

# L2 Acquisition of Wh-Features and Syntactic Constraints: Evidence for Full-Access Approaches

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## 1. Introduction

This paper presents an experimental study to re-evaluate the Feature Interpretability Hypothesis (see Hawkins & Hattori, 2006; Tsimpli & Dimitrakopoulou, 2007; Tsimpli & Mastropavlou, 2007), a theory of learnability in adult Second Language Acquisition (SLA) that has received a substantial amount of attention in SLA research. Proponents of the Feature Interpretability Hypothesis (henceforth the Interpretability Hypothesis) adopt a distinction from the Minimalist Program (MP) in syntactic theory (Chomsky, 1995, 2001 & thereafter) and postulate that the L2 acquisition of uninterpretable syntactic features, which are purely syntactic and interface independent in nature, is subject to an early critical period, a time when one has complete access to the inventory of features made available by Universal Grammar (UG):<sup>1</sup> “in this theory, the domain of the functional lexicon in the Language Faculty (FL) ceases to be accessible once first language acquisition is complete.” (Tsimpli & Dimitrakopoulou 2007, p. 217). Therefore, after the so-called critical period during which a child constructs a mental lexicon by acquiring feature values/specifications for their native language, an L2 learner has access only to those uninterpretable syntactic features which are directly instantiated in their L1. Given this, acquiring native-equivalent competence in any new uninterpretable syntactic features (those features absent in the learner’s L1) is argued to be ‘impossible’ after the critical period and apparent native-like performance by L2ers does not imply that they have developed native-equivalent underlying grammatical representations: “by hypothesis, there is a permanent ‘loss of capacity to acquire’ in this domain” (Hawkins & Hattori, 2006, p. 273). In contrast to uninterpretable syntactic features, interpretable features can be fully acquired regardless of whether L2 acquisition takes place before or after the proposed critical period. Thus, the Interpretability Hypothesis assumes partial access to UG in post-childhood L2 acquisition.

Evidence for the Interpretability Hypothesis has been reported in a variety of studies conducted in different L2 learning environments (e.g., Hawkins & Hattori, 2006; Tsimpli & Dimitrakopoulou, 2007 and references therein). In a study involving Greek L2 speakers of English (intermediate and advanced proficiency), Tsimpli and Dimitrakopoulou (2007) present results to show that Greek native speakers have difficulty attaining native-equivalent competence in English wh-questions. They argue that this difficulty arises from a typological distinction between the two languages, which can be attributed to different uninterpretable features: Greek uses resumptive agreement in wh-questions that is absent in English. Due to this syntactic difference, Greek learners would find it difficult to abandon their L1 resumptive strategy (acquiring a new feature specification) in forming English wh-questions and

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<sup>1</sup> Abbreviations used in this paper: Adv/L2= Advanced Second Language Learners, AP=Advanced proficiency L2 speakers, CP= Complementizer Phrase, DAT=Dative Case, ECP= Empty Category Principle, FL= Language Faculty, INDEF= Indefinite, Inter/L2= Intermediate Second Language Learners, IP= Intermediate proficiency L2 speakers, LD= Long Distance, L1= First Language, L2= Second Language, MP= Minimalist Program, NP= NATIVE Speakers, NOM= Nominative Case, Q= question; RD= Representational Deficit, SD = Standard Deviation, SLA= Second Language Acquisition, TP=Tense Phrase, TVT= Truth Value Judgment Task ,UG= Universal Grammar.

instead end up producing non-target-like structures. Tsimpli and Dimitrakopoulou (2007) showed that the same is true even for advanced learners of English, implying a permanent ‘loss of capacity’ to acquire in this domain, according to Tsimpli and Dimitrakopoulou’s view.

Hawkins and Hattori (2006, henceforth H&H) conducted a similar study involving Japanese native speakers acquiring (L2) English wh-questions. English and Japanese are typologically distinct in the way they form wh-interrogatives. In English wh-questions, the complementizer (C) consists of an uninterpretable syntactic feature (following Adger 2003, they name this feature *uw̄h\**) responsible for the overt movement of a wh-phrase from its interpretation site to Spec(ifier), CP (i.e. English is an overt wh-movement language). However, the same feature is absent in C in Japanese, as evidenced by the fact that wh-phrases do not undergo overt wh-movement in Japanese (i.e. Japanese is a wh-in-situ language). Given this, H&H hypothesized that not only would Japanese speakers show difficulty in the acquisition of English wh-questions, but they would also not be sensitive to syntactic properties that are dependent upon the uninterpretable *uw̄h\** feature that triggers overt wh-movement. In a Truth Value Judgment Task (TVT) testing 19 English L2 (Japanese L1) speakers and a control group of 11 English monolinguals, H&H found that the performance of Japanese L1 speakers in their experimental test was distinct from that of native speakers in a statistically significant way, and they argued that this result implied that the acquisition of the English uninterpretable wh-feature (*uw̄h\**) is problematic for L2 learners of English (L1 speakers of Japanese).

The Interpretability Hypothesis is a Representational Deficit (RD) account; it assumes that at least part of the observed divergence in performance between native speakers and L2ers results from a representational deficit in narrow syntax. Representational Deficit accounts differ from Full Access approaches (e.g., Campos-Dintrans, Pires & Rothman 2014; Epstein, Flynn & Martohardjono, 1996; Schwartz & Sprouse, 1996; White, 1989, 2003) in the way UG constrains the development of interlanguage (L2) grammars. Full Access approaches assume that L2 learners have access to the complete inventory of features (along with related syntactic operations and principles) of UG without any restrictions imposed by a critical period. More importantly, Full Access approaches maintain that native-like cognitive representations are indeed possible in L2 syntax despite a Poverty of the Stimulus (Chomsky, 1982) situation: “L2 learners acquire complex and subtle properties of language that could not have been induced from the L2 input” (White, 2003, p. 22). Still, proposals supporting Full Access to UG can differ in terms of what they assume to be the initial state of L2 acquisition. For instance, Schwartz and Sprouse’s (1996) Full Transfer/Full Access Hypothesis proposes that the initial state of L2 acquisition consists of the morpho-syntactic system of the learners’ L1. In contrast, Epstein, Flynn and Martohardjono (1996) assume that L2 acquisition is not different from L1 acquisition in terms of what constitutes the initial state of language acquisition. The initial state for both L1 and L2 is UG itself. Despite these differences, approaches supporting Full Access to UG in L2 do not predict intrinsic difficulties in the domain of uninterpretable syntactic features. Given this, not only are L2ers expected to be able to reset parameters or acquire new feature specifications for uninterpretable syntactic features, but their ability to acquire the corresponding native-equivalent underlying representations cannot be permanently lost due to the time of onset of L2 acquisition.

This paper re-evaluates the predictive and explanatory power of the Interpretability Hypothesis regarding the acquisition of wh-questions and corresponding locality constraints (Subjacency and Superiority) by Sinhala Native Speakers acquiring L2 English. The L2 acquisition of English wh-questions by Sinhala native speakers, similar to the acquisition of L2 English by Japanese native speakers in Hawkins and Hattori (2006), meets the three criteria proposed in Campos-Dintrans, Pires & Rothman (2014) for testing the explanatory adequacy of RD accounts: (i) given that Sinhala is a wh-in-situ language, acquiring competency in English wh-questions requires the acquisition of a new uninterpretable syntactic feature in the target L2, (ii) this feature and the syntactic constraints associated with it cannot be learned from the input alone and (iii) those constraints associated with English wh-questions are not explicitly taught in language classes. In order to re-evaluate the Interpretability Hypothesis, we conducted two experiments—a Truth Value Judgment Task (TVT), and a Grammaticality Judgment Task (GT)—with 38 L2 speakers of English (Sinhala L1 speakers) and a control group of 31 English native speakers. We present here a summary of the results of the experiment involving the Truth Value Judgment Task (TVT), which is a replication of a similar task carried out by Hawkins and Hattori (2006). The results from the TVT that we present here clearly reveal, contra predictions of RD accounts, that advanced L2 speakers show sensitivity to the Subjacency constraint that governs the syntax and interpretation of English wh-questions with overt

wh-movement.<sup>2</sup> This indicates that the L2 English learners have acquired the relevant uninterpretable *uwh\** syntactic feature that triggers the application of Subjacency, despite its non-instantiation, at least in the same syntactic domain, in the L1 syntax. Based on these results, we will argue that the reconfiguration of uninterpretable syntactic features is possible in adult L2 acquisition and the acquisition of those features is not intrinsically restricted by an early critical period for language acquisition, challenging RD accounts.

The rest of this paper is structured as follows. Section 2 provides an overview of the relevant syntactic properties and differences between wh-questions in English and Sinhala. Section 3 presents the methodology and the results of the experimental study. In Section 4, we present our experimental results and discuss their theoretical implications.

## 2. The Syntax of Wh-questions

English and Sinhala are distinct regarding the way wh-interrogatives are formed. As it is extensively discussed in the generative literature, English is an overt wh-movement language. A single wh-phrase initially merged inside the vP domain (site of theta-interpretation) in non-echo questions subsequently undergoes overt syntactic movement to its surface position, the specifier of the Complementizer Phrase (CP), where it is pronounced. This is illustrated in (1) and (2) below:<sup>3</sup>

- (1) [CP What did [TP Siri [vP read *t<sub>i</sub>* yesterday? ]]]  
 (2) [TP Mary wondered [CP what<sub>*i*</sub> [TP Siri [vP read *t<sub>i</sub>* yesterday.]]]]

Sinhala, in contrast, is a wh-in-situ language (e.g. Gair, 1998; Gair & Sumangala, 1991; Hettiarachchi, 2015; Kishimoto, 2005): in the unmarked case a wh-phrase always stays in its first merged position in narrow syntax.

- (3) [CP [ TP siri [vP mokak də kiyeww-e ?]]]  
       Siri.NOM what Q read.PAST-E  
       What did Siri read?  
 (4) [TP mary [CP [ TP siri [vP mokak də kiyeww-e kiyəla] kalpəna-kəla.]]]  
       Mary.NOM Siri.NOM what Q read.PAST-E that wonder.PAST-A  
       Mary wondered what Siri read.

The examples in (3) and (4) show at least two properties associated with Sinhala wh-questions: (i) in the unmarked case, a Q-particle *də* occurs adjacent to the wh-phrase, and (ii) the verb of a wh-question is obligatorily marked by an *-e* suffix (Kariyakarawana, 1998). This is different from declaratives and yes/no questions in Sinhala, which carry an *-a* suffix on the verb, as illustrated in (5) below:

- (5) a. siri potə-k kiyeww-a.  
       Siri.NOM book-INDEF.ACC read.PAST  
       Siri read a book.  
       b. siri potə-k kiyeww-a də?  
       Siri.NOM book-INDEF.ACC read.PRE-A Q  
       Did Siri read a book?

<sup>2</sup> The Grammaticality Judgment experiment shows further supporting results regarding the Superiority constraint that will be reported in another paper.

<sup>3</sup> Under current Minimalist theorizing, traces and indices left after movement are considered violations of the Inclusiveness Condition; in this paper, they are used only for expository purposes. Copies of moved elements have been invoked in most minimalist approaches, and they are compatible with the proposals made here.

The *e*-marking on the verb has been treated as a licensing requirement for the *wh*-element in Sinhala (see Kariyakarawana, 1998). In the absence of *e*-marking, the *wh*-element functions as an existential quantifier (6).

- (6) sita mokak də kiyeww-a.  
 Sita.<sub>NOM</sub> what Q read.<sub>PAST</sub>  
 Sita read something.

Also, it has been assumed that the *-e* suffix in Sinhala “cannot occur unless some constituent not including the verb is focused” in a sentence (Gair & Sumangala, 1991, p. 94). This has led Gair and Sumangala (1991) and Kariyakarawana (1998) to propose that Sinhala *wh*-constructions, by default, are also associated with a focus interpretation.

Similar to mono-clausal, local *wh*-interrogatives illustrated in (1)-(4), complex questions involving Long Distance (LD) *wh*-movement show the same distinction between the two languages. As it is extensively argued in syntactic theory, in a long-distance *wh*-question in English, such as the one illustrated in (7), the *wh*-phrase undergoes overt movement from the position where it is first merged inside the embedded clause to the matrix clause initial position. Lack of overt *wh*-movement yields ungrammaticality in non-echo questions, implying the obligatory nature of this operation (7). Also, as it has been extensively argued in generative syntax, Long Distance (LD) *wh*-movement happens successive cyclically via the embedded Complementizer Phrase (CP):

- (7) a. [<sub>CP</sub> What<sub>i</sub> did [<sub>TP</sub> Siri say [<sub>CP</sub> *t*<sub>i</sub> [<sub>TP</sub> Grace [<sub>VP</sub> bought *t*<sub>i</sub> yesterday?]]]]]  
 b. \* Siri said Grace bought what yesterday? [Non-echo interpretation]

In contrast, in the non-echo question corresponding to (7), Sinhala displays *wh*-in-situ properties:

- (8) [<sub>CP</sub> [<sub>TP</sub> siri [<sub>CP</sub> [<sub>TP</sub> amma [<sub>VP</sub> monəwa də genawa] kiyəla]] kiywe?]]  
 Siri.<sub>NOM</sub> mother.<sub>NOM</sub> what Q bring.<sub>PAST</sub> that say-<sub>E.PAST</sub>  
 What did Siri say (that) mother brought? (Lit. ‘Siri said that mother bought what?’)

### 2.1. Constraints on English *Wh*-Questions

According to Ross (1967), Long Distance (LD) *wh*-movement in English, as in (7), is subject to various island constraints. An ‘island’ is considered a syntactic domain from which an element cannot be extracted. For instance, the following sentence is ungrammatical in English because the complex DP (a DP in which the head noun takes a sentential complement) serves as a barrier for the movement of the *wh*-phrase to the matrix clause initial position, representing a so-called Complex-NP Island:

- (9) \*[<sub>CP</sub> Which car<sub>i</sub> did [<sub>TP</sub> Mary hear [<sub>DP</sub> the rumor [<sub>CP</sub> *t*<sub>i</sub> that you sold *t*<sub>i</sub>?]]]]]

Similar to the Complex NP Island in (9), *wh*-movement is also barred from inside *Wh*-islands: an embedded CP introduced by a *wh*-constituent. This is illustrated in (10) below:

- (10) \*[<sub>CP</sub> How<sub>j</sub> do [<sub>TP</sub> you wonder [<sub>CP</sub> which car<sub>i</sub> [<sub>TP</sub> Sara could buy *t*<sub>i</sub> *t*<sub>j</sub> ]]]].

Huang (1982) observed that adjuncts also constitute islands for *wh*-movement:

- (11) \*[<sub>CP</sub> Who did [<sub>TP</sub> Ravi enter the building [<sub>PP</sub> before [<sub>TP</sub> Jay called *t*<sub>i</sub> ]]]].

Chomsky (1973 and thereafter) proposed a more general constraint to account for the ungrammaticality associated with Ross’ (1967) island violations. This is known as the ‘Principle of Subjacency’,<sup>4</sup> assumed to be a property of UG.

<sup>4</sup> Under Minimalism, Subjacency is subsumed under the Phase Impenetrability Condition/PIC (see Chomsky, 2001). The discussion here is framed in terms of Subjacency, but we take our conclusions to be compatible with an approach that invokes the PIC instead.

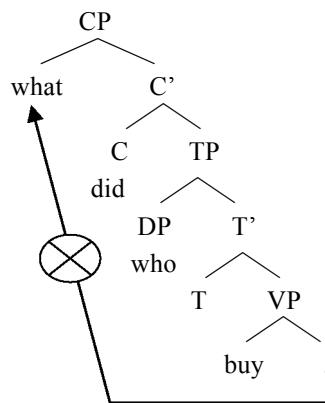
The principle of Subjacency requires that movement be a local operation which takes place in short cycles via intermediate CPs. If a *wh*-phrase crosses more than one bounding node (TP and DP in English) at a time, as illustrated in (12), it violates Subjacency. Subjacency successfully accounts for the ungrammaticality of (12), in which the movement of the *wh*-phrase ‘which car’ from the embedded clause to the matrix CP crosses two bounding nodes: TP and DP.

- (12) \* $[_{CP} \text{Which car}_i \text{ did } [_{TP} \text{ Mary hear } [_{DP} \text{ the rumor } [_{CP} t_i \text{ that you sold } t_i?]]]]]$
- 

In addition to Subjacency, Chomsky (1973, p. 246) observed that in English multiple *wh*-interrogatives, the movement of one *wh*-phrase over the other results in ungrammaticality<sup>5</sup>.

- (13)  $[_{CP} \text{Who}_i [_{TP} t_i [_{VP} [\text{bought what?}]]]]]$

- (14) \* $[_{CP} \text{What}_i \text{ did } [_{TP} \text{ who } [_{VP} \text{ buy } t_i?]]]$



Chomsky (1973) proposed the following condition to account for the type of ungrammaticality in (14):

- (15) Superiority Condition:

- (a) No rule can involve X, Y in the structure:  $..X.. [.. Z...WYV ... ]...$  where the rule applies ambiguously to Z and Y and Z is superior to Y.
- (b) The category A is superior to category B if every major category dominating A dominates B as well but not conversely.

The Superiority condition<sup>6</sup> in (15) imposes a restriction on which *wh*-phrase(s) can undergo movement into the Spec-CP position when a clause contains multiple *wh*-phrases. According to (15), *who* (Z) in (13) and (14) is superior to *what* (Y) given that every major category (i.e. at least every maximal projection) dominating *who* also dominates *what* (i.e. CP and TP) but not conversely (i.e. VP dominates *what*, or its trace position, but not *who*).

## 2.2. Constraints on Sinhala Questions

We observed above that Sinhala is a *wh*-in-situ language (Gair & Sumangala, 1991; Hettiarachchi, 2015; Kishimoto, 2005); in the unmarked case a *wh*-phrase stays in situ in the overt syntax, maintaining e.g. an SOV word order (16) for an object *wh*-question.

<sup>5</sup> We omit reference to the *vP*-internal subject analysis in these examples, although that doesn't circumvent the application of the Superiority condition.

<sup>6</sup> Under Minimalism, Superiority has been subsumed under Relativized Minimality (Rizzi, 1990) or the Minimal Link Condition (Chomsky, 1995). Although we will make reference to Superiority, we take the results presented here to be compatible with either Minimalist approach to Superiority.

- (16) [CP [TP siri [VP mokak də kiyeww-e ?]]].  
 Siri.NOM what Q read.PAST-E  
 What did Siri read?

However, wh-questions in Sinhala, similar to non-wh clauses, also allow the OSV word order, as illustrated in (17) below:

- (17) mokak də siri kiyeww-e ?  
 what Q Siri.NOM read.PAST-E  
 What is it that Siri read?

Even though (17) is superficially similar to an overt wh-question in English, its non-canonical word order in Sinhala is derived through a syntactic operation called scrambling, driven by a different syntactic feature than *uwh\** in C. Following Miyagawa's (2009) proposal for Japanese scrambling, Hettiarachchi (2015) argues that clause initial scrambling in Sinhala (OSV) is triggered by either a topic or focus feature, as further discussed below. As a consequence, scrambling can apply even to non-wh elements in Sinhala, unlike wh-movement in English:

- (18) a. siri potə kiyewwa.  
 Siri.NOM book.ACC read.PAST  
 Siri read the book.  
 b. potə siri kiyewwa.  
 book.ACC Siri.NOM read.PAST  
 The book, Siri read.

It has been argued that wh-displacement, which is optional in Sinhala, is also an instance of scrambling (wh-scrambling) in Sinhala (17) and that it does not exhibit Superiority effects, as shown in (19), unlike wh-movement in English (see Kariyakarawana, 1998, p.145):

- (19) a. siri [kau də mokak də kiwwe kiyəla] kalpəna-kəruwa.  
 Siri.Nom who.NOM what.ACC say-PAST that wonder  
 Siri wondered who said what.  
 b. siri [mokak də kau də  $t_i$  kiwwe kiyəla] kalpəna kəruwa.  
 \*Siri wondered what who said.

If the scrambling in (17) were driven by the same uninterpretable feature as wh-movement in English, the displacement of *mokak* 'what' in (19) would be expected to show sensitivity to Superiority.

Evidence for the absence of overt wh-movement in Sinhala also comes from the status of Subjacency violations. Similar to many other wh-in-situ languages, wh-phrases are allowed inside a variety of syntactic islands in Sinhala (Gair, 1983; Gair & Sumangala, 1991; Kariyakarawana, 1998; Kishimoto, 2005). We illustrate this with the following examples from Kishimoto (2005): Relative clause island (20), Complex DP island (21) and Adjunct island (22), each of which is grammatical in Sinhala in a non-echo question, as opposed to the corresponding overt wh-movement in English:

- (20) [CP oya [DP [CP chitra kaa-tə dunnə ] potə] də kiyewwe]?  
 you Chitra who-DAT gave book Q read  
 \*Who did you read the book that Chitra gave to?
- (21) [CP chitra [DP [CP Ranjith monəwa gatta kiənə] katəkataawə] də əhuwe]?  
 Chitra Ranjith what bought that rumor Q heard  
 \*What did Chitra hear the rumor that Ranjith bought?
- (22) [CP [CP chitra monəwa kanə kəʔə] də Ranjith pudumə unne]?  
 Chitra what ate when Q Ranjith surprise became  
 \*What was Ranjith surprised when Chitra ate?

The absence of Subjacency violations in Sinhala *wh*-in-situ questions is compatible with Huang's (1982) generalization that *wh*-in-situ questions involve LF (*wh*-)movement, which is only sensitive to the Empty Category Principle (ECP), and not Subjacency, unlike overt *wh*-movement (Chomsky, 1981).<sup>7</sup>

This is also compatible with the analysis discussed above that instances of overt displacement of a *wh*-phrase in Sinhala correspond to scrambling, which has been shown not to be sensitive to Superiority violations, as discussed above. In addition, Sinhala scrambling, unlike English A'-movement, is allowed from a variety of syntactic islands in Sinhala, as illustrated in the following examples with a Complex DP Island (23), Adjunct Island (24), and Topic Island (25) (Müller, 2011). In each case, the island violation yields an ungrammatical sentence with topicalization in English, but not in Sinhala.

- (23) [<sub>TopP</sub> karekak [<sub>TP</sub> mamə [<sub>DP</sub> [<sub>CP</sub> sita rajutə t<sub>i</sub> dunna kiyənə] katawə] dannəwa.]]  
 car.INDEF I.NOM Sita.NOM Raju-DAT gift.PAST that story know.PRE  
 \*A car<sub>i</sub>, I know the story that Sita gave (as a gift) t<sub>i</sub> to Raju.
- (24) [<sub>TopP</sub> chitrapatiya [<sub>CP</sub> sunil ti balanə-kota, [<sub>TP</sub> eya-tə parənə katawa-k matak una.]]]  
 movie.ACC Sunil.NOM watch-when he-DAT old story-INDEF remember.PAST  
 \*A movie<sub>i</sub>, Sunil remembered an old story when he watched t<sub>i</sub>.
- (25) a. [<sub>TopP</sub> me karekə [<sub>TP</sub> mamə [<sub>CP</sub> [<sub>TP</sub> taththa malli-tə t<sub>i</sub> dunna kiyəla] dannəwa]]]  
 this car I.NOM father.NOM brother-DAT gift.PAST that know  
 This car<sub>i</sub>, I know that father gifted t<sub>i</sub> to brother.  
 b. [<sub>TopP</sub> me karekəi [<sub>TP</sub> mamə [<sub>TopP</sub> malli-tə taththa t<sub>i</sub> dunna kiyəla] dannəwa]]]  
 This car I.NOM brother-DAT father.NOM gift.PAST that know  
 \*This car<sub>i</sub>, I know that to brother<sub>j</sub> father gifted t<sub>i</sub> t<sub>j</sub>.

In terms of the properties outlined in this section, Sinhala is structurally very similar to Japanese: (i) both languages are *wh*-in-situ languages (lack overt *wh*-movement), (ii) they have *wh*-scrambling which superficially resembles overt *wh*-movement in English, (iii) scrambling does not exhibit Superiority and subjacency effects (iv) *wh*-phrases can occur inside islands. Therefore, considering the predictions of RD accounts (H&H; Tsimpli & Dimitrakopoulou, 2007; Tsimpli & Mastropavlou, 2007), the acquisition of English overt *wh*-movement and corresponding constraints would be expected to pose a learnability problem for Sinhala L1-English L2 speakers, in the same way that they have been argued in H&H to be problematic for Japanese L1 speakers acquiring L2 English.

### 3. Experimental Study

The experiment we present here involved a Truth Value Judgment task (TVT), a slightly modified version of the task used in Hawkins and Hattori (2006). The goal of this experiment was to test the sensitivity of Sinhala/English L2ers to violations of Superiority and Subjacency in English overt LD *wh*-questions, to determine whether they have acquired the *uwh*\* that triggers *wh*-movement in English. It is assumed that the TVT task would allow us to test participants' sensitivity to the two locality constraints on *wh*-questions in a more natural way, targeting the possible ambiguity between a main clause and embedded clause interpretation of a *wh*-phrase, which would be more difficult to test using only a grammaticality judgment task.

#### 3.1. Participants

Thirty-nine L2 speakers of English (L1 Sinhala) in Sri Lanka and a control group of 31 English native controls in the US participated in this study. The mean age of the L2 speakers was 28.3 (SD= 8.6). The mean age of the English monolinguals was 22.2 (SD= 7.5). At the time of the testing, all L2 participants were either studying or teaching in English at a university in Sri Lanka. Native

<sup>7</sup> The ECP specifies that any trace must be properly governed by an antecedent or a lexical head, a constraint that needs to be reformulated under a Minimalist approach.

English controls were recruited from a pool of undergraduates at the University of Michigan, Ann Arbor. In addition to the two experiments and a language background survey, all participants completed an English language proficiency test. This test (a Cloze Test) consisted of 40 test items and was worth 40 points total. Based on the results of the proficiency test, L2 speakers were assigned to two proficiency groups. Participants who scored between 34 and 40 were included in the Advanced Proficiency Group ( $n = 14$ ) while the ones with lower scores (15-33) were included in the Intermediate Proficiency Group ( $n = 23$ ).

### 3.2. Materials and Procedure

The TVT experiment consisted of a series of test items that each included a short background story, followed by a multiple wh-question about the content of the story and two possible answers. Both answers were pragmatically plausible, given the context created by the story. But some answers were grammatically impossible, because the interpretation they corresponded to would require violations of Superiority, Subjacency or both, in the interpretation of the test question. This is illustrated in the sample test item below:

(26) (a) **Story**

James is making plans to go hike the Great Wall of China during the summer. Last Tuesday, James promised to call Lois the following day with the details of the trip, so that Lois can join him too.

(b) **Test Question**

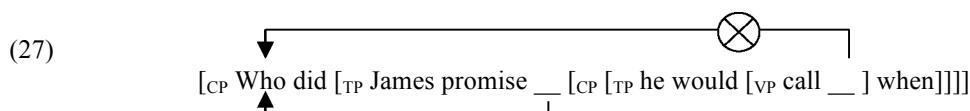
Who did James promise he would call when?

(c) **Answers**

a: James promised that on Wednesday he would call Lois.

b: James promised Lois that he would call on Wednesday.

In this task, participants were asked to choose the most acceptable answer (they had the option to choose one or both answers) to the question that was being asked. Since both answers were always pragmatically possible given the context created by the story, the difference in acceptance or non-acceptance of either answer to the test question relied on whether subjects allowed the fronted wh-phrase in the test question (*who* in (26)) to be interpreted either in the matrix or embedded clause, which was the only difference between the two possible answers. For answer (a) to be accepted in the above example, both *who* and *when* must have scope in the embedded clause. At least according to the standard view in generative syntax (following Chomsky, 1973), this violates the Superiority condition: *who* would have to be generated lower than *when* in the syntactic structure corresponding to the embedded clause interpretation of *who* in (a). For answer (b) to be acceptable, *who* has scope in the matrix clause, while *when* is expected to have scope in the embedded clause; this reading arguably does not yield any syntactic violations. The two readings are illustrated in (27):



As considered by Hawkins and Hattori (2006), we predict that participants who have acquired the [uw<sup>h\*</sup>] will show sensitivity to Superiority and Subjacency violations, choosing answers that do not involve such violations in the interpretation of the test question.<sup>8</sup>

<sup>8</sup> In addition to these two possible answers, the test items used in H&H's study included a third answer which required both wh-phrases to be interpreted in the matrix clause. In our replication (following White, 2007), we avoided this option given that it was not directly relevant to testing the two locality constraints that we focused on in this study. Crucially, the elimination of the third answer reduced the complexity of the task significantly, which could be a confounding factor that negatively affected the performance of the non-native speakers in H&H's study.

Test Condition 1 (four items) involved no violation of either Subjacency or Superiority in the interpretation of the fronted wh-phrase either in the matrix/main clause or the embedded clause. Condition 2 (four items) included a Superiority violation in the embedded clause interpretation of that wh-phrase (26). In Condition 3 (four items), the embedded clause reading was blocked by a Subjacency violation, and in Condition 4 (four items) it was blocked by both Subjacency and Superiority violations.

### 3.3. Results

Figure 1 summarizes participants' mean choices of matrix/embedded readings for the fronted wh-word in each condition. As stated earlier, Condition 1 included complex wh-questions in which either the matrix or embedded reading was predicted to be possible for the fronted wh-phrase without any violations of Superiority or Subjacency. These items allowed us to determine whether L2 participants, similar to native speaker controls, are sensitive to the scopal ambiguity in LD English wh-interrogatives. Our results show that English monolinguals in these cases had a preference, though marginally, for the embedded scope reading (Mean = 0.85, SD = 0.27) over the matrix one (Mean = 0.73, SD = 0.34). Advanced L2ers, in contrast, showed almost no difference in their choices between matrix (Mean = 0.64, SD = 0.34) and embedded readings (Mean = 0.66, SD = 0.32) while the intermediate L2 group displayed a strong preference for the matrix interpretation (Mean = 0.73, SD = 0.30) over the embedded one (Mean = 0.47, SD = 0.36).

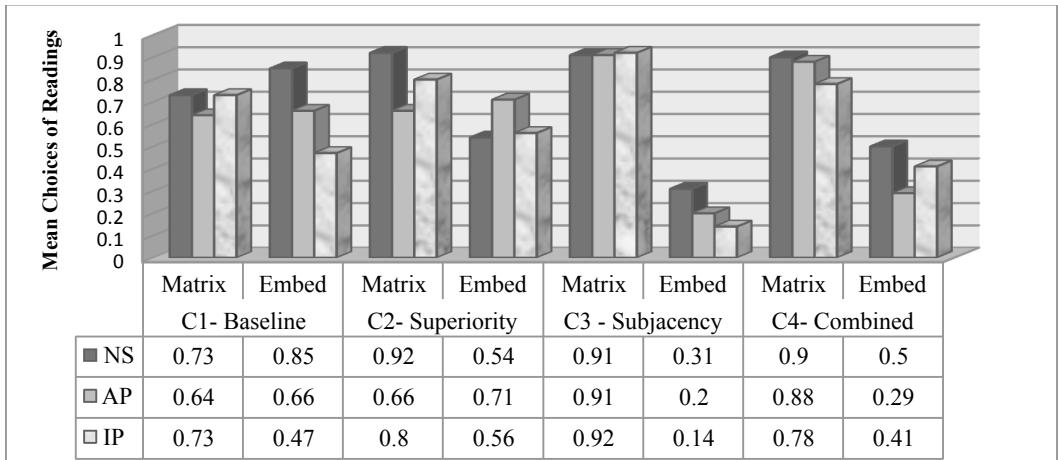
Despite these differences, all three participant groups showed that (i) they were sensitive to the scopal ambiguity in LD wh-movement, and (ii) they can assign both matrix and embedded readings for the fronted wh-word when there is no movement violation involved. Thus, their performance in this condition provided us with a baseline to evaluate participants' scopal assignment in the other three experimental conditions.

We submitted participants' mean choices of embedded/matrix readings to a repeated measures ANOVA, with proficiency as a between subject factor and condition (1 to 4) and interpretation site (matrix vs. embedded clause) as within subject factors. Both by-participant and by-item analyses showed a significant three-way interaction of interpretation site, condition and proficiency ( $F_1(6, 12) = 3.91, p < .001, F_2(6, 24) = 3.43, p < .01$ ) and significant effects of interpretation site ( $F_1(1, 65) = 14.37, p < .001, F_2(1, 12) = 33.82, p < .001$ ), condition ( $F_1(3, 63) = 15.90, p < .001, F_2(3, 12) = 8.08, p < .001$ ) and proficiency ( $F_1(2, 65) = 8.78, p < .001, F_2(2, 11) = 10.80, p < .003$ ). Given that proficiency interacted with the other two factors in question, we conducted separate repeated measures ANOVAs for each participant group. The interaction between interpretation site and condition was significant for native controls ( $F_1(3, 28) = 21.22, p < .001, F_2(3, 12) = 42.34, p < .001$ ) and for advanced L2ers ( $F_1(3, 11) = 12.36, p < .001, F_2(3, 12) = 6.85, p < .006$ ). For intermediate L2ers, this became significant only in the by-participant analysis,  $F_1(3, 20) = 13.61, p < .001, F_2(3, 12) = 2.92, p > .07$ . Overall, these results imply that both L2 groups, similar to our control group, were sensitive to the different scopal possibilities offered by the four conditions.

However, we were specifically interested in whether L2ers would accept an embedded reading in those conditions, which involve a Superiority violation (C2), Subjacency violation (C3) or both (C4), differently from the baseline condition (C1). To answer this question, we conducted several post-hoc tests (paired t-tests and ANOVA when necessary) comparing participants' mean embedded interpretations in the baseline condition (C1) with their own embedded interpretations in each experimental condition (C2 to C4).

Recall that items in the Superiority condition (C2), unlike those in the baseline condition, offered a different possibility in terms of their scopal interpretation for the fronted wh-word: the embedded reading for the matrix wh-word was predicted to be blocked by a Superiority violation, given standard theoretical accounts (see section 2.1). When compared to the baseline condition (Mean = 0.85, SD = 0.27), native speakers' embedded reading in this instance (Mean = 0.54, SD = 0.33) proved to be significantly different,  $t(30) = 4.42, p < .001$ . But this was not different for the advanced L2 group, as their mean embedded interpretation in this condition (Mean = 0.71, SD = 0.31) was not significantly different from their own performance in condition 1 (Mean = 0.66, SD = 0.32,  $t(13) = -0.50, p > .62$ ). The latter was also true for the intermediate group: there was no significant difference between their own embedded interpretation in the baseline condition and the Superiority condition,  $t(22) = -0.85, p > .40$ . According to these comparisons, only native speakers seemed to be sensitive to the Superiority

violations that we tested in the TVT experiment, but this was also affected by the fact that the L2 speakers showed lower preference for the embedded reading in C1 (we return later to further discussion of the results of this condition). Crucially, however, advanced L2ers were not significantly different ( $p > .34$ ) from the native speaker controls in terms of the number of times that they assigned an embedded reading in C2.



**Figure 1:** Mean matrix and embedded (Embed) interpretations of the first wh-phrase for all three participant groups in the TVT. NS (Native), AP (L2 Advanced Proficiency) and IP (L2 Intermediate Proficiency).

Items in C3 were similar to those in C2 except that the embedded reading for the matrix wh-word in these items was predicted to be blocked by a Subjacency violation. In this condition, both L2ers and English monolinguals showed a clear preference for the matrix reading of the first (higher) wh-word. Native controls behaved as predicted, as their performance in this condition significantly differed from their own embedded readings in the baseline condition,  $t(30) = 7.65, p < .001$ . The same was true both for advanced L2ers ( $t(13) = 5.95, p < .001$ ) and intermediate L2ers ( $t(22) = 4.11, p < .001$ ). Furthermore, as far as the performance in this condition is concerned, there was no significant difference between native controls and advanced L2ers ( $p > .49$ ) even though intermediate L2ers were slightly different from native speakers ( $p < .05$ ), in that they more strongly rejected an embedded reading.

Condition 4, meanwhile, involved items in which the embedded reading for the higher wh-word was predicted to be excluded by both Superiority and Subjacency violations. As we predicted, for the native control group, the embedded reading in this instance was significantly different from their own performance in the baseline condition ( $t(30) = 4.81, p < .001$ ). The same pattern was again observed for advanced L2ers ( $t(13) = 4.17, p < .001$ ), but not for the intermediate group ( $t(22) = 0.45, p > .65$ ). Therefore, only advanced L2ers and native speakers showed strong sensitivity to violations that blocked the embedded reading in this condition.

## 4. Discussion and Conclusion

Our results on the TVT experiment clearly show that these L2 English speakers have successfully acquired the principle of Subjacency as evident in their low mean preference for embedded scope readings in C3. Recall that for both advanced and intermediate L2ers, the embedded reading in C3 significantly differed from their own assignment of embedded readings in the no violation condition. This is consistent with what was found for the native controls in the comparison between these two conditions. Thus, regarding the Subjacency constraint, both L2 groups show strong evidence of the acquisition of the uninterpretable feature (*uw<sup>h</sup>\**) that drives movement in English wh-questions.

Still, if Sinhala/English L2ers have indeed acquired the *uw<sup>h</sup>\** in the target L2, one would expect them to show sensitivity to Superiority violations in C2 as well. However, neither the advanced L2 group nor the intermediate L2 group showed a strong level of sensitivity to Superiority violations in C2: unlike native controls, neither of the L2 groups showed a significant difference in their mean

choice of embedded scope between this condition and the baseline condition. Thus, at least regarding the Superiority condition, our results do not show a substantially stronger contrast than what Hawkins and Hattori (2006) found for Japanese Native Speakers (JSE) acquiring L2 English: JSE did not block embedded readings that violated Superiority as much as native controls did.

However, notice that even native controls in our study have shown weaker sensitivity to Superiority violations (Mean = 0.54, SD = .33) than Subjacency violations (Mean = 0.31, SD = .23). If native controls were equally sensitive to Subjacency and Superiority constraints in *wh*-questions, we would not expect to see a difference in their performance in the embedded readings between C2 and C3. But in our results, this difference actually proved to be significant ( $t(30) = 3.96, p < .001$ ). This shows that even native controls were less sensitive to the Superiority violations that we tested than to Subjacency violations. We argue that this disparity between the sensitivity to the two constraints resulted from the fact that the test items on Superiority that H&H used in their study (and that we replicated in this experiment) only involved Argument over Adjunct extractions which are acceptable to many native speakers of English (see e.g. Bošković, 1997; Lasnik & Saito, 1992; Obata, 2008). For instance, in the following sentence, either the argument or the adjunct could be extracted without yielding an ungrammatical reading for different speakers:

- (28) a. [<sub>CP</sub> Where<sub>i</sub> did [<sub>TP</sub> you [<sub>VP</sub> read what] *t<sub>i</sub>*]]?  
 b. [<sub>CP</sub> What<sub>i</sub> did [<sub>TP</sub> you [<sub>VP</sub> read *t<sub>i</sub>*] where]]?

Even though the Superiority Condition, as formulated in Chomsky (1973), would predict only (a) in (28) to be grammatical, Obata (2008) proposes that that the extraction of the argument (*what*) over the adjunct (*where*) in (b) in (28) can be grammatical in English because in her analysis, the argument matches the C head better than the adjunct in terms of the number of features that they share: *what* carries both case and *wh*-features while *where* only carries a *wh*-feature. If so, in the following test item on Superiority (H&H, 2006, p. 287), either answer should in fact be acceptable for an English native speaker:

- (29) Who did Sophie's brother warn <who<sub>1</sub>> [Sophie would telephone <\*who<sub>2</sub>> when]?
- Answer 1: He warned Norman that Sophie would phone on Friday.  
 Answer 2: He warned that Sophie would phone Mrs. Smith on Friday.

In contrast, a clearer Superiority violation is observed when an argument in a lower position in the structure is extracted over an argument occupying a higher position.

- (30) \*What<sub>i</sub> does Siri believe [who [said *t<sub>i</sub>*]]?

Due to this difference in grammaticality, a more extensive test on Superiority should include a sample of both kinds of violations, as illustrated in (28) and (30). If L2ers, like native speakers, show a difference in their judgments between these two kinds of Superiority violations, that can provide further evidence for their sensitivity to overt *wh*-movement violations in L2 syntax. The results of our second experiment, including a Grammaticality Judgment Task, provide additional evidence of this, showing that the L2 learners of English that were tested in this study were more sensitive to Superiority violations showing argument-over-argument *wh*-extraction than to violations involving argument-over-adjunct extractions in English, similarly to native speakers. For reasons of space, we report the GT detailed results in another paper in preparation.

In sum, in re-testing the Interpretability Hypothesis, this study replicated the Truth Value Judgment task reported in Hawkins and Hattori (2006). Contra the predictions of the Interpretability Hypothesis, our L2 learners of English showed strong sensitivity to Subjacency violations, indicating native-like underlying mental representations involving uninterpretable syntactic features in L2 syntax that are not instantiated in the L1 grammatical system. These results with Sinhala L1/English L2 speakers are also consistent with other studies which report the successful acquisition of new functional (uninterpretable) features in various L2 contexts (e.g., Campos-Dintrans et al. 2014; Foucart & Frenck-Mestre, 2012; Gess & Herschensohn, 2001). Finally, these results can reasonably be interpreted as additional evidence for Full Access to UG principles and constraints in adult L2 syntax,

concerning the empirical domain investigated here (e.g., Epstein et al., 1996; Schwartz & Sprouse, 1996; White, 2003).

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