

Constraints on Syntactic Representations and Second Language Acquisition

7.1 Introduction

In section 1.4 several reasons were given for thinking that human beings have an innate language faculty which guides and facilitates the way mental grammars for native languages are constructed. Chapters 2–6 have been concerned with establishing the extent to which that innate language faculty might be involved in the establishment of mental grammars for second languages. The position argued for so far, briefly, is that principles of Universal Grammar underlie the development of knowledge; initial-state grammars consist primarily of lexical projections, but we have encountered a number of cases where functional projections are apparently present from early on; knowledge of syntax develops incrementally in transitional-state grammars, with learners initially constructing representations for local syntactic relations with underspecified functional categories; L1 influence may occur at points of development where the L1 property is relevant; parameters associated with functional categories which are set differently in the L2 from the L1 may be unresettable for older L2 learners, with learners ‘misanalysing’ input data from the target language (although we encountered an apparent counter-example to this claim in section 6.4.4).

An argument given in section 1.4 in support of an innate language faculty operating in native language acquisition was that the syntactic knowledge of a mature native speaker is greater than anything that could have been inferred from the input (i.e. the samples of language that are encountered). This is often called the **underdetermination** of syntactic knowledge by the input, or the **poverty**

of the stimulus (Hornstein and Lightfoot 1981; Lightfoot 1991; 1999; White 1989). For example, native speakers know that while some arrangements of syntactic constituents produce grammatical sentences, others, which are just as interpretable and are of no greater complexity, are nevertheless ungrammatical. Yet there is nothing in the input to indicate this. Consider the following. We have seen that information questions are normally formed in English by the movement of a *wh*-phrase to the specifier position of a clause-initial CP, leaving a trace in the position from which the *wh*-phrase has moved (see section 4.8.1):

- 1a [CP Who_i e [_{IP} t_i bought an electric guitar]]?
 b [CP What_i did_j [_{IP} Janice t_j buy t_i]]?

Such movement or extraction of *wh*-phrases can also take place from embedded clauses:

- 2a [CP Who_i did_j [_{IP} Freda t_j discover [_{CP} e [_{IP} t_i bought an electric guitar]]]]?
 b [CP What_i did_j [_{IP} Freda t_j discover [_{CP} e [_{IP} Janice bought t_i]]]]]?

Information questions can even be formed by turning two of the constituents in a clause into *wh*-phrases, but in this case one of them does not move, as in (3):

- 3 [CP Who_i did_j [_{IP} Freda t_j discover [_{CP} e [_{IP} t_i bought what]]]]?¹

Children learning English as a first language will come across examples of grammatical sentences like these in the input they receive. They subconsciously convert the facts of movement of *wh*-phrases in questions into a productive grammar which enables them to produce and to understand information questions they have never come across before. They must be able to do this to explain the following: every native speaker of English recognizes that while the sentences of (4) may be nonsensical (because the questions are bizarre) or unintelligible (because the words are invented) they are nevertheless grammatical:

- 4a What did your goldfish discover the television ate?
 b Who did the snazzle discover primped the torlab?

So, exposed to examples like (1)–(3) speakers of English will learn that *wh*-phrases are extracted in information questions, and that they may be extracted from embedded clauses. Once learned, they will be able to use this knowledge productively to determine the grammaticality of novel sentences, as (4) illustrates.

Given such productivity, however, how is it that native speakers know immediately that while sentences like (3) are grammatical, the sentences of (5) are ungrammatical?

- 5a *_{[CP What_i did [_{IP} Freda discover [_{CP} who_j e [_{IP} t_j bought t_i]]]]]?}
- b *_{[CP Who_i did [_{IP} Freda discover [_{CP} what_j e [_{IP} t_i bought t_j]]]]]?}

(5a–b) are as easy to interpret as (3), and appear to be no more complex. And yet we feel strongly that they are ungrammatical. The inevitable conclusion is that there is a constraint on the movement of *wh*-phrases in English. Native speakers know this unconsciously without benefit of evidence in the input (and it is unlikely that native speakers are ever taught about the ungrammaticality of sentences like (5)). There must therefore be principles of UG which constrain (i.e. put limits on) the movement of constituents in syntax.

One purpose of this chapter is to outline, briefly, some of the constraints on syntactic operations which linguists have uncovered, and to consider how those constraints might follow from principles of UG. They appear to fall into two basic types: constraints on the movement of constituents (like *wh*-phrases) and constraints on the interpretation of pronouns and anaphors (pronouns are forms like *she/her, he/him, they/them*, etc.; anaphors are ‘self’ forms like *herself, himself, themselves*, and so on). The way that linguists have attempted to account for both of these types of constraint has changed over time. We will try to give a flavour in this chapter both of the early attempts at explanation and of more recent ones.

A second purpose of the chapter is to assess the extent to which such constraints are operative in the mental grammars of second language speakers. Since we have already seen evidence supporting the involvement of principles of UG in other areas of L2 grammar construction, we might expect to see evidence for the principles governing constraints on movement and interpretation, even where they are not manifest in an L2 speaker’s native language. However, for such principles to operate, learners typically have to have highly developed L2 grammars which are capable of productively generating complex sentences. This engages the question of final-state L2 grammars more directly than has been the case up to now.

Because constraints on syntactic operations provide evidence that grammatical knowledge cannot be wholly inferred from properties of input, they have been an important focus for L2 researchers working within the principles and parameters approach to L2 syntax. If it can be established that older L2 learners show knowledge of constraints, where evidence for these is absent both in samples of the target language and in the speaker’s L1, this would suggest the involvement of UG in second language acquisition. The results, so far, have been mixed though, as we shall see. The position that will be argued for in this chapter is that principles which determine constraints are fully operative in L2 acquisition, but that older L2 speakers can differ from native speakers in their reactions to violations of constraints for two reasons: either their ability to process complex sentences in the L2 in real time declines with age; or they have difficulty with parameter settings in the L2 which are different from the L1.

7.2 The early treatment of constraints on the movement of constituents: subjacency and bounding nodes

Section 7.2 explains a proposed principle of UG called ‘subjacency’ which requires constituents extracted from embedded clauses to move in short steps. Some constructions which force constituents to move over longer stretches of syntactic structure, giving rise to ungrammaticality, are then described.

There are three types of syntactic movement, and each is subject to different kinds of constraint. Head movement is one kind, for example when V moves to I (see section 3.3.3), or N moves to Num (see section 6.4.3). Another kind is the movement of an argument DP to another argument position, as in the case of the movement of postverbal arguments with unaccusative verbs (see section 5.3.4). A third kind of movement, which we will be concerned with here, involves moving a *wh*-phrase, or *wh*-phrase-like operator (see note 4) from an argument position like subject, direct object or object of a preposition to a non-argument position at the front of the clause: in English, the specifier position of CP.

Compare the structure of sentence (3) and the sentences in (5) in more detail, repeated here as (6):

- 6a $[_{CP1} \text{Who}_i \text{ did } [_{IP1} \text{Freda discovered } [_{CP2} e [_{IP2} t_i \text{ bought what}]]]]?$
 b $*[_{CP1} \text{What}_i \text{ did } [_{IP1} \text{Freda discovered } [_{CP2} \text{who}_j e [_{IP2} t_j \text{ bought } t_i]]]]?$
 c $*[_{CP1} \text{Who}_i \text{ did } [_{IP1} \text{Freda discovered } [_{CP2} \text{what}_j e [_{IP2} t_i \text{ bought } t_j]]]]?$

In section 4.8.1 it was proposed that a Q morpheme belonging to the category C(omplementizer) indicates that a clause is a question. In English, if there is a *wh*-phrase present, Q requires that the *wh*-phrase move into the specifier position of CP. In the sentences of (6), which are all direct questions, the Q morpheme is located under the C of CP1. This means that the questioned phrase – either the subject *who* or direct object *what* of the embedded clause – must move out of the lower clause to the specifier of the CP in the main clause. This is in order to satisfy a principle of Universal Grammar which requires that *wh*-phrases be in a specifier–head relation with a head specified for Q. In (6a), where the embedded subject moves and the embedded direct object remains *in situ*, this yields a grammatical result. In (6b–c), where one of the *wh*-phrases moves to the specifier position of CP2, movement of the other *wh*-phrase to CP1 is impossible. And yet movement of a *wh*-phrase to CP2 is not in principle impossible, as (7) shows:

- 7a Freda discovered $[_{CP} \text{who}_i e [_{IP} t_i \text{ bought an electric guitar}]]]$
 b Freda discovered $[_{CP} \text{what}_i e [_{IP} \text{Janice bought } t_i]]]$

The difference between (6a) on the one hand, and (6b–c) on the other, appears to be precisely the fact that when the specifier of CP2 is filled, a *wh*-phrase from the embedded clause cannot move to the higher CP1. This suggests that when *wh*-phrases move in English, they have to move to the specifier position of the nearest CP. And to do that the specifier position has to be empty.

A *wh*-phrase does not have to stay there, however. If there is an empty CP specifier higher up, and if there are reasons for doing so, the *wh*-phrase can carry on moving, for example if there is a Q morpheme under the C of CP1. So in (6a) *who* moves first to the specifier of CP2, and then on up to the specifier of CP1. This is known as step-by-step or cyclic movement. A trace is left by the moved *wh*-phrase in the specifier of CP2:

- 8 $[_{CP1} \text{Who}_i \text{ did } [_{IP1} \text{ Freda discover } [_{CP2} \text{ t}'_i \text{ e } [_{IP} \text{ t}_i \text{ bought what}]]]]?$

The reason why (6a) is grammatical, then, is that the *wh*-phrase has moved in two local steps, in each movement going to the specifier position of the nearest CP. The reason why (6b)–(6c) are ungrammatical is that *wh*-phrases already fill the specifier position of CP2, forcing the other *wh*-phrase to make a long movement up to CP1. This movement is just too long.

The early account of this requirement for the cyclic movement of *wh*-phrases was to propose a principle of Universal Grammar called **subjacency** (Chomsky 1973, 1977). Subjacency requires that a constituent move only a short distance from its trace (the trace must be ‘subjacent to’ the moved constituent) where distance is measured in terms of structural domains called **bounding nodes**. A node is a point in a tree diagram (or a labelled bracketing) representing a maximal projection, like IP. The principle of subjacency is usually expressed along the following lines:

Subjacency

A constituent may cross only one bounding node in a single movement.

It was then stipulated that IP is a bounding node in English, but CP is not. Consider how this accounts for the grammaticality of (6a) and the ungrammaticality of (6b–c). In (9), the bounding nodes are marked by a #.

- 9a $[_{CP1} \text{Who}_i \text{ did } [_{IP1\#} \text{ Freda discover } [_{CP2} \text{ t}'_i \text{ e } [_{IP2\#} \text{ t}_i \text{ bought what}]]]]?^2$
 b $*[_{CP1} \text{What}_i \text{ did } [_{IP1\#} \text{ Freda discover } [_{CP2} \text{ who}_j \text{ e } [_{IP2\#} \text{ t}_j \text{ bought t}_i]]]]?$
 c $*[_{CP1} \text{Who}_i \text{ did } [_{IP1\#} \text{ Freda discover } [_{CP2} \text{ what}_j \text{ e } [_{IP2\#} \text{ t}_i \text{ bought t}_j]]]]?$

In (9a) *who* moves first to the specifier of CP2. In doing so it crosses IP2, but this is the only bounding node it crosses in that movement, and so the trace t_i is subjacent to the moved *who*. In a second step *who* moves to the specifier of CP1,

leaving another trace, t'_i , in the specifier of CP2, and in doing so again crosses just one bounding node, IP1, and so there is no violation of subjacency. In (9b–c), however, because there are *wh*-phrases already occupying the specifier of CP2, to get to the specifier of CP1 *what* and *who* have to move directly from the embedded clause, and in doing so cross two IP nodes (IP2 and IP1). The traces of *what* in (9b) and *who* in (9c) are therefore not subjacent to their *wh*-phrase antecedents, and the principle of subjacency is violated.

7.2.1 Constructions which give rise to violations of subjacency

Various types of construction can give rise to subjacency violations. The case considered in the previous section is an example of a *wh*-island. A clause headed by a *wh*-phrase blocks the grammatical extraction of some other constituent (like a castaway, a constituent cannot escape from the island – the imagery, and discovery of most of the constructions which give rise to subjacency violations are due to Ross 1967).

Complex DPs

DP, as well as IP, is a bounding node in English. This means that when a DP takes a clausal complement, any extraction of a *wh*-phrase from that clausal complement will cross two bounding nodes – DP and a higher IP – and give rise to a subjacency violation. Compare (10a) and (10b):

- 10a $[_{CP1}$ Which film star $_i$ did $[_{IP1\#}$ Bob hear $[_{CP2}$ t'_i that $[_{IP2\#}$ Jerry had married t_i]]]])?
- b * $[_{CP1}$ Which film star $_i$ did $[_{IP1\#}$ Bob hear $[_{DP\#}$ the news $[_{CP2}$ t'_i that $[_{IP2\#}$ Jerry had married t_i]]]]]])?

In both sentences *which film star* moves first from the embedded clause to the specifier of CP2, crossing only one bounding node, IP2. In the second step, while *which film star* in (10a) again crosses only one bounding node, IP1, in (10b) it crosses DP and IP1 on its way to the specifier of CP1; these are two bounding nodes, and there is a subjacency violation.³

A similar, but more perceptible, violation occurs in extracting *wh*-phrases from relative clauses, where three bounding nodes are crossed, as in (11b):

- 11a Bob met $[_{DP\#}$ a journalist $[_{CP}$ who $_i$ e $[_{IP\#}$ t_i writes detective stories]]]]
- b * $[_{CP1}$ What $_i$ did $[_{IP1\#}$ Bob meet $[_{DP\#}$ a journalist $[_{CP2}$ who $_j$ e $[_{IP2\#}$ t_j writes t_i]]]]]]]?

Here *what* has not been able to move into the specifier of CP2 because it is filled by the relative pronoun *who*, and has to move directly to CP1. In doing so it crosses three bounding nodes: IP2, DP and IP1. Thus DPs with clausal complements – complex DPs – constitute islands.

Complex subjects

Subjects which are themselves clauses are often analysed as DPs with empty D heads, and hence create domains out of which movement is impossible:

- 12a $[_{IP1\#} [_{DP\#} e [_{CP} \text{That } [_{IP2\#} \text{he invited his boss for lunch}]]]]$ was surprising]
- b * $[_{CP1} \text{Who}_i \text{ was } [_{IP1\#} [_{DP\#} e [_{CP2} t'_i \text{ that } [_{IP2\#} \text{he invited } t_i \text{ for lunch}]]]]]$ surprising]]?

Contrast this with *wh*-phrase movement from a clause in object position in similar sentences (and where it is assumed that the clause is not a DP):

- 13a $[_{IP1\#} \text{It was surprising } [_{CP} \text{that } [_{IP2\#} \text{he invited his boss for lunch}]]]]]$
- b $[_{CP1} \text{Who}_i \text{ was } [_{IP1\#} \text{it surprising } [_{CP2} t'_i \text{ that } [_{IP2\#} \text{he invited } t_i \text{ for lunch}]]]]]]?$

In (13b) the second movement of *who* crosses only one bounding node, IP1, and the sentence is grammatical.

By the same token, extraction from any lexically overt DP subject with a complement causes a violation of subjacency:

- 14a $[_{IP\#} [_{DP\#} \text{An invitation to lunch}]]$ is accepted by most people]
- b * $[_{CP\#} \text{What}_i \text{ is } [_{IP\#} [_{DP\#} \text{an invitation to } t_i]]$ accepted by most people]]?

Thus subjects constitute islands for subjacency.

7.2.2 Subjacency is only a constraint on movement

Subjacency is a property which is only activated by the movement of constituents in syntactic structure. If constituents do not move they cannot give rise to subjacency violations. For example, sometimes subjacency violations in English can be 'rescued' to a certain extent by the introduction of a **resumptive pronoun**. This is a pronoun inserted in the position where a *wh*-phrase would have left a trace if it had moved. The presence of a resumptive pronoun means that the *wh*-phrase has not moved, but is inserted directly into the specifier position of CP. Compare:

- 15a *_{[CP1} Which book_i did _{[IP1#} she wonder _{[CP2} when e _{[IP2#} he read
t_i]]]])?
- b ?_{[CP1} Which book did _{[IP1#} she wonder _{[CP2} when e _{[IP2#} he read
it]]]])?

The reason why (15b) feels less ungrammatical is that nothing has moved. Instead of a *wh*-phrase moving from a position inside an embedded clause to CP1 leaving a trace behind, it is generated directly in CP1 and binds the pronoun in IP2 (see section 7.6 for binding). The reason why sentence (15b) nevertheless still feels odd is because English *wh*-phrases do not naturally bind pronouns – they are constituents which seem to need to bind traces.

Similarly, in languages where there is no overt syntactic movement there are no subjacency violations. Huang (1982) was one of the first to show that Chinese, which does not have overt syntactic *wh*-phrase movement, allows constructions which would violate subjacency in English where *wh*-phrases move. To illustrate, (16a) involves an interrogative *wh*-phrase inside a complex DP (example from Lasnik and Uriagereka 1988) and (16b) an interrogative *wh*-phrase inside a complex subject (example from Huang). In Chinese, complements to DPs are to the left of the N within that DP, the opposite to English:

- 16a *Complex DP*
Ni xiangxin [[[Lisi mai-le shenme _{IP}] de _{CP}] shuefa _{DP}]?
You believe Lisi buy-ASPECT what C claim
‘*What_i do you believe [the claim [that Lisi bought t_i]]?’
- b *Complex subject*
[_{IP} _{DP} [_{CP} [_{IP} Wo mai shenme]]] zui hao]?
I buy what most good
‘*What_i is [that I buy t_i] best?’

(16a–b) are direct questions in Chinese and fully grammatical. English allows similar constructions only as ‘echo’ questions (i.e. where there is emphatic stress on the *wh*-phrase, and either the speaker has failed to hear what someone has said, or expresses surprise at it):

- 17a You believe the claim that Lisi bought WHAT?
b That I buy WHAT is best?

In both the Chinese and the English cases, because the *wh*-phrase has not moved in the syntax, there is no violation of subjacency.

7.3 The investigation of subjacency in second language acquisition

Section 7.3 outlines the conditions which must be met in order to investigate whether subjacency is operative in second language acquisition. Three studies are described which have attempted to assess whether the L2 English grammars of speakers whose first languages do not have *wh*-phrase movement are subject to subjacency. Findings appear to suggest that the older speakers are when they are first immersed in English, the less likely they are to be sensitive to subjacency.

Because languages differ in whether they have syntactic *wh*-phrase movement or not, this area has been of considerable interest to L2 researchers investigating whether Universal Grammar guides the construction of L2 mental grammars. Subjacency is a principle which is claimed to constrain all such movement. If UG is involved in second language acquisition, evidence for subjacency should be found in cases where the L2 involves *wh*-phrase movement, even in the grammars of speakers whose L1s do not have such movement.

7.3.1 Establishing that L2 speakers are sufficiently advanced to test for subjacency

One has to be quite careful in testing the question of whether L2 learners are sensitive to the constraints which subjacency imposes on movement operations. As Schachter (1989) and White (1989) have pointed out, because the structures in question are relatively complex and because they require speakers' intuitions about types of sentences they do not normally encounter – ungrammatical ones – test design must incorporate two controls:

- (a) It has to be established that subjects have indeed acquired the kinds of structure in which movement occurs. For example, if L2 learners treated sentences like (18a) as ungrammatical, we could not conclude that this was the result of subjacency if they did not also recognize a sentence of the same structural complexity, like (18b), as fully grammatical:

- 18a *What_i did she wonder [_{CP} when e [_{IP} John would buy t_i]]?
 b She wondered [_{CP} when e [_{IP} John would buy a new car]]

- (b) It has to be established that subjects have acquired the type of movement involved. For example, if again L2 learners treated sentences like (18a) as ungrammatical, we could not conclude that this was a result of subjacency unless they also treated (19) as fully grammatical:

19 What_i did she expect [_{CP} t'_i e [_{IP} John would buy t_i]]?

If L2 learners treated both (18b) and (19) as grammatical, but treated (18a) as ungrammatical, then that finding would be compatible with the claim that they are sensitive to a subjacency violation, and hence have built a grammatical representation in which movement is constrained by that principle. If L2 learners failed to recognize either (18b) or (19) as grammatical, no conclusion could be drawn about the reason for their treating (18a) as ungrammatical, since it would not be clear that they had the relevant syntactic representations in their grammars.

7.3.2 Early studies of the involvement of subjacency in the construction of L2 mental grammars

There have been a number of studies of whether L2 learners are sensitive to subjacency or not. Results have not always been clearly interpretable, though, because the necessary conditions described in 7.3.1 for determining whether a speaker has acquired the structural prerequisites have not always been established. An early attempt to design a study which takes account of these conditions is that of Schachter (1989). Schachter devised a test which incorporated both a measure of subjects' sensitivity to subjacency violations and a measure of their knowledge of parallel fully grammatical sentences (a 'syntax test'). She chose four construction types which induce subjacency violations in English (from Schachter 1989: 79–80 – bounding nodes are indicated by #):

wh-island violations

*Who_i did [_{IP#} the senator ask the President [_{CP} where e [_{IP#} he would send t_i]]]?

Complex DP violations (called 'complex NP violations' in Schachter's study)

*Who_i did [_{IP#} the police have [_{DP#} evidence [_{CP} t'_i that [_{IP#} the mayor murdered t_i]]]]?

Combined *wh*-island and complex DP violations (relative clauses)

*What_i did [_{IP#} Susan visit [_{DP#} the store [_{CP} Op_i that [_{IP#} t_j had t_i in stock]]]]?⁴

Complex subject violations

*Which party_i did [_{IP#} [_{DP#} [_{CP} t'_i for [_{IP#} Sam to join t_i]]] shock his parents]?

For each construction type Schachter devised 6 sentences, so that there were 24 ungrammatical sentences in the test. Alongside these she had 4 parallel grammatical construction types which did not involve *wh*-phrase movement to the CP of the main clause, and again she devised 6 test sentences for each construction type:

wh-island

The dorm manager asked me [_{CP} who_i e [_{IP#} I wanted [_{CP} t'_i e [_{IP#} to have t_i as a roommate]]]]

Complex DP

There is [_{DP#} a good possibility [_{CP} that [_{IP#} we can obtain the information elsewhere]]]

Combined *wh*-island and complex DP

[_{DP#} The theory [_{CP} Op_i e [_{IP#} we discussed t_i yesterday]]] will be on the exam next week

Complex subject

[_{DP#} e [_{CP} That [_{IP#} oil prices will rise again this year]]] is nearly certain

Finally, 18 distractor sentences were added to the test.⁵ The sentences were then randomized, and subjects in the test were required to judge the grammaticality of the sentences. There were three groups of experimental subjects:

- 20 Chinese speakers
- 21 Korean speakers
- 20 Indonesian speakers

All the subjects were students at the University of Southern California, and had begun English at the age of 12 or later. They were 'all highly proficient speakers of English' (1989: 80) who had on average lived in the United States for the following periods of time: Chinese subjects (four years); Korean subjects (three years one month); Indonesian subjects (two years three months). There was also a control group of 19 native speakers.

Schachter chose to include speakers of Chinese and Indonesian alongside Korean speakers in the test because she assumed that while no *wh*-phrase movement to CP occurs in Korean, there is limited movement in Chinese and Indonesian. In Chinese, although *wh*-phrase movement is not possible in questions, Schachter followed Huang (1982) in assuming that movement occurs in topicalized and relative clause constructions. In Indonesian she assumed that *wh*-phrase movement

Table 7.1 Possible outcomes for individual subjects on a given construction type in a test of knowledge of subjacency

| | | <i>Syntax test</i> | |
|-----------------|------|--------------------|-------------|
| | | <i>Pass</i> | <i>Fail</i> |
| Subjacency test | Pass | A | B |
| | Fail | C | D |

Source: Schachter 1989: 79

occurs in questions, but only from subject position (so that *Who_i [t_i ate the cake]_j?* is grammatical, while *What_i did [Sheila eat t_i]_j?* is not).⁶ By including speakers of languages with some movement, but more restricted movement than in English, Schachter hoped to test whether this would have any effect on subjects' ability to detect violations of subjacency.

In her analysis of the results, Schachter compared subjects' performance on the 'syntax test' component with their performance on the 'subjacency violation' part. She determined that a subject had passed the syntax test if that subject judged 5/6 of the sentences as grammatical for each construction type, and that a subject had passed the subjacency test if that subject judged 5/6 of the sentences as ungrammatical for each construction type. She then tabulated the results to check, for each subject and for each construction type, the relationship between performance on related grammatical and ungrammatical sentences. Given this approach to analysing the results, a particular subject could fall into any one of the cells A–D in table 7.1 for a given construction type.

It is expected that the majority of native speaking controls would fall into cell A: that is, they will accept the grammatical sentences and reject the ungrammatical subjacency violations. Providing that the experimental subjects have acquired the relevant syntactic properties, if they have access to Universal Grammar in building syntactic representations they should also fall into cell A. If their results are such that they fall into cell C, this would indicate that they have acquired the relevant syntactic properties, but are not sensitive to subjacency, and would call into question whether they have access to UG. If the results of the subjects fall into either cell B or cell D, nothing can be inferred from them about whether UG plays a role in the construction of L2 mental grammars because subjects have not yet acquired the relevant syntactic properties.

On the basis of this partitioning of the results, table 7.2 compares, on each construction type, those subjects from each of the four groups in the experiment who fell into cell A (i.e. the numbers from each L1 group who passed both the

Table 7.2 Comparison of the number of subjects who passed both the syntax test and the subjacency test with those who failed one or both of the tests

| | <i>wh-island</i> | | | <i>Complex DP</i> | | | <i>Relative clause</i> | | | <i>Complex subject</i> | | |
|------------------|------------------|----|----|-------------------|----|----|------------------------|---|----|------------------------|----|----|
| | A | C | BD | A | C | BD | A | C | BD | A | C | BD |
| Korean | 3 | 13 | 5 | 2 | 15 | 4 | 5 | 8 | 8 | 3 | 7 | 11 |
| Indonesian | 8 | 6 | 6 | 8 | 11 | 1 | 6 | 9 | 5 | 6 | 11 | 3 |
| Chinese | 7 | 9 | 4 | 11 | 9 | 0 | 10 | 6 | 4 | 7 | 7 | 6 |
| English controls | 14 | 3 | 2 | 10 | 7 | 2 | 17 | 0 | 2 | 15 | 1 | 3 |

A = subjects who passed both the syntax and subjacency tests

C = subjects who passed the syntax test but failed the subjacency test

BD = subjects who failed the syntax test

Source: Based on Schachter 1989

syntax test and the subjacency test, suggesting that they have access to UG) with those who fell into cell C (i.e. the numbers from each L1 group who passed the syntax test but failed the subjacency test, suggesting that they may not be sensitive to this principle of Universal Grammar) and with those who fell into either of cells B or D (suggesting that they have not acquired the syntactic properties from which an inference can be drawn).

The native speakers perform as expected on *wh*-islands, relative clauses (that is a combination of a *wh*-island and a complex DP) and complex subjects; the majority of them accept the sentences they were expected to accept as grammatical, and reject the sentences containing subjacency violations. The less clear-cut performance of the native speakers on the sentences involving complex DPs may possibly indicate that the subjacency violation induced by the sentences used in the test is weaker than in other cases. (See section 7.5 for discussion of the more recent treatment of constraints on movement, and in particular the notion of 'strong' and 'weak' islands.)

Note that the number of Korean speakers who pass both the syntax test and the subjacency test (i.e. those who fall into cell A) is smaller than the number of Indonesian and Chinese speakers; however, even in the latter two groups fewer subjects, proportionately, are successful than in the group of native speakers. Schachter found, on the basis of a statistical measure (the 'chi-square' test) that the proportion of subjects in each of the three non-native speaker groups who were successful was significantly lower than the proportion of subjects in the native speaker group. Fewer of the Koreans were successful than the Chinese and Indonesians, but not significantly so.

The conclusion that Schachter draws is that the results 'constitute a major difficulty for . . . those who believe that all the principles of UG are available and accessible to postpuberty language learners' (1989: 85). She also suggests that they partially support the view which says that adult second language learners are only able to access properties of UG which are instantiated in their L1. Korean lacks evidence of subjacency (because there is no movement), and as expected few Korean subjects who have acquired the relevant constructions in L2 English are sensitive to subjacency. Indonesian and Chinese speakers have subjacency in a limited form, and while more of them appear to be sensitive to subjacency in L2 English, a substantial number of them are not: 'It would appear that these subjects had difficulty either in generalizing their knowledge to new cases, or in accessing their knowledge reliably' (1989: 85). Notice, however, that what these results show is that *some* speakers from all of the non-native speaker groups are fully successful in establishing mental grammars for English which obey subjacency constraints. The difference is that the number of those who are fully successful varies from one language group to another.

Schachter pursued her investigation of the influence of the L1 in a subsequent study (1990) by introducing a comparison group of L1 Dutch-speaking learners of L2 English. It was assumed that *wh*-movement and bounding nodes are alike in Dutch and English. We then have four groups of L2 learners of English whose L1s would appear to represent a spectrum of divergence from English in relation to how the principle of subjacency is realized. At the extremes are Dutch (which has movement and bounding nodes as in English) and Korean (which has no movement, and hence no role for subjacency to play). In between are Chinese and Indonesian, which have movement but of a more restricted kind than in English. If L2 learners' mental grammars are constrained by UG, and assuming that they have acquired the property of syntactic movement of *wh*-phrases, we would expect to see similar intuitions about the ungrammatical cases across all the learners. If, however, learners do not have direct access to UG, we might expect to see some influence of the L1. The subjects in this second study were:

- 18 Dutch speakers
- 21 Indonesian speakers
- 20 Chinese speakers
- 20 Korean speakers
- 19 native speaker controls

The Indonesian, Chinese, Korean and English-speaking controls were, as in the 1989 study, students at the University of Southern California; the Dutch subjects were first year undergraduate students in a language and linguistics programme at the Catholic University of Nijmegen. The Indonesian, Chinese and Korean subjects were classed by Schachter as 'highly proficient speakers of English',

Table 7.3 Mean correct responses of L2 learners to three types of sentence in English: (a) 24 grammatical declarative sentences; (b) 24 ungrammatical sentences involving subjacency violations; (c) 6 grammatical sentences involving *wh*-phrase movement

| | <i>24 grammatical sentences treated as grammatical</i> | <i>24 ungrammatical sentences treated as ungrammatical</i> | <i>6 grammatical sentences with wh-movement treated as grammatical</i> |
|----------------|--|--|--|
| Native English | 21.6 | 21.2 | 5.6 |
| Dutch | 22.2 | 21.9 | 5.8 |
| Indonesian | 21.2 | 15.2 | 4.3 |
| Chinese | 21.2 | 17.2 | 4.4 |
| Korean | 19.8 | 12.4 | 4.6 |

Source: Based on Schachter 1990

who had begun acquisition of English at the age of 12 or later, and had all lived in the United States for at least two years three months at the time of testing. The Dutch subjects had begun studying English at the age of 11 or 12, and had had at least six years of predominantly classroom instruction; but none of them had studied the property of subjacency. The average length of time the Dutch subjects had spent in English-speaking countries was about one month.

Results of the second study are presented in table 7.3 as accuracy scores for each language group under three headings: (a) mean score for each group in judging as grammatical 24 grammatical declarative sentences involving complex subjects, complex DPs, relative clauses and embedded questions; (b) mean score for each group in judging as ungrammatical 24 sentences where there are subjacency violations involving complex subjects, complex DPs, relative clauses and embedded questions; (c) mean score for each group in judging as grammatical 6 grammatical sentences displaying movement of *wh*-phrases from a direct object position (two cases of movement to the nearest CP, two cases of movement to the next higher CP, and two displaying movement to a yet higher CP).⁷

Schachter found that while there was a high correlation between all subjects' scores on the grammatical declarative sentences and the sentences involving grammatical *wh*-phrase movement, the Dutch speakers were significantly better than all the other groups at detecting the ungrammaticality of the sentences involving subjacency violations, and indistinguishable from the native speaker controls. The Koreans 'performed quite poorly' (1990: 116) on subjacency violations, and the Indonesian and Chinese speakers were better than the Koreans but worse than the Dutch.

Given that the conditions of exposure to English were apparently more favourable for the Indonesian, Chinese and Korean speakers than for the Dutch (much longer residence in an English-speaking environment), the results are very striking. It would appear that unless specific properties of UG are instantiated in one's L1, access to them in later SLA is difficult. Dutch has *wh*-phrase movement and bounding nodes like English. Because of that, Dutch speakers can deploy that knowledge in acquiring L2 English. Korean has no parallel movement, hence the bounding status of nodes is irrelevant in Korean, and there are no subjacency effects. Although exposure to English input enables Korean speakers to acquire the appropriate locations for *wh*-phrases in English, they appear to have great difficulty in determining the constraints on those locations. Schachter comments:

the learner can identify certain sentences with *wh*-movement as being possible English patterns . . . But there is no external evidence . . . which would lead the learner to conclude that subjacency violations . . . are *not* grammatical. For this, the learner of English must access an internal knowledge source – and if one's internal knowledge source is lacking in this area, the learner is at a loss. (1990: 116–17)

Schachter's interpretation of this 'lack' in the internal knowledge source is that the principle of subjacency itself becomes inaccessible after the development of the L1. In a more recent review of these issues (Schachter 1996: 163) she argues that UG is not available to older L2 learners outside the L1, and that there is a maturational schedule in early life before and after which certain principles of UG cannot be incorporated into a developing grammar.

Johnson and Newport (1991) adopt a similar view to Schachter, proposing that 'whatever the nature of the endowment that allows humans to learn language, it undergoes a very broad deterioration as learners become increasingly mature' (1991: 215–16). The evidence for their view comes from a study which, like Schachter, investigates the acquisition of *wh*-phrase movement in L1 Chinese-speaking L2 speakers of English and the sensitivity of learners to the principle of subjacency. Their study is designed to incorporate a number of controls to ensure the validity of the results, and it also introduces an additional variable not investigated by Schachter: the effect of the age at which subjects were first immersed in English on their sensitivity to subjacency violations.

The test instrument was a grammaticality judgement task focusing on three structural domains which potentially give rise to subjacency violations if *wh*-phrases are extracted:

- (a) complex DPs with clausal complements: . . . [*the fact [that Janet liked maths]*]
- (b) complex DPs which are relative clauses: . . . [*the policeman [who found Cathy]*]
- (c) *wh*-islands: . . . [*how [Mrs Gomez makes her cookies]*]

On the basis of each of these structural domains, Johnson and Newport constructed four sentence types:

- (i) **A declarative sentence**
The teacher knew the fact that Janet liked maths
- (ii) **A sentence involving grammatical *wh*-phrase extraction**
What_t did [the teacher know [t'_i [that Janet liked t_i]]]?
- (iii) **A subjacency violation**
*What_t did [the teacher know [the fact [t'_i that [Janet liked t_i]]]]?
- (iv) **An ungrammatical sentence involving lack of S-V inversion**
*What the teacher did know that Janet liked?

Sentence type (i) tests whether subjects have acquired the kinds of structure from which *wh*-movement gives rise to a subjacency violation. Sentence type (ii) tests whether subjects have acquired the kind of cyclic movement of *wh*-phrases necessary to examine their sensitivity to subjacency. Sentence type (iii) actually tests sensitivity to subjacency. Sentence type (iv) acts as a control to test subjects' ability to detect ungrammaticality generally in a task of this sort. Thus the task met the requirement described in 7.3.1 that subjects should be tested on their knowledge of the structural domains and the operation of *wh*-movement alongside, and independently of, testing of awareness of subjacency violations.

This procedure produced 12 basic sentence types (4 for each of the 3 structural domains), for which 12 test sentence tokens were constructed, producing a total of 144 sentences. To these were added 12 simple main clause *wh*-questions, and 24 unrelated 'filler' sentences (12 grammatical/12 ungrammatical) to produce a test of 180 items. These were presented to subjects aurally as a tape recording, each read twice by a native speaker of American English at a slow to moderate speed. Subjects were required to circle, on a piece of paper, 'yes' if they thought a sentence was grammatical, and 'no' if they thought it was not. They were asked to respond to every sentence, guessing if they were not sure.

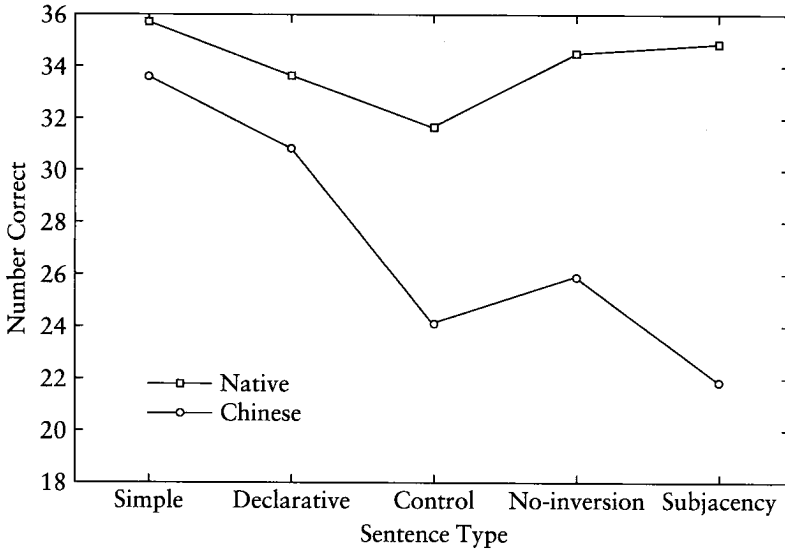
The subjects who participated in the test were all native speakers of Chinese. For 23 of the subjects immersion in English occurred at age 18 or later (the age range of the group was 18–38). By 'immersion' Johnson and Newport mean arrival in the United States and exposure to natural English on a daily basis. Although all of the subjects had received tutored instruction before arrival (on average 6.8 years of instruction) earlier research (Johnson and Newport 1989) had led them to conclude that 'whatever natural endowment youth confers upon the language-learning process, it is limited to the natural learning situation (i.e. immersion)' (1991: 228). The subjects had been resident in the United States for

a minimum period of 5 consecutive years at the time of testing (the range of years of residence being 5–12), and they were all graduate students, postdoctoral researchers or teaching staff at an American university, using English on a daily basis at work (although the married subjects tended to use Chinese at home with their families). Type and length of exposure to English, then, would appear to be optimal for testing whether learners are able to acquire *wh*-phrase movement in English, and are sensitive to subjacency.

A second group of 21 subjects had arrived in the United States between the ages of 4 to 16. They had also had a minimum of 5 consecutive years of residence (range 5–15). They were undergraduate students (with the exception of two who were graduates) at an American university. Like the older learners, they typically spoke Chinese at home and English at school/university, although once at university they mostly spoke English. They had received no tutored instruction in English prior to arrival in the United States. Note that in terms of length of exposure to English, this group is similar to the older informants of the first group; the intention was to make the two groups as comparable as possible, varying only the age at which immersion in English first occurred. In addition to the experimental groups, a control group of eleven native speakers of American English (undergraduate students) took the test. Johnson and Newport eliminated any subject who failed to respond to the grammaticality of simple *wh*-questions in main clauses above chance level. This resulted in one of the post-18-year-old arrivals being eliminated from the results.

The group results for the older, late immersion group and the native-speaker control group are presented in figure 7.1 (Johnson and Newport's figure 3 – results from the younger, early immersion group are considered below). Construction types are indicated along the horizontal axis. 'Simple' appears to refer to the 12 simple main clause *wh*-questions plus the 24 'fillers';⁸ 'control' refers to grammatical sentences like (ii) above which involve cyclic *wh*-phrase movement and are structurally parallel to the subjacency violation cases. The results show that in judging the grammaticality of declarative sentences of comparable complexity to subjacency violations, and in judging simple *wh*-questions, both the non-native speakers and the native speakers are highly accurate: the native speakers score 36/36 on the simple questions and close to 34/36 on the declaratives, while the non-natives score close to 34/36 and 32/36 respectively. (We return to the control sentences below.) However, on the subjacency violation sentences there is a wide discrepancy in accuracy. While the native speakers correctly reject 35/36 sentences on average, the non-natives only reject 22/36 sentences on average. This is a statistically significant difference (on the basis of a t-test). The non-native speakers find many of the subjacency violations grammatical. They also perform quite inaccurately on the ungrammatical sentences involving no S–V inversion, although subjects are more accurate at detecting these errors than the subjacency violations.

Figure 7.1 Mean number of correct responses to five sentence types in English: comparison of native speakers and the late immersion group of L1 Chinese speakers (figure 3 in Johnson and Newport 1991)



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Breaking down subjects' performance on the subjacency violations by type – DP with a clausal complement, DP which is a relative clause and *wh*-island – Johnson and Newport found that the performance of the non-native speakers was significantly above chance level on DPs which were relative clauses, but not significantly above chance in the other two cases. Recall that this contrasting performance on different types of subjacency violations was found by Schachter (1989) in her native English-speaking control subjects, who were less likely to reject extractions out of complex DPs with a clausal complement than out of relative clauses or *wh*-islands. I take up this issue in section 7.5.

Finally, Johnson and Newport ran one further test with a subset of seven of the non-native speakers and six of the native speakers to see whether the non-native speakers were interpreting the moved *wh*-phrases in the subjacency violation sentences appropriately; for example, if in a sentence like **What did the policeman know where the thief hid?* the subjects were interpreting *what* as somehow not the object of *hid*, but of *know* (e.g. as in the equivalent declarative *The policeman knew something about where the thief hid*) then one couldn't tell whether they were constrained by subjacency or not because movement from the object position of *know* does not violate subjacency.

Table 7.4 Mean responses of subjects in interpreting *wh*-phrases on a subjacency comprehension test

| <i>Type of island</i> | <i>Correct</i> | <i>Other interpretation</i> | <i>Don't know</i> |
|-----------------------|----------------|-----------------------------|-------------------|
| DP-complement clause | | | |
| Chinese | 3.57 | 0.14 | 0.28 |
| English | 3.83 | 0.0 | 0.16 |
| DP-relative clause | | | |
| Chinese | 2.57 | 0.14 | 1.28 |
| English | 1.16 | 0.0 | 2.83 |
| <i>wh</i> -island | | | |
| Chinese | 3.28 | 0.28 | 0.43 |
| English | 3 | 0.0 | 1 |

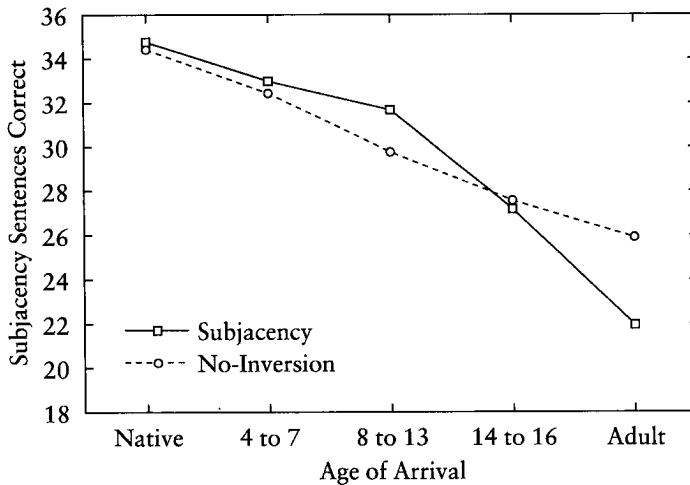
Note: 4 is the maximum potential correct for each type of island

Source: Adapted from Johnson and Newport 1991: 242

Informants were presented with written sentences like *The policeman knew where the thief hid the jewels*. They were then asked questions like *What did the policeman know where the thief hid?* Their responses were scored as 'correct' (*jewels* would be the correct answer in this case), as 'other interpretation' (if they gave some other response) or as 'don't know'. The results are presented in table 7.4. The crucial scores are in the middle column 'other interpretation'. If subjects scored 2 or more here, they would be assigning a different interpretation to the moved *wh*-phrase from the one intended, and as can be seen they do not. An interesting and unexpected result, however, emerges in the case of the interpretation of the moved *wh*-phrase in subjacency violations involving relative clauses. The native speaker controls have considerable difficulty assigning an interpretation to such *wh*-phrases, hence the score of 2.83 in the 'don't know' column. By contrast, the non-native speakers, as Johnson and Newport observe, appear to be better than the natives at understanding questions which contain relative clause subjacency violations. We will return to this observation in section 7.5.

Turning now to a comparison of the results on the subjacency violation sentences of the non-native-speaker group who arrived in the United States after the age of 18 with the group who arrived before the age of 17, there is a considerable difference (figure 7.2). The subjects whose first immersion in English occurred between the ages of 4 to 7, although slightly less accurate than the native speakers, are not significantly different from them. Arrival after the age of 7, by contrast,

Figure 7.2 Comparison of the number correct on subjacency and no-inversion test items by native speakers of English and L1 speakers of Chinese whose immersion occurred at different ages (figure 7 in Johnson and Newport 1991)



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does give rise to significant differences between the native and non-native groups, and these differences become more marked with increasing age.

The results show that the test used is a valid measure of sensitivity to subjacency (both the native speaker controls and the youngest age-of-arrival non-native speaker group perform highly accurately) and that Chinese speakers immersed in English beyond the age of 17 are very different in the way they treat subjacency violations in English from native speakers or other Chinese speakers who experienced immersion at a younger age. Older learners reject subjacency violations above chance level in the case of DP-relative clause islands, but at chance level in the case of DP-complement clause islands and *wh*-islands. Since they are accurate on simple sentences involving grammatical *wh*-questions and grammatical declarative sentences of comparable complexity to the islands, Johnson and Newport conclude that they have partial access to a principle of UG: 'It may seem odd to suggest that adult learners have partial access to subjacency . . . however, this odd probabilistic status is what the empirical data suggest. How this partial knowledge should ultimately be characterised is unknown at this time' (1991: 244).

However, one aspect of the results from the older learners which Johnson and Newport do not take fully into account is the rather poor performance

of informants on the 'control' sentences in figure 7.1. These are grammatical *wh*-questions which are structurally equivalent to the subjacency violation cases (rather than simple *wh*-questions). The group accepts only two-thirds of these. This could either mean that every individual is only accepting two-thirds of the sentences, or that there is a profile more like the one found in Schachter's (1989) study, where some speakers accept all the control sentences, while others do not. Since accuracy on the subjacency violations in figure 7.1 is just under two-thirds, there is the possibility that those speakers who are inaccurate on subjacency violations just haven't acquired *wh*-phrase extraction in complex sentences. This might cast doubt on whether the results really show that speakers are not sensitive to subjacency. What still requires explanation, if this is the case, is why older speakers with long exposure to the L2 like these have difficulty with *wh*-phrase movement in complex sentences, whereas younger speakers apparently do not.

Nevertheless, both Schachter (1990, 1996) and Johnson and Newport (1991) question the availability of principles of UG to guide the construction of mental grammars in older L2 learners, arguing that there is a sensitive period during which such principles are available (hence the success of the younger group of learners) but which declines as an effect of increasing maturity. In Schachter's case she argues that principles become unavailable; in Johnson and Newport's case, they propose that principles remain partially available, but in a way which is unclear.

These views are obviously a strong challenge to the view I have been adopting up to now that grammar-building by all L2 learners, including older L2 learners, is constrained by the principles of UG (even if parametric options are difficult for learners to access) and for which considerable evidence has been presented in chapters 2–6. In the next section we will consider more recent proposals in linguistics concerning how constraints on movement are determined within Universal Grammar, and then in section 7.5 how this might offer the potential for an alternative interpretation of results like those of Schachter and Johnson and Newport.

More Advanced Discussion

7.4 More recent accounts of constraints on movement

In this section it will be shown that the notion of 'bounding node' is not sufficient on its own to explain different degrees of ungrammaticality which arise when different types of constituents are moved in sentences. Rather, it is necessary to consider the nature of the structural position from which a constituent has moved, and the type of constituent it is. Once this has been done, constraints on movement can be defined in a way which does not require reference to specific bounding nodes. This section illustrates the notion of a 'barrier', and explains the 'Empty Category Principle' and 'Relativized Minimality'.