (e.g., *closed*) and /t/ (e.g., *asked*). This prediction is not confirmed in the total 1142 file analysis. Non-syllabic phoneme ending verbs show higher mean accuracy rate of past marking (65.2%) than syllabic phoneme ending verbs (50.29%). The two-way factorial ANOVA analysis of the 117 files (Table 4) showed a significant difference between syllabic and non-syllabic phoneme ending verbs ($p = .017$) and also a significant group effect ($p = .023$). Further one-way within-subjects ANOVA analysis of each group showed that the lower group performed significantly better with non-syllabic ending verbs than syllabic ending verbs. In contrast, the higher group performed better with syllabic ending verbs than non-syllabic ending verbs, but this distinction is not significant.

Table 4: Output of factorial two-way ANOVA (117 sample files) - Regulars
Tests of Between-Subjects Effects

Dependent Variable: Accuracy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.678 ^a	3	.226	6.864	.000	.082
Intercept	15.779	1	15.779	479.314	.000	.676
Group	.171	1	.171	5.203	.023	.022
Phonology	.191	1	.191	5.801	.017	.025
Group * Phonology	.294	1	.294	8.942	.003	.037
Error	7.571	230	.033			
Total	23.917	234				
Corrected Total	8.249	233				

a. R Squared = .082 (Adjusted R Squared = .070)

5.1.2.2.2 Phonological Saliency: Within the Irregular Verbs

As discussed previously, the PSH categorizes three types of irregular verbs based on saliency of the ending phonemes: (1) internal vowel change plus suffix change (e.g., sleep-slept); (2) only internal vowel change (e.g., come-came); (3) others (e.g., send-sent, go-went). To use abbreviated labels, the PSH predicts a hierarchical order of past tense marking of the three categories of verbs: suffix > internal > others. A two-way factorial ANOVA analysis did not show a significant difference between the three categories ($p = .128$). Contrary to the PSH prediction, both groups' performance of irregular verb past marking follows the same order: others > internal > suffix (Figure 1), and there is a significant group effect ($p = .002$)

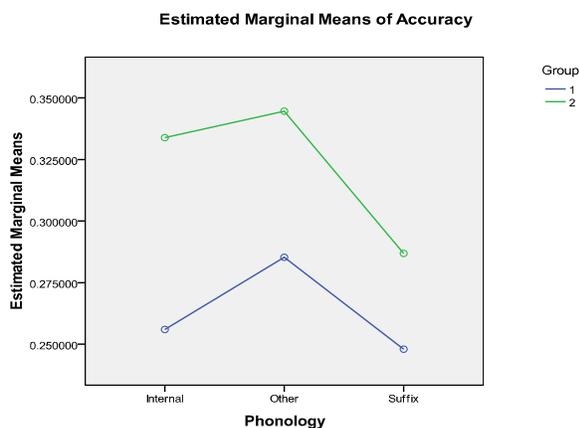


Figure 1: Plot output of factorial two-way ANOVA (117 files) – Irregulars

5.2 Research Question Two: Interaction between the Three Factors

A two-way within-subjects ANOVA analysis of the 117 files showed a significant interaction effect between lexical aspect and morphological inflection ($p = .012$). Our analysis of the total 1142 files suggested a telic-regular and atelic-irregular combination (Table 5): within atelic verbs, irregular verbs showed a higher accuracy than regular verbs; within telic verbs, regulars showed a higher accuracy. In terms of past tense marking, telic verbs are the stronger category in lexical aspect whereas regular verbs are the weaker category in morphological inflection.

Table 5: Accuracy rate of regular and irregular verbs (percentage)

Aspect	Atelic verbs				Telic verbs			
	States		Activities		Accomplish.		Achievements	
Morph.	Reg.	Irre.	Reg.	Irre.	Reg.	Irre.	Reg.	Irre.
Past	36.7	58.8	42.9	71.2	71.9	37.9	68.3	62.9

A two-way within-subjects ANOVA also showed a significant interaction effect between lexical aspect and phonological saliency within the irregular verbs ($p = .0001$). The output plot also suggested a similar strong-weak combination between aspectual strong category (telic) and phonologically weak category (others) and vice versa. But we failed to find neither significant interaction between aspect and phonology ($p = .312$) nor similar strong-weak combination within the regular verbs. Nonetheless, the finding of these strong-weak combinations enriched our understanding of how the three factors complement and balance with each other in learners' performance.

6. Discussion and conclusion

Summarizing the results of both the total 1142 files and the 117 sampled files, we found that lexical aspect is the strongest and most consistent factor in predicting the learners' performance in both of the two proficiency levels even when frequency effect is considered. Thus the Aspect Hypothesis is confirmed in the present study of advanced Chinese EFL students' tense-aspect acquisition.

Morphological inflection, which encodes the distinction of regular and irregular verbs, is a marginal significant factor in influencing the learners' performance. Both proficiency groups performed better with irregular verbs than regular verbs in past tense marking. Phonological saliency, which describes the phonological feature of the inflected past form, is found to be a significant factor only in regular verbs but not in irregular verbs. Contrary to the prediction of the Phonological Saliency Hypothesis, our study suggested that, the low proficiency learners performed better with the phonologically less salient forms than with the more salient forms in both regular and irregular verbs. The high proficiency group, in comparison, shows better performance with the more salient forms in

irregular verbs, though the difference is not significant. Nonetheless it suggests that with lower proficiency students, it is not phonological saliency but phonetic complexity that strongly influences the learner performance. We suspected that the lower level students are still struggling with articulation of the English words. The phonologically less salient forms, which are phonetically easier to pronounce, are more likely to be articulated correctly by the learners. Once they move beyond to a higher level of phonological sensitivity towards the English language, phonological saliency plays a more important role in predicting the learner performance.

Last but not least, we observed a series of strong-weak combination in the interaction between the three factors. This challenges the intuitive assumption that the combination of strong cues produce better learning outcome. Our results suggest that, among the competing cues, sometimes a strong cue needs to balance with a weak cue so as to produce more reliable outcome. This finding enriches our knowledge of the process of cue competition: second language learners' interlanguage may contain a balancing mechanism that mediates and adjusts conflicting cues to generate better performance.

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