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On the Acquisition of Universal and Parameterised Goal Accessibility Constraints by Japanese Learners of English[1]

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Abstract

This paper reports on how adult Japanese Learners of English/JLEs acquire universal and parameterised constraints which regulate the accessibility of Goals to Wh-Movement, and which determine whether subordinate or superordinate material is pied-piped or stranded when a wh-word is moved. We present evidence that universal constraints on Goal Accessibility operate in early JLE grammars, and that learners initially transfer setting for parameterised constraints from L1 to L2, concluding that our overall findings are broadly consistent with the *Full Transfer Full Access* model of L2 acquisition developed in Schwarz and Sprouse (1994, 1996). We show that JLEs are able to reset some parameterised constraints (e.g. the P-Stranding Constraint) but not others (e.g. the Left Branch Condition), and argue that they are only able to re-set *learnable* parameterised constraints (i.e. those whose setting can be learned solely on the basis of positive evidence from input), not *unlearnable* parameterised constraints (i.e. those whose settings cannot be learned solely on the basis of positive input).

Key words and phrases

Constraints; Goals; Japanese Learners of English; Parameters; Pied-piping; Questions; Stranding; Transfer; Wh-movement; Universal Principles.

1. Introduction

Acquiring the syntax of wh-questions in English involves (inter alia) acquiring the syntax of Wh-Movement. Within the framework of the Minimalist Programme outlined in Chomsky (2000, 2001, 2004, 2005, 2007, 2008), successfully implementing Wh-Movement involves (tacitly) knowing what kind of Probe attracts what kind of Goal in what kind of clause. In this paper, we examine the constraints which govern the 'size' of the Goals which undergo interrogative Wh-

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Movement in the L2 English of a group of Elementary and Lower Intermediate learners whose L1 is Japanese[2]. The paper is organized as follows. In §2, we look at factors which determine the accessibility of goals for Wh-Movement in Native English questions, and show that goal accessibility is determined partly by universal principles, and partly by parameterised constraints. In §3, we outline previous research on the acquisition of universal and parameterized wh-goal accessibility conditions in L2 grammars. In §4 and §5, we report on (and analyse the results of) Elicited Production and Grammaticality Judgment experiments which we conducted in order to test wh-goal accessibility in our Japanese learners. In §6, we summarise our main findings and discuss our results.

2. Goal Accessibility Conditions in Native English

To illustrate the role played by constraints in determining the 'size' of wh-goals in Native English, consider how Wh-Movement applies to a structure such as the following (where the prenominal adjective *new* is treated as the specifier of a Functional Projection/FP which modifies the noun *rules*, as in Cinque 1994)[3]:

(1)   [$_{CP}$ [$_C$ will] [$_{TP}$ there [$_T$ ~~will~~] [$_{VP}$ [$_V$ be] [$_{QP}$ [$_Q$ what] [$_{FP}$ new [$_F$ ø] [$_N$ rules]]]]]]

Wh-Movement in such a structure requires the interrogative C probe to attract a wh-goal (i.e. a goal containing an interrogative wh-item) to move to spec-CP. The 'size' of the wh-goal is determined (inter alia) by the following universal principle:

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[2]   Yokota (2011) examines how Japanese L2 learners of English acquire the Probe Conditions and Spellout Conditions governing Wh-Movement in English. Here we focus on Goal Conditions.

[3]   Our discussion will be kept as informal as possible (for expository reasons), and consequently a number of technical issues which are not directly relevant to our discussion of Goal Accessibility Conditions will be set aside. For example, labelled bracketings will show only part of the structure of the sentences concerned, focusing on projections relevant to the discussion at hand, and generally showing only heads and maximal projections, not intermediate projections (and sometimes omitting null constituents). We will also represent verb phrases simply as VPs (rather than as vP+VP structures), and will set aside the claim made in Chomsky (1986, 2001) that movement to the edge of a transitive clause transits through the edge of the Verb Phrase. These assumptions serve purely to simplify exposition and in no way affect the validity of our conclusions.

(2)　　**Attract Smallest Condition/ASC** (cf. Akiyama 2004)

　　　　A Probe which attracts a particular type of Goal attracts the smallest accessible string

　　　　containing the relevant goal[4]

What ASC tells us is that we should first try moving the wh-item on its own, and then (if some constraint makes it inaccessible to movement) move the next smallest string containing it…and so on, until we find the smallest wh-goal which can be preposed without violating any constraint.

If C attracts the wh-word *what* to move to spec-CP on its own in (1), we derive:

(3)　　[$_{CP}$ *what* [$_C$ will] [$_{TP}$ there [$_T$ ~~will~~] [$_{VP}$ [$_V$ be] [$_{QP}$ [$_Q$ ~~what~~] [$_{FP}$ new [$_F$ ø] [$_N$ rules]]]]]]

But the resulting sentence **What will there be new rules?* is ungrammatical, because *what* is rendered inaccessible for solo wh-movement by the following universal constraint:

(4)　　**Chain Uniformity Condition** (Chomsky 1995: 253)

　　　　'A chain is [only well-formed if every copy in it is] uniform with regard to phrase structure

　　　　status'

This is because the resulting wh-chain *what*…~~*what*~~ in (3) is of non-uniform status, in that the deleted lower copy ~~*what*~~ is a head Q/Quantifier which projects into a superordinate QP/Quantifier Phrase *what new ø rules* in (3), whereas the italicized higher copy *what* is not a head (i.e. does not project into an immediately superordinate QP) but rather is a maximal projection serving as the specifier of CP.

Because *what* is prevented by the Chain Uniformity Principle from moving on its own, we try preposing the next smallest string containing *what* (viz. *what new*), resulting in:

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[4]　ASC is essentially a reworking of a condition on pied-piping proposed by Chomsky (1995: 262) to the effect that movement 'carries along just enough material for convergence', and is a reflex of more general economy conditions (which may be properties of natural systems in general, rather than of grammars in particular).

(5)   [$_{CP}$ *what new* [$_C$ will] [$_{TP}$ there [$_T$ ~~will~~] [$_{VP}$ [$_v$ be] [$_{QP}$ [$_Q$ ~~what~~] [$_{FP}$ ~~new~~ [$_F$ ø] [$_N$ rules]]]]]]

However, the resulting sentence *_What new will there be rules?_ is ungrammatical, because movement of the string _what new_ violates a further universal principle (dating back to constraints on possible 'syntactic objects' in the days of X-bar Syntax), namely:

(6)   **Constituency Condition/CC**
       Only a constituent which is a minimal or maximal projection can be the Goal for a Probe

The reason why (5) is ungrammatical is that _what new_ is a non-constituent string (i.e. a string which is not a constituent of the structure in 1), and hence not a minimal or maximal projection. By contrast, if the whole maximal (QP) projection _what new ø rules_ is fronted in (1), deriving (7) below:

(7)   [$_{CP}$ [$_{QP}$ [$_Q$ what] [$_{FP}$ new [$_F$ ø] [$_N$ rules]]] [$_C$ will] [$_{TP}$ there [$_T$ ~~will~~] [$_{VP}$ [$_v$ be]
                                      [$_{QP}$ [$_Q$ ~~what~~] [$_{FP}$ ~~new~~ [$_F$ ø] [$_N$ ~~rules~~]]]]]]]

there will be no violation of the Attract Smallest Condition (because we preposed the smallest accessible wh-goal), nor of the Chain Uniformity Condition (because the higher and lower links of the wh-chain have a uniform structure), nor of the Constituency Condition (because the fronted string _what new ø rules_ is a QP and hence a maximal projection).

Thus far, we have seen that there are a number of _universal_ principles (such as the Attract Smallest, Chain Uniformity and Constituency Conditions) which determine the choice of goals for Wh-Movement. However, in addition to universal conditions such as these there are also _parameterized_ conditions which regulate goal accessibility. For example, a number of languages (e.g. French, Italian, Spanish, Greek and Japanese) have a constraint such as the following which bars preposition stranding (see Chomsky 1995, Abels 2003):

(8)   **P-Stranding Constraint/PSC**

No constituent in the domain of a Preposition/Postposition P can be extracted out of the PP headed by P

In a language like Japanese which obeys PSC, when a wh-constituent is the object of a P, PSC makes the complement of P *inaccessible* as a goal for extraction out of PP. In accordance with the Attract Smallest Condition (1) requiring us to prepose the smallest accessible maximal projection containing the wh-word, this means that we have to prepose the whole PP instead – as illustrated by the following Japanese sentences:

(9)(a)   *Dare-ni* sono purezento-wo kare-wa agemashita ka
             who-to   the   present-Acc   he-Top gave   Q
             To whom did he give the present?

   (b)   *Dare sono purezento-wo kare-wa *ni* agemashita ka
             who the   present-Acc   he-Top *to* gave   Q
             Who did he give the present *to*?

It would appear that the P-Stranding Constraint is parameterised, in that it operates in some languages (including Japanese) but not in others. For example, as is obvious from the grammaticality of sentences such as that below:

(10)   Who did he give the present to?

no such constraint against P-stranding holds in (non-formal registers of) English.

A further parameterized constraint which can render potential goals inaccessible for movement can be illustrated in relation to contrasts such as the following:

(11)(a)   *What a great goal* Rooney scored!

  (b)   **What* Rooney scored *a great goal*!

(12)(a)   *So bitter a memory* did it leave that he resigned

  (b)   **So bitter* did it leave *a memory* that he resigned

(13)(a)   *How big a payrise* have they awarded him?

  (b)   **How big* have they awarded him *a payrise*?

(14)(a)   *How many cars* do there appear to be?

  (b)   **How* do there appear to be *many cars*?

(15)(a)   *That much aggravation*, nobody else would have put up with

  (b)   **That*, nobody else would have put up with *much aggravation*

The italicized constituents in the (a) examples in (11-15) can be argued to be QPs with a structure along the lines shown schematically below:

(16)

	Specifier	Q	Complement
(a)	*what*	a	great goal
(b)	*so bitter*	a	memory
(c)	*how big*	a	payrise
(d)	*how*	many	cars
(e)	*that*	much	aggravation
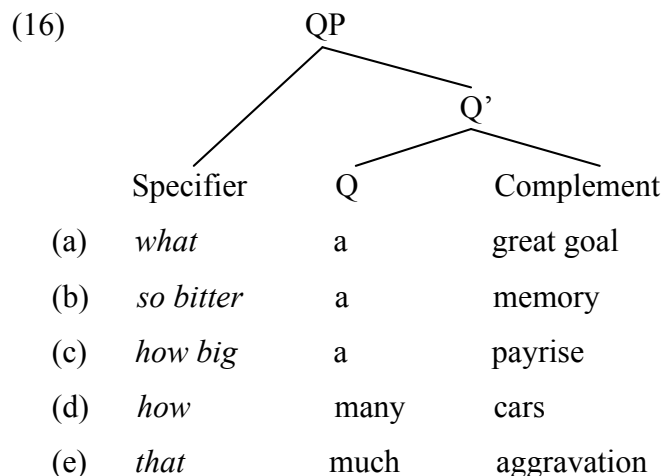
Since specifiers are maximal projections, and since the Chain Uniformity Condition and the Constituency Condition will only be satisfied if C attracts a maximal projection to become its specifier (cf. the earlier discussion of 3-7 above), we might expect the italicized constituents in the specifier position within QP in (16) to be attracted by C; but as the ungrammaticality of the

(b) examples in (11-15) above shows, this is not possible. Why? The answer given in Ross (1967, 1986) is that movement of the specifier on its own would violate the following constraint:

(17)   **Left Branch Condition/LBC**

No constituent on the (lefthand) edge of a nominal expression can be subextracted out of the nominal containing it

Since *what* is positioned on the edge of its containing QP (cf. 16a), LBC would bar movement of *what* on its own in (11b). It would then follow from the Attract Smallest and Chain Uniformity Conditions that (because LBC blocks movement of *what*) we try moving the next smallest maximal projection containing *what* (providing it is accessible) and this is the overall QP *what a great goal*, yielding the grammatical outcome in (11a).

However, as is well known, there are languages which allow subextraction of a wh-constituent on the (lefthand) edge of a containing nominal. Japanese is one such language, as we see from the observation by Yamane (2003: 31) that the wh-quantifier *ikutsu*$_{\text{how.many}}$ can be subextracted out of the nominal containing it (leaving the bold-printed noun that it modifies stranded) in sentences such as:

(18)   *Ikutsu*   kodomo-wa **cookie-o**   tabemashita-ka?
        How.many kid-NOM   cookie-ACC ate-Q
        'How many cookies did the kid eat?'

This suggests that the Left Branch Condition is parameterised, so that some languages (like English) obey it, whereas others (like Japanese) do not.

The overall conclusion to be drawn from the discussion in this section is that accessibility of goals to Wh-Movement is partly determined by universal principles (like the Attract Smallest, Chain Uniformity, and Constituency Conditions), and partly by parameterised principles (like the P-Stranding Constraint, and the Left Branch Condition). Where some constraint bars movement of a wh-item, the next smallest accessible constituent containing the wh-item is moved instead.

3. Goal Accessibility Conditions in L2 grammars

Having argued in the previous section that goal accessibility in Native English is jointly determined by universal and parameterized constraints, we now turn to look at the question of what kind of constraints determine the choice of wh-goals in L2 grammars. The answer depends on the role that universal and parameterized constraints are taken to play in L2 acquisition. In relation to the question of whether L2 acquisition is guided by universal principles, it should be noted that a number of early L2 studies in the 1980s investigated whether universal principles governing the application of Wh-Movement (like the Subjacency Condition) operate in L2 grammars. Some early work claimed that principles of Universal Grammar/UG were only partially available to L2 learners (Bley-Vroman, Felix and Ioup 1988, Schachter 1989, 1990). Subsequently Martohardjono and Gair (1993) claimed that universal principles such as the Subjacency Condition (Chomsky 1973) and the Empty Category Principle (Chomsky 1981) are operative in the grammars of L2 learners at all stages of acquisition, arguing that L2 learners show evidence of knowledge which could not have been acquired from their L1 grammars. White (1992) argued that apparent Subjacency violations by L2 learners are attributable to their developing different syntactic representations from native speakers, not to their having no access to UG principles: so (for example), in English relative clauses produced by speakers whose L1 is Chinese, wh-expressions are generated in situ and bind a null resumptive pronoun *pro*, rather than undergoing wh-movement and binding a wh-trace. This means that L2 learners may acquire grammars that are not the same as target native grammars, although they are still constrained by UG.

There are also divergent views on the acquisition of parameterized constraints by L2 learners. For example, Gavruseva (1997, 1998) argued that L2 learners acquire the settings for parameterized constraints like the Left Branch Condition/LBC solely on the basis of positive evidence from their input (without transfer from their L1), in essentially the same way as L1 learners do. By contrast, Yamane (2003) argued that Japanese learners transfer the negative setting for LBC (viz. 'LBC is inoperative') from their L2 grammars of Japanese to their initial L1 grammars of English, and so produce left branch violations like *Whose do you think he likes present best?* (Yamane 2003: 52). We shall look at these two studies in rather more detail below.

The divergence of views on the operation of universal and parameterised constraints in L2 grammars leads to a divergence of predictions about the kinds of goals that L2 learners will use for movement operations like Wh-Movement. For example, if universal principles are inoperative in L2 grammars, we would expect to find (e.g.) that learners produce 'wild' structures which involve preposing non-constituent strings or intermediate projections, in violation of the universal Constituency Condition; and if parameter settings are initially transferred from L1 to L2, we would expect to find (e.g.) that speakers whose L1 does not obey the Left Branch Condition will produce LBC violations when acquiring an L2 which is LBC-constrained. Below, we briefly review a selection of existing research on pied-piping and stranding of subordinate and superordinate material under Wh-Movement in L2 grammars.

Gavruseva (1997, 1998) investigated the production of *wh*-questions by two Russian-speaking child L2 learners of English (Alex at age 5;11 and Nadia at age 6;5). She reported that in the initial stages of acquisition, the two children typically fronted wh-words on their own without pied-piping subordinate material with them, so producing sentences such as (19a) below in which an (italicized) possessor was fronted leaving the (bold-printed) possessum stranded, and structures like (19b) in which an (italicized) adverb is extracted on its own leaving the (bold-printed) adjective which it modifies stranded:

(19)(a)   *Who* did you like **dessert**? (= 'Whose dessert did you like')

   (b)   *How* your neck is **long**?   (= 'How long is your neck?')

Gavruseva's data suggest that the Left Branch Condition/LBC is inoperative in early L2 grammars, so allowing the children to extract the wh-word on its own, without pied-piping subordinate material (i.e. material c-commanded by the wh-word) along with it. She reports experimental evidence that L1 learners aged 4;5 to 6;0 produce similar structures like (20) below in which subordinate material is stranded:

(20)   *Who* do you think**'s cat** came up on the building?

She concludes that both L1 and L2 learners go through an initial stage in which LBC is either inoperative, or is over-ridden by Economy considerations which dictate that 'questions formed by extraction of *wh*-elements are less costly derivations than their pied-piping alternatives because the former involve movement of less material' (Gavruseva 1998: 244). On this view, L2 learners (like L1 learners) set parameters on the basis of positive input only.

A different position is argued for by Yamane (2003), on the basis of experiments conducted with adult Japanese learners of English on left branch wh-extractions. The results of an Elicited Production Task showed that the learners produced a number of *how many* questions like (21a) below which involve fronting *how many* without pied-piping of the bold-printed modified noun, but no *whose* questions like (21b) in which the italicized possessor is extracted and the bold-printed possessum is stranded:

(21)(a)   *How many* did you eat **cookies**?

(b)   *Whose* did you eat **cookies**?

Yamane also found that on a Grammaticality Judgment Task, her subjects 'accepted LBC violations significantly more often in *how many* questions than in *whose* questions' (2003: 46). She accounts for the possibility of subextracting *how many* on its own by supposing that the learners in question analyse *how many* as the specifier of a DP which has the structure shown below (cf. Yamane 2003: 49):

(22)   [$_{DP}$ how many [$_{D'}$ [$_{D}$ ø] cookies]]

She argues that Japanese learners transfer the negative setting for the parameterized Left Branch Condition (viz. 'LBC is inoperative') from their Japanese L1 to their English L2, with the result that LBC does not operate in their grammar of English and so *how many* can move on its own and strand the noun *cookies*, as in (21a). However, she maintains (2003: 33) that a phrase like *whose cookies* has the very different structure in (23) below, in which possessive *'s* is analysed as a determiner heading a DP whose complement is the possessum and whose specifier is the possessor (parallel to the structure posited for Native English by Chomsky 1995: 263):

(23)   [DP who [D' [D 's] cookies]]

Even though LBC is hypothesized to be inoperative in the L2 grammars of Japanese speakers, *who* cannot be extracted on its own because this will leave the affix *'s* stranded, in violation of the following universal constraint (a variant of Lasnik's 1981 *Stray Affix Filter*):

(24)   **Affix Attachment Condition** (Chomsky 1995: 138)
        'Lexical items identified as affixes' must 'be properly attached' at PF

Nor can the string *who's* (= *whose*) be extracted on its own, 'because movement of a non-constituent is not allowed' (Yamane 2003: 33) as it would violate the Constituency Condition. Thus, grammaticality only results if the whole DP in (23) is moved.

Having briefly reviewed two studies looking at whether L2 learners of English pied-pipe subordinate material along with fronted wh-words, we now turn to look at studies which consider whether they pied-pipe superordinate prepositions along with fronted wh-words. Mazurkewich (1984a, b) investigated preposition pied-piping and preposition stranding in the L2 English of native speakers of French (a language with obligatory preposition pied-piping) and Inuktitut (a language with no prepositions). The participants were given declarative sentences like *Cathy gave a book to Kevin* and instructed to form a question asking for the identity of the prepositional object. The results showed that the French speakers produced more preposition pied-piping than preposition stranding structures, and conversely the Inuktitut speakers produced more preposition stranding than pied-piping structures. White (1986) concluded from this that preposition pied-piping by the French speakers is the result of Transfer, whereas the results from the Inuktitut speakers are more likely to be UG-determined: in terms of the framework outlined in section 2, this would mean that the universal *Attract Smallest Condition* leads Inuktitut speakers not to pied-pipe prepositions unless and until they come across sufficient positive evidence from their input that English allows preposition pied-piping.

Ohba (2003) investigated whether adult Japanese Learners of English pied-pipe or strand prepositions under wh-movement in relative clauses (Japanese being a language which does not

allow P-stranding). Subjects were given two tasks: a Grammaticality Judgment Task/GJT involving restrictive relative clauses (e.g. *The file in which she put the papers has been stolen*) and a Sentence Combining Task/SCT in which they were instructed to combine a pair of sentences into a single sentence containing a relative clause. The results showed that the subjects produced more preposition stranding than pied-piping structures, and that beginners in particular seldom produced preposition pied-piping structures. Ohba (2003) noted that the results are compatible with previous L1 acquisition studies showing that stranding is acquired before pied-piping (McDaniel and McKee 1996; McDaniel, McKee and Bernstein 1998). In terms of the assumptions made in section 2, this might be taken to be evidence that universal principles (like the Attract Smallest Condition) operate in L2 grammars. However, an alternative possibility is that the results could be the consequence of input frequency (i.e. of learners being exposed to more stranding structures than pied-piping structures).

Yamashita (2007) examined preposition pied-piping and stranding in relative clauses in third grade Japanese High School Students and third year University Students, using a similar dual methodology (GJT and SCT). The GJT results showed that both groups accepted preposition stranding at a higher rate than pied-piping, and similarly the SCT results showed that both groups produced preposition stranding structures far more frequently than pied-piping structures. Interestingly, Yamashita (2007) searched the extent of the learners' exposure to preposition stranding and pied-piping in three coursebooks, and this showed that preposition stranding and pied-piping appeared with roughly equal frequency (7 and 8 times respectively). From this, Yamashita concluded that universal principles are operative in L2 grammars from the outset and can guide L2 acquisition where input data are insufficient or inconclusive: in terms of the analysis in §2, this means the Attract Smallest Condition leads L2 learners not to pied-pipe prepositions along with fronted prepositional objects unless there is overwhelming evidence to the contrary[5].

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[5]   However, Yamashita's claim that there was no input effect is potentially problematic, because only 3 coursebooks were searched, and yet even third grade high school students must have used at least 6 coursebooks. Moreover, it seems likely (from the low numbers of prepositional wh-structures reported) that Yamashita only counted relative clauses (and not wh-questions), and if so, this ignores a further vital source of evidence on the frequency of exposure which JLEs received to preposition pied-piping and preposition stranding structures.

Having briefly reviewed a selection of earlier research on the pied-piping and stranding of subordinate and superordinate material under wh-movement in L2 grammars, in the next two sections, we outline (and analyse the results from) two sets of experiments which we conducted that were designed to test what kind of principles determine the accessibility of goals for interrogative Wh-Movement in L2 grammars. Given that our interest is in post-childhood L2 learners, we used University students as our subjects. Since our main interest lies in the early stages of acquisition, we used Elementary and Lower Intermediate subjects (excluding Beginners because we wanted to test left branch extractions out of structures which beginners had received little exposure to). We chose Japanese learners because of differences in parameterized Goal Accessibility Constraints between English and Japanese (Japanese being subject to the P-Stranding Constraint but not to the Left Branch Condition, and the opposite being the case in English).

4. Elicited Production Task experiment

An Elicited Production Task/EPT was administered to 38 native Japanese university freshers (aged 18-20) whose English was assessed (See Table 1 below) as being at *Elementary* or *Lower Intermediate* level on the scale used by the Association of Language Testers in Europe/ALTE through the *Quick Placement Test* developed by the University of Cambridge Local Examinations Syndicate (2001), and to 10 Native Speaker Controls/NSCs (aged 24 to 56) of British, American and Gibraltarian origin who teach English at elementary schools, high schools and universities in Japan.

Table 1: Information about the QPT scores and ALTE levels of the Japanese participants

ALTE Level	Number	QPT range	Mean QPT	SD
1 (= Elementary)	25	16 - 23	19.3	2.12
2 (= Lower Intermediate)	13	24 - 30	25.4	1.76

We used a conversational dialogue which provided the participants with a context to elicit short-distance wh-pied-piping questions. Our aim was to see what range of structures the participants

would produce in contexts where mature native speakers produce wh-pied-piping questions like those listed below:

(25)(a)   *What other colours* do you have?

   (b)   *Which green tie* do you like best?

   (c)   *How many new green ties* do you have?

   (d)   *How much English money* do you have?

   (e)   *Which teacher's lessons* do you like best?

   (f)   *Whose red dress* do you like?

   (g)   *What* are you looking *for?*

   (h)   *Which teacher* did you complain *about*?

The sentences were designed to test whether any of the learners produce structures violating universal conditions like the Constituency Condition and the Chain Uniformity Condition, or violating parameterized conditions like Left Branch Condition and the P-Stranding Constraint. Subjects were given a set of elicitation tasks like that in (26) below, with instructions presented to them in writing in Japanese (translated into English below for convenience):

(26)   Please form a wh-question containing the word in parentheses to which the underlined reply would be an appropriate answer,

      CLERK: May I help you, sir?

      _____? (what)

      JOHN: I'm looking for **a new tie**.

In the various subsections below, we provide Tables detailing the range of structures elicited from the participants and the number of participants in each learner group producing each type of structure, along with an analysis of the responses elicited. Note that all tables exclude all *uninformative* responses – i.e. responses which provide no information about the subject's ability to produce the type of structure we are trying to elicit. This category includes null responses, sentence fragments (e.g. using a wh-phrase in a context designed to elicit a wh-clause), incomplete utterances (e.g. responses lacking a preposition on a task designed to test for

preposition pied-piping, or lacking a noun on a task designed to see whether a noun is pied-piped along with a fronted wh-quantifier), and utterances of indeterminate structure. Details of all uninformative responses (and why they were excluded) can be found in Yokota (2011). A two-way ANOVA overwhelmingly showed no significant difference between the Elementary and Lower Intermediate groups, so they were treated as a single JLE group for all the sentence types in all Tables, and a one-way ANOVA using the Bonferroni Method was employed to test for significant differences within overall total scores for each sentence type.

4. 1 EPT results for *what* and *which*

Tables 2 and 3 below report informative responses for sentences (25a, b) which were designed to test pied-piping in clauses containing a wh-word like *what/which* modifying a nominal expression (the target goals being *what other colours* and *which green tie*). Note that (in all tables of results presented here) JLE denotes the Japanese Learners of English, and NSC denotes the Native Speaker Control group.

Table 2: EPT results for Target (25a) *What other colours do you have?*

Response type	Participant Group	
	JLE	NSC
(27) <u>Pied-piping responses</u>		
(a) *What other colour(s)* do you have?	8/31(25.8%)	9/10 (90%)
(b) *What other colour* have?	1/31 (3.2%)	0/10 (0.0%)
(c) *What colour(s)* do you have other?	5/31 (16.1%)	0/10 (0.0%)
(d) *What colour* is it other?	1/31 (3.2%)	0/10 (0.0%)
(e) *What colour* the other?	1/31 (3.2%)	0/10 (0.0%)
(f) Could I see *what other colours* you have?	0/31 (0.0%)	1/10 (10%)
TOTAL	**16/31 (51.6%)**	**10/10 (100%)**
<u>Left Branch Extraction responses</u>		
(g) *What* do you have *other colour(s)*?	12/31 (38.7%)	0/10 (0.0%)
(h) *What* do you have *any other colour*?	1/31 (3.2%)	0/10 (0.0%)
(i) *What* have you *other colour(s)*?	2/31 (6.5%)	0/10 (0.0%)
TOTAL	**15/31 (48.4%)**	**0/10 (0.0%)**

Table 3: EPT results for Target (25b) *Which green tie do you like best?*

Response type	Participant Group	
	JLE	NSC
(28) Pied-piping responses		
(a) *Which (new) green tie* do you like best?	6/28 (21.4%)	2/2 (100%)
(b) *Which tie(s)* do you like (the) best?	7/28 (25.0%)	0/2 (0.0%)
(c) *Which (new) green ties* (the) best?	2/28 (7.1%)	0/2 (0.0%)
(d) *Which new green ties* like?	1/28 (3.6%)	0/2 (0.0%)
(e) *Which green tie* do you best?	1/28 (3.6%)	0/2 (0.0%)
(f) *Which ties* do you(r) best?	2/28 (7.1%)	0/2 (0.0%)
TOTAL	**19/28 (67.9%)**	**2/2 (100%)**
Left Branch Extraction responses		
(g) *Which* do you like *green tie(s)* best?	1/28 (3.4%)	0/2 (0.0%)
(h) *Which* do you like (the) best *green tie(s)*?	4/28 (13.8%)	0/2 (0.0%)
(i) *Which* do you like (the) best *tie(s)*?	2/28 (6.9%)	0/2 (0.0%)
(j) *Which* do you like *new green ties*?	1/28 (3.4%)	0/2 (0.0%)
(k) *Which* best like *green ties*?	1/28 (3.4%)	0/2 (0.0%)
TOTAL	**9/28 (32.1%)**	**0/2 (0.0%)**

The Wilcoxon Test for paired samples showed no significant difference between the medians of the total Pied-piping responses (P-PR) (51.6%) and the total Left Branch Extraction responses (LBER) (48.4%) in Table 2 ($z = -1.80$, n.s.), nor between the total P-PR (67.9%) and the total LBER (32.1%) in Table 3 ($z = -1.890$, n.s.).

Tables 2 and 3 show only two types of response: either the wh-word moves on its own, or it pied-pipes all the material it modifies along with it. For Native English speakers, the target sentences in (25a,b) will have a structure along the lines of (29a,b) below prior to Wh-Movement applying:

(29)(a) $[_{CP} [_{C} \text{do}] [_{TP} \text{you} [_{T} \text{do}] [_{VP} [_{V} \text{have}] [_{QP} [_{Q} \text{what}] [_{FP} \text{other} [_{F} \text{ø}] \text{colours}]]]]]$

(b) $[_{CP} [_{C} \text{do}] [_{TP} \text{you} [_{T} \text{do}] [_{VP} [_{V} \text{like}] [_{QP} [_{Q} \text{which}] [_{FP} \text{green} [_{F} \text{ø}] \text{tie}]] \text{best}]]]$

Movement of *what* or *which* on its own violates the Chain Uniformity Condition/CUC, and movement of the non-constituent strings *what other* or *which green* violates the Constituency Condition/CC, so native speakers prepose the whole QP *what other colours* or *which green tie.* It is plausible to suppose that learners who pied-pipe the modified expression along with

what/which have native-like structural representations for such sentences, and obey universal constraints like CUC and CC.

However, the conclusion that universal principles constrain the choice of wh-goals for L2 learners is potentially undermined by the observation that a substantial number of the learners produced structures (listed as Left Branch Extraction responses in Tables 2 and 3) in which they moved the wh-word on its own (stranding the modified nominal), in apparent violation of the universal Chain Uniformity Condition. Nevertheless, before rushing to the conclusion that such learners violate universal constraints like CUC, it is important to bear in mind the methodological point made by White (2003) that L2 learners may develop non-native structural representations. Reasoning along these lines, it is plausible to assume that L2 learners will have difficulty in determining whether a word which appears on the edge of a particular type of projection occupies the head or specifier position within the projection. They may face conflicting and competing criteria: on the one hand, *Economy* would lead them to posit maximally simple structures containing as few constituents as possible, and consequently to treat wh-quantifiers as head of their QPs; but on the other hand, *Transfer* would favour treating wh-quantifiers as specifiers, in that Japanese is a specifier-initial and head-final language and so the wh-quantifier in a Japanese phrase such as *donna*$_{what}$ *hon*$_{book}$ must be a specifier rather than a head (and learners may therefore also assume that English wh-quantifiers like *what* are also specifiers). It may be that some learners place more weight on Economy, and others on Transfer.

In connection with the possibility that some learners treat wh-quantifiers like *what/which* as specifiers, consider the following sentence produced by one of the elementary learners:

(30)   What do you have any other colour?

Here *what* modifies the expression *any other colour*, and it therefore seems reasonable to suppose that the learner in question treats indefinite *what* as the specifier of a QP headed by the indefinite quantifier *any*. If so, (30) will have the intermediate structure shown below prior to wh-movement taking place:

(31)   [CP [C do] [TP you [T ~~do~~] [VP [V have] [QP what [Q any] other colour]]]]

Interrogative *what* will then c-command (and thereby license) the polarity item *any*. But if *what* originates as the specifier of a QP headed by *any*, it is a maximal projection, so movement of *what* from spec-QP to spec-CP does not lead to violation of the universal Chain Uniformity Condition. By contrast, movement of *what* on its own in (31) to derive (30) violates the parameterised Left Branch Condition, providing evidence that this is inoperative in JLE grammars. The error in (30) arises because the universal Attract Smallest Condition requires learners to prepose the smallest accessible goal, and (if LBC is inoperative in JLE grammars), the wh-word *what* will be the smallest accessible goal for the C-probe.

Responses like those in (32) below can be treated in an analogous fashion:

(32)(a)   What do you have other colour?

   (b)   What have you other colour?

   (c)   What do you have other colour?

   (d)   Which do you like new green ties?

These can be analysed in much the same way as sentence (30), except for the head Q of QP being null rather than filled by *any*. If so, the structure of (32a) prior to Wh-Movement will be:

(33)   [CP [C do] [TP you [T ~~do~~] [VP [V have] [QP what [Q ø] other colour]]]]

Movement of *what* from spec-QP to spec-CP will then satisfy universal conditions like ASC, CUC and CC, but will violate the parameterised LBC.

The only response which does not fit straightforwardly into one of the two response patterns described above is that in (34) below:

(34)   What colour(s) do you have other?

At first sight, it might seem as if (34) involves extracting the discontinuous string *what…colour* out of the QP *what other colour*, thereby violating the universal Constituency Condition and casting doubt on the claim that universal principles operate in L2 grammars. However, it seems more likely that the learners producing (34) treat *other* as a floating/extraposed adjectival modifier (as in Native English 'What colours do you have *other than these?*') or as an adverb (as in Native English 'What colours do you have *otherwise*?') If so, (34) will have a structure along the lines shown below prior to wh-movement (if *other* is contained within VP rather than TP):

(35)   [CP [C do] [TP you [T ~~do~~] [VP [V have] [QP [Q what] colour] other]]]]

and the whole QP *what colour* will be preposed on its own (in conformity with the universal Constituency and Chain Uniformity Conditions), leaving *other* stranded at the end of the sentence.

If so, then the learners in our EPT study produced only two types of *what/which* structure. One involved pied-piping the modified material along with the wh-word (consistent with the wh-word originating as the head Q of QP, and with wh-movement obeying universal conditions such as ASC, CC and CUC); the other involved moving the wh-word on its own and stranding the modified material, consistent with the wh-word originating in spec-QP and with Wh-Movement obeying universal conditions like ASC, CC and CUC) but violating the parameterised LBC.

4.2 EPT results for *how many* and *how much*

Test sentences (25c,d) were designed to see whether learners would pied-pipe additional material along with the wh-word in structures containing a wh-goal such as *how many new green ties* or *how much English money*, and the results are shown in Tables 4 and 5:

Table 4: EPT results for Target (25c) *How many new green ties do you have?*

Response type	Participant Group	
	JLE	NSC
(36) Pied-piping responses		
(a) *How many new green ties* do you have?	15/31 (48.4%)	3/10 (30.0%)
(b) *How many green ties* do you have?	0/31 (0.0%)	1/10 (10.0%)
(c) *How many other green ties* do you have?	0/31 (0.0%)	1/10 (10.0%)
(d) *How many* do you have?	0/31 (0.0%)	5/10 (50.0%)
TOTAL	**15/31 (48.4%)**	**10/10 (100%)**
Left branch extraction responses		
(d) *How many* do you have *new green ties*?	12/31 (38.7%)	0/10 (0.0%)
(e) *How many* are you have *new green ties*?	1/31 (3.2%)	0/10 (0.0%)
(f) *How many* have you *new green ties*?	3/31 (9.7%)	0/10 (0.0%)
TOTAL	**16/31 (51.6%)**	**0/10 (0.0%)**

Table 5: EPT results for Target (25d) *How much English money do you have?*

Response type	Participant Group	
	JLE	NSC
(37) Pied-piping responses		
(a) *How much English money* do you have?	7/33 (21.2%)	9/9 (100%)
(b) *How much money of Britain* do you have?	1/33 (3.0%)	0/9 (0.0%)
TOTAL	**8/33 (24.2%)**	**9/9 (100%)**
Left branch extraction responses		
(c) *How much* do you have *English money*?	21/33 (63.6%)	0/9 (0.0%)
(d) *How much* are you have *English money*?	1/33 (3.0%)	0/9 (0.0%)
(e) *How much* do you have *money of England*?	1/33 (3.0%)	0/9 (0.0%)
(f) *How much* do you have *money in English*?	1/33 (3.0%)	0/9 (0.0%)
(g) *How much* have *English money?*	1/33 (3.0%)	0/9 (0.0%)
TOTAL	**25/33 (75.8%)**	**0/9 (0.0%)**

The Wilcoxon Test for paired samples revealed no significant difference between the medians of the total Pied-piping responses (P-PR) (48.4%) and the total Left Branch Extraction responses (LBER) (51.6%) in Table 4 ($z = -1.80$, n.s.), but there is a significant difference between the total P-PR (24.2%) and the total LBER (75.8%) in Table 5 ($z = -2.959$, $p < .01$).

An interesting (negative) finding to emerge from the data in Tables 4 and 5 is that none of the learners preposed *how many/how much* along with a subpart of the quantified expression (e.g. none produced responses like *How many new (green) do you have ties?*): this is consistent with

the assumption that L2 learners obey universal constraints such as the Constituency Condition and so do not prepose non-constituent strings. Equally interesting is the (negative) observation that none of the learners preposed *how* on its own (so that there were no responses such as *How do you have much English money?*). At first sight, this would appear to be puzzling. After all, if (as in 16 above) a phrase like *how much English money* is a Quantifier Phrase comprising the head Quantifier *much*, the complement *English money* and the specifier *how*, then prior to Wh-Movement we will have structures such as the following:

(38) $[_{CP} [_C$ do$]$ $[_{TP}$ you $[_T$ ~~do~~$]$ $[_{VP} [_V$ have$]$ $[_{QP}$ how $[_Q$ much$]$ English money$]]]]$

If the universal Constituency Condition (but not the parameterized Left Branch Condition) is operative in JLE grammars, we would expect them to prepose *how* on its own (in violation of LBC) but not to prepose the string *how much* because this would violate CC (since *how much* is not a constituent under the analysis in 38). But in fact the very opposite happens: none of the learners move *how* on its own, and some of them move *how much/how many* (stranding *English money* or *green ties*). How can we account for this?

A plausible answer is that the learners treat *how much* and *how many* as compound quantifiers (in which *how* is an adjunct to *much/many*), perhaps because of Transfer (the Japanese counterpart of these items being the single word *ikutsu* 'how.much/how.many'). If we suppose (as we did earlier in relation to *what/which*) that some learners (perhaps driven by Economy) treat English quantifiers as the heads of their containing QPs and others (perhaps driven by Transfer) treat them as specifiers, what we expect to find is the following. Learners who treat a compound quantifier like *how much* as the head Q of the QP containing it will generate a structure such as (39a) prior to Wh-Movement, whereas learners who treat *how much* as the specifier of a null Q head will generate (39b):

(39)(a) $[_{CP} [_C$ do$]$ $[_{TP}$ you $[_T$ ~~do~~$]$ $[_{VP} [_V$ have$]$ $[_{QP} [_Q$ how-much$]$ English money$]]]]$

   (b) $[_{CP} [_C$ do$]$ $[_{TP}$ you $[_T$ ~~do~~$]$ $[_{VP} [_V$ have$]$ $[_{QP}$ [how-much] $[_Q$ ø$]$ English money$]]]]$

If the learners treat *how much* as a compound quantifier in which *how* is adjoined to *much*, we can account for why neither group of learners extracts *how* on its own by supposing that movement of *how* on its own is barred by the following universal constraint:

(40)   **Excorporation Constraint/EC** (cf. Roberts 1991)

No subpart of a structure in which one head is adjoined to another can excorporate out of the relevant structure

EC will prevent *how* from excorporating out of the compound *how much* in either (39a) or (39b). For learners who treat *how much* as a head, the (universal) Chain Uniformity Constraint will bar movement of *how much* from head position within QP to specifier position within CP in (39a), so such learners will instead front the whole QP and thereby derive (37a) *How much English money do you have?* For learners who treat *how much* as a specifier and assume that the parameterized Left Branch Condition is inoperative in English, nothing will prevent *how much* moving from specifier position within QP to specifier position within CP in (39b), so deriving (37c) *How much do you have English money?*[6]

To summarise: what we are suggesting here is that Japanese learners treat *how many* and *how much* as compound quantifiers which either originate in the head Q position of QP and trigger pied-piping of the quantified nominal (obeying universal principles such as ASC, EC, CC and CUC), or originate in the specifier position of QP and move on their own, stranding the quantified nominal (obeying universal principles, but violating the parameterised LBC).

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[6]   It is possible that *how much* and *how many* may function as compound quantifiers even for Native Speakers. One piece of evidence which suggests this is that only a solo wh-word can appear in a *Swiping* structure such as the following (as noted by Radford 1993):

(i)   I lent the book to one of my students, but I can't remember *who to*
(ii)   *I lent the book to one of my students, but I can't remember *which student to*

However, *how much/how many* behave like a solo wh-word in this respect: cf.

(iii) I sold it on e-Bay, but I can't remember *how much for*
(iv)   I lent the book to quite a few people, but I've no idea *how many to*.

4.3 EPT results for wh-possessors

Sentences (25e, f) were designed to test whether pied-piping is induced by movement of nominal and pronominal wh-possessors, and the results are presented in Tables 6 and 7 below.

Table 6: EPT results for Target (25e) *Which teacher's lessons do you like?*

Response type	Participant Group	
	JLE	NSC
(40) <u>Pied-piping responses</u>		
(a) *Which teacher's lesson(s)* do you like?	24/32 (75.0%)	3/10 (100%)
(b) *Which teacher's lesson* like?	1/32 (3.1%)	0/10 (0.0%)
TOTAL	**25/32 (78.1%)**	**3/10 (100%)**
<u>Left branch extraction responses</u>		
(c) *Which* do you like *teacher's lessons*?	5/32 (15.6%)	0/10 (0.0%)
(d) *Which* like *teacher's lessons*?	2/32 (6.3%)	0/10 (0.0%)
TOTAL	**7/32 (21.9%)**	**0/10 (0.0%)**

Table 7: EPT results for Target (25f) *Whose red dress do you like?*

Response type	Participant Group	
	JLE	NSC
(41) <u>Pied-piping responses</u>		
(a) *Whose red dress(es)* do you like?	23/34 (67.7%)	3/10 (30.0%)
(b) *Whose red dress* do you think is the best?	0/34 (0.0%)	1/10 (10.0%)
(c) *Whose dress* do(did) you like (best)?	0/34 (0.0%)	6/10 (60.0%)
TOTAL	**23/34 (67.7%)**	**10/10 (100%)**
<u>Left branch extraction responses</u>		
(d) *Whose* do you like *red dress(es)*?	5/34 (14.7%)	0/10 (0.0%)
(e) *Whose* are you like *red dress(es)*?	1/34 (2.9%)	0/10 (0.0%)
(f) *Whose* like *red dress(es)*?	4/34 (11.8%)	0/10 (0.0%)
TOTAL	**11/34 (32.4%)**	**0/10 (0.0%)**

The Wilcoxon Test for paired samples revealed there is a significant difference between the medians of the total P-PR (78.1%) and the total LBER (21.9%) in Table 6 ($z = -3.182$, $p < .01$), and there is also a significant difference between the total P-PR (67.7%) and the total LBER (32.4%) in Table 5 ($z = -2.058$, $p < .05$).

Consider first structures with a nominal possessor. If we follow Yamane (2003: 33) in supposing that Japanese learners treat possessive 's as a determiner with a possessum complement and a possessor specifier, (25e) will have the structure below prior to application of Wh-Movement:

(42)   [CP [C do] [TP you [T do] [VP [V like] [DP which teacher [D 's] lessons]]]]

The Attract Smallest Condition will lead learners to try and extract *which* on its own. However, solo movement of *which* will be barred by a further (universal) constraint, namely:

(43)   **Constraint on Extraction Domains/CED** (cf. Huang 1982)
         Only complements allow material to be extracted out of them, not specifiers or adjuncts

CED will prevent *which* from being extracted out of the specifier *which teacher* in (42).

Given that movement of *which* on its own in (42) is barred by CED, the Attract Closest and Chain Uniformity Conditions will lead learners to attempt to move the smallest maximal projection containing *which* (namely the QP *which teacher*), resulting in the structure below:

(44)   [CP which teacher [C do] [TP you [T do] [VP [V like] [DP which teacher [D 's] lessons]]]]

However, any such movement will be prevented by the (universal) Attachment Condition (24), because it results in the possessive affix 's being stranded without a suitable host to attach to. Nor can the string *which teacher's* move instead (so deriving **Which teacher's do you like lessons?* because any such movement of a non-constituent string is barred by the universal Constituency Condition. Accordingly, the smallest constituent containing *which* that can move in (44) is the whole DP *which teacher's lessons*, so deriving the native sentence *Which teacher's lessons do you like?*

However, the account offered above faces the empirical challenge that 4 elementary and 1 intermediate learners produced sentence (45a) below, and another elementary learner produced (45b):

(45)(a)   *Which* do you like *teacher's lessons*?

(b)   *Which* like *teacher's lessons?*

Such sentences might at first sight seem to undermine the claim that L2 grammars obey universal constraints like the Constraint on Extraction Domains and the Chain Uniformity Condition

However, this is only true if sentences like (45) have the structure in (42) prior to Wh-Movement. And yet it could well be that (for some learners) possessive structures like *which teacher's lessons* have a rather different structure, and an interpretation more akin to that of a Native English sentence like 'Which of Teacher's lessons do you like?' One possibility along these lines would be to suppose that (45a) has the following structure prior to Wh-Movement:

(46) $[_{CP} [_C$ do$] [_{TP}$ you $[_T$ ~~do~~$] [_{VP} [_V$ like$] [_{QP}$ which $[_Q$ ø$] [_{DP}$ teacher $[_D$'s$]$ lessons$]]]]]$

If *which* is the specifier of a QP which modifies a possessive DP, it will not be prevented by the universal Chain Uniformity Condition from moving to spec-CP, nor by the parameterised Left Branch Condition if this is inoperative in JLE grammars. Movement of *which* from spec-QP to spec-CP will then derive the superficial structure associated with (45a); (45b) can be treated in a similar fashion (with the difference that it lacks an overt subject and overt auxiliary).

Having looked at what happens in structures involving a nominal possessor, we now turn to consider what happens in structures containing a pronominal possessor. Table 7 shows that there are only two types of (informative) pronominal possessive structure produced by the learners – one in which *whose* pied-pipes the possessum *red dress* along with it, and another in which *whose* moves on its own leaving the possessum stranded. Below, we briefly consider how each of these two types of structure arises.

Prior to Wh-Movement taking place, the target sentence (25f) will have the intermediate structure shown below, if we follow Yamane (2003: 33) in supposing that Japanese learners analyse *whose* as comprising the head determiner *'s* and the possessum *who* (cf. 23):

(47)   [CP [C do] [TP you [T d̶o̶] [VP [V like] [DP who [D 's] red dress]]]]

If universal principles operate in L2 grammars, the Affix Attachment Condition (24) will bar *who* from moving on its own and leaving the affix *'s* stranded, and the Constituency Condition will likewise bar the non-constituent string *who+'s* from moving on its own. Accordingly, the smallest constituent which can undergo wh-movement in (47) is the whole DP *who's red dress*, so deriving a structure which is conventionally written (by a quirk of English orthography) as *Whose red dress do you like?*

However, the above analysis fails to account for a minority of learners who move only *whose* and leave the possessum stranded, so giving rise to sentences such as *Whose do you like red dress?* What happens in such cases? It could well be that the relevant learners take *whose* to be an indivisible lexical item which functions as the specifier of a null D head – an analysis which is made all the more plausible by the fact that *whose* is written as a single word and the main input which learners receive is from written texts in their coursebooks[7]. For such learners, the target sentence (25f) may have an intermediate structure such as:

(48)   [CP [C do] [TP you [T d̶o̶] [VP [V like] [DP whose [D ø] [FP red dress]]]]]

If so, ASC will lead learners to try and prepose the word *whose* on its own in (48). If the parameterised Left Branch Condition is inoperative in JLE grammars, nothing will prevent *whose* from being fronted by itself, ultimately deriving (41d) *Whose do you like red dress?* An interesting corollary of the analysis proposed here is that it accounts for why we find left branch extraction of a pronominal possessor like *whose* but not of a nominal possessor like *which teacher's*.

4. 4 EPT results for prepositional wh-complements

Sentences (25g,h) were designed to test whether learners pied-pipe prepositions along with a fronted wh-word or wh-phrase which originates within the domain of a preposition. As we saw

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[7]   Alternatively, the *s*-affix might attach to *who* in the syntax (rather than at PF).

in §2, preposition pied-piping or stranding is governed by the parameterised P-Stranding Constraint/PSC: in languages subject to the constraint (like Japanese), the complement of a preposition/postposition P is frozen in place and so cannot be extracted out of PP. By contrast, languages like English which are not subject to the constraint freely allow prepositions to be stranded. If L2 learners transfer the settings of parameterised constraints from their L1 grammar to their initial L2 grammar, we would expect Japanese learners of English to assume that PSC operates in English as well as Japanese, and hence not to produce preposition stranding structures. However, if Japanese learners receive sufficient positive evidence from preposition stranding structures in their English input, we would expect them to be able to re-set PSC from the positive value that it has in Japanese (viz. 'PSC is operative') to the negative value that it has in English (viz. 'PSC is inoperative'). In order to check the kind of input which our learners had been exposed to, we made a search of the 6 main coursebooks which they had been taught with to determine the extent of their exposure to preposition stranding on the one hand, and to preposition pied-piping on the other. The results are presented in Table 8 below:

Table 8: Frequency of preposition stranding and pied-piping in wh-clauses

Name of coursebook	Frequency of preposition stranding	Frequency of preposition pied-piping
New Crown 1 (Junior High coursebook)	0/0 (0%)	0/0 (0%)
New Crown 2 (Junior High coursebook)	1/1 (100%)	0/1 (0%)
New Crown 3 (Junior High coursebook)	1/1 (100%)	0/1 (0%)
Oral Communication (High School coursebook)	2/2 (100%)	0/2 (0%)
Unicorn English Course I (High School coursebook)	10/11 (90.9%)	1/11 (9.1%)
Unicorn English Course II (High School coursebook)	9/14 (64.3%)	5/14 (35.7%)
Total	23/29 (79.3%)	6/29 (20.7%)

The data in Table 8 suggest that the coursebooks used by the learners in our study exposed them to preposition stranding structures earlier and more frequently than to preposition pied-piping structures. This in turn means that the learners received positive evidence from their input that

PSC is inoperative in English[8]. If they re-set the PSC parameter accordingly and assumed that PSC is inoperative in English, we would then expect them to produce preposition stranding structures. Moreover, given that universal constraints (viz. ASC and CUC together) require learners to prepose the smallest maximal projection containing the target wh-word, we would not expect JLEs to produce structures in which a preposition is pied-piped along with its wh-complement.

The EPT results for preposition pied-piping and stranding under Wh-Movement are reported in Tables 9 and 10 below[9].

Table 9: EPT results for Target (25g) *What are you looking for?*

Response type	Participant Group	
	JLE	**NSC**
(49) <u>Preposition pied-piping responses</u>		
(a) *For what are you looking?*	0/31 (0.0%)	0/9 (0.0%)
TOTAL	**0/31 (0.0%)**	**0/9 (0.0%)**
<u>Preposition stranding responses</u>		
(b) *What* are/do you looking *for*?	28/31 (90.3%)	9/9 (100%)
(c) *What* looking *for*?	1/31 (3.2%)	0/9 (0.0%)
(d) *What* do you look *for*?	2/31 (6.5%)	0/9 (0.0%)
TOTAL	**31/31 (100%)**	**9/9 (100%)**

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[8]   In the context of the studies reported on in this chapter, the term 'English' should be taken to mean 'the variety of English which the learners in our study were exposed to'.

[9]   One of the 10 NSCs has been excluded from Tables 9 and 10 for producing the uninformative non-prepositional responses *What would you like?* and *Which teacher is it?*

Table 10: EPT results for Target (25h) *Which teacher did you complain about?*

Response type	Participant Group	
	JLE	NSC
(50) <u>Noun-pied-piping responses</u>		
(a) *Which teacher* did/do you complain(ed) *about*?	13/27 (48.1%)	8/9 (88.9%)
(b) *Which teacher* did/are you complain *about*?	2/27 (7.4%)	0/9 (0.0%)
(c) *Which teacher* complain *about*?	1/27(3.7%)	0/9 (0.0%)
(d) *Which teacher* do you want to complain *about*?	0/27(0.0%)	1/9 (11.1%)
TOTAL	**16/27 (59.3%)**	**9/9 (100%)**
<u>Left branch extraction responses</u>		
(e) *Which* do you complain(ed) *about teacher*?	3/27 (11.1%)	0/9 (0.0%)
(f) *Which* you complained *about teacher*?	1/27 (3.7%)	0/9 (0.0%)0
(g) *Which* do you have complain *about teacher*?	2/27 (7.4%)	0/9 (0.0%)
(h) *Which* complain *about teacher*?	1/27 (3.7%)	0/9 (0.0%)
(i) *Which* did complain *about teacher*?	1/27 (3.7%)	0/9 (0.0%)
(j) *Which* are you have complained *to teacher*?	1/27 (3.7%)	0/9 (0.0%)
(k) *Which* complain *about a teacher*?	1/27 (3.7%)	0/9 (0.0%)
(l) *Which* did you complained *about an English teacher*?	1/27 (3.7%)	0/9 (0.0%)
TOTAL	**11/27 (40.7%)**	**0/9 (0.0%)**

As Table 10 shows, none of the learners pied-piped the preposition along with the moved wh-constituent; all left the preposition stranded in situ after the verb *complain*. However, there were differences between learners in respect of whether they pied-piped the noun *teachers* along with the moved wh-quantifier *which*, or whether they moved only the wh-word on its own (leaving the noun stranded in situ). The Wilcoxon Test for paired samples revealed there is a significant difference between the medians of the total P-PR (0.0%) and the total LBER (100%) in Table 9 (z = -5.568, p < .01), but there is no significant difference between the total P-PR (59.3%) and the total LBER (40.7%) in Table 10 (z = -.962, n.s.).

Consider first the range of structures produced by the learners in contexts where Native English shows preposing of a wh-word which is the complement of a preposition – as in the target sentence (25g) *What are you looking for?* Let us suppose that the structure immediately prior to Wh-Movement applying is the following:

(51)   [CP [C are] [TP you [T ~~are~~] [VP [V looking] [PP [P for] what]]]]

The Attract Smallest Condition will lead learners to try and prepose just the wh-word *what* on its own. Movement of *what* on its own from PP-complement position to CP-specifier position involves movement from one maximal projection position to another and so satisfies Chain Uniformity. If (as we assume) PSC is inoperative in JLE grammars, movement of *what* out of the PP in (51) would not be barred, so accounting for why all the learners in the EPT study stranded the preposition, and none pied-piped the preposition along with the wh-pronoun *what*.

Now consider the range of structures produced by the learners in contexts where Native English shows preposing of a nominal wh-constituent which serves as the complement of a preposition – as in the target sentence (25h) *Which teacher did you complain about?* As Table 10 shows, the JLEs produced two main types of structure: either they front the wh-quantifier *which* on its own, or they pied-pipe the noun *teacher* along with the fronted wh-word: both types of structure violate PSC by moving a wh-goal which originates in the domain of a preposition out of the PP containing it.

Consider first how to account for structures in which the noun *teacher* is pied-piped along with the wh-word *which* but the preposition *about* is stranded. Suppose that a series of syntactic operations lead to the formation of the following intermediate structure:

(52)   [$_{CP}$ [$_C$ did] [$_{TP}$ you [$_T$ ~~did~~] [$_{VP}$ [$_V$ complain] [$_{PP}$ [$_P$ about] [$_{QP}$ [$_Q$ which] teacher]]]]]

ASC will require C to attract the smallest accessible wh-goal. However, movement of *which* on its own to spec-CP will be barred by the (universal) Chain Uniformity Condition/CUC, because *which* is a minimal projection (by virtue of being the head Q of QP) and so cannot move to a maximal projection position like spec-CP. Accordingly, ASC leads learners to try and prepose the next smallest constituent containing *which*, namely the QP *which teacher*: this is a maximal projection, so moving it to the edge of CP will not violate CUC. If the learners know that the P-Stranding Constraint does not hold in English, they will be able to prepose the QP *which teacher* on its own, so deriving the structure below:

(53)   [$_{CP}$ Which teacher [$_C$ did] [$_{TP}$ you [$_T$ ~~did~~] [$_{VP}$ [$_V$ complain] [$_{PP}$ [$_P$ about] ~~which teacher~~]]]]

And (53) will be mapped into the grammatical sentence *Which teacher did you complain about?*

However, alongside native-like structures in which the wh-word *which* and the noun *teacher* are fronted and the preposition *about* is stranded, the learners in our study also produced a number of non-native structures in which the wh-word is fronted but the noun *teacher* and the preposition *about* are stranded, including the following:

(54)   *Which* did you complained about **an English teacher**?

What is going on here? One possibility is that the relevant learners treat *which* as the specifier of a QP headed by the indefinite article/quantifier *a(n)* (much like *such* in *such a shame*), so that (54) has the following structure prior to Wh-Movement:

(55)   [$_{CP}$ [$_{C}$ did] [$_{TP}$ you [$_{T}$ ~~did~~] [$_{VP}$ [$_{V}$ complained] [$_{PP}$ [$_{P}$ about] [$_{QP}$ which [$_{Q}$ an] English teacher]]]]]

ASC will drive such learners to try and prepose the wh-word *which* on its own: if LBC is inoperative in the JLE's English, nothing will prevent *which* from moving on its own from spec-QP to spec-CP[10], so forming the structure below:

(56)   [$_{CP}$ which [$_{C}$ did] [$_{TP}$ you [$_{T}$ ~~did~~] [$_{VP}$ [$_{V}$ complained] [$_{PP}$ [$_{P}$ about] [$_{QP}$ ~~which~~ [$_{Q}$ an] English teacher]]]]]

The structure in (56) will ultimately be spelled out as in (54).

A variant of the above analysis can be proposed for a number of related sentences such as those below:

(57)(a)   Which do you complain about teacher?

   (b)   Which complain about teacher?

   (c)   Which are you have complained to teacher?

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[10]   A technical (phase-related) question which we set aside here is whether *which* transits through spec-PP and spec-vP on its way to spec-CP.

(d)   Which you complained about teacher?

(e)   Which do you have complain about teacher?

For example, if we suppose that *which* in such sentences originates as the specifier of a QP with a null head, then (57a) will have the following structure prior to Wh-Movement:

(58)   [CP [C do] [TP you [T ~~do~~] [VP [V complain] [PP [P about] [QP which [Q ø] teacher]]]]]

The wh-word *which* will then move on its own from spec-QP into spec-CP, so deriving the structure below:

(59)   [CP which [C do] [TP you [T ~~do~~] [VP [V complain] [PP [P about] [QP ~~which~~ [Q ø] teacher]]]]]

The structure in (59) will be spelled out as sentence (57a) *Which do you complain about teacher?* As before, learners who produce such structures seem to know that the parameterised P-Stranding Constraint is inoperative in English.

Having reviewed the findings from our EPT study, we now turn to present and analyse the results from our Grammaticality Judgment Task/GJT study.

5. Grammaticality Judgment Task experiment

A Grammaticality Judgment Task was administered to 37 native Japanese university freshers (aged 18-20) whose English was assessed as being at LTE *Elementary* or *Lower Intermediate* level through the Quick Placement Test, as in Table 11 below.

Table 11: Information about the QPT scores and ALTE levels of the Japanese participants

ALTE Level	Number	QPT range	Mean QPT	SD
1 (= Elementary)	25	16 - 23	17.1	3.49
2 (= Lower Intermediate)	13	24 - 30	1.95	1.95

10 native speakers of English also participated in the GJT task as Native Speaker Controls/NSCs. The NSCs (aged 24 to 56) were of British, American and Gibraltarian origin, and teach English at elementary schools, high schools and Universities in Japan. Participants were tested using a five-point acceptability scale (+2 = fully OK, +1 = OK, 0 = don't know, -1 = odd, -2 = very odd). The task comprised 30 test sentences (shown in Tables 12-15 below, along with their mean acceptability scores) and 30 distractors: they were given to the participants as an untimed written test, with the order of sentences randomized. A two-way ANOVA overwhelmingly showed no significant difference between the Elementary and Lower Intermediate groups so, they were treated as a single JLE group for all the sentence types in all Tables, and a one-way ANOVA using the Bonferroni Method was employed to test for significant differences within overall total scores for each sentence type. The results are presented in the various subsections below.

5. 1 GJT results for *what* and *which*

Table 12 below presents the results for sentences containing a nominal goal of the form WH-Q + ADJECTIVE + NOUN.

Table 12: Test sentences used to test for pied-piping with *what* and *which*

Response type	Participant Group	
	JLE	NSC
(60) *What+other+*N		
(a) What other vegetables do you like?	0.65	1.70
(b) What other have you seen films?	-0.38	-1.50
(c) What did he give other reasons?	0.49	-1.40
(61) *Which* + Adj + N		
(a) Which red dress did you buy?	1.22	2.00
(b) Which red do you want apple?	-0.51	-1.80
(c) Which would you prefer red wine?	0.35	-1.50

A one-way ANOVA using the Bonferroni Method was employed to test for significant differences within the JLE scores for each sentence type (the same method was employed in Tables 13, 14 and 15 below). The main effect within sentence types (60a-c) is significant (F (2, 72) = 6.799, MSe = 1.659, $p < .01$): (60a) > (60b) ($p < .01$), (60c) > (60b) ($p < .05$), but there is no significant difference between (60a) and (60c). Similarly, the main effect within sentence types (61a-c) is significant (F (2, 72) = 16.425, MSe = 1.685, $p < .01$): (61a) > (61c) > (61b)

(between (61a) and (61b) $p < .01$; between (61a) and (61c) $p < .05$; between (62b) and (62c) $p < .05$).

The judgments reported in Table 12 are consistent with the following analysis. Many learners treat *what/which* as the head Q of QP, and the (universal) Chain Uniformity Condition requires them to prepose the whole QP *what other vegetables/which red dress* as in (60a, 61a). Some learners instead treat *what/which* as a QP-specifier, and the (universal) Attract Smallest Condition means that *what/which* will undergo Wh-Movement on its own as in (60c, 61c), satisfying CUC and not incurring any violation of the parameterized Left Branch Condition because this is inoperative in JLE grammars. The (universal) Constituency Condition bars both types of learner from fronting the non-constituent strings *what other* and *which red*, so accounting for the low acceptability of (60b, 61b).

5. 2 GJT results for *how many* and *how much*

Table 13 below presents the results for wh-questions containing a nominal goal of the form HOW MUCH/HOW MANY + ADJECTIVE + NOUN.

Table 12: Test sentences used to test for pied-piping with *what* and *which*

Response type	Participant Group	
	JLE	NSC
(60) *What+other*+N		
(a) What other vegetables do you like?	0.65	1.70
(b) What other have you seen films?	-0.38	-1.50
(c) What did he give other reasons?	0.49	-1.40
(61) *Which* + Adj + N		
(a) Which red dress did you buy?	1.22	2.00
(b) Which red do you want apple?	-0.51	-1.80
(c) Which would you prefer red wine?	0.35	-1.50

Table 13: Test sentences used to test for pied-piping with *how many* and *how much*

Response type	Participant Group	
	JLE	NSC
(62) *How + many + N*		
(a) *How many green apples* did you buy?	1.24	2.00
(b) *How many green* have you eaten *apples*?	-1.05	-1.60
(c) *How many* do you have *green pears*?	0.22	-1.40
(d) *How* have you bought *many green plants*?	-0.16	-1.30
(63) *How + much + N*		
(a) *How much red wine* did he drink?	0.81	1.80
(b) *How much red* do we need *paint*?	-0.54	-1.60
(c) *How much* did you buy *red wool*?	0.43	-1.50
(d) *How* have you eaten *much red cabbage*?	-0.14	-1.80

The main effect within sentence types (62a-d) is significant (F (3, 108) = 16.305, MSe = 2.054, p < .01): (62a) > (62b) (p < .01); (62c) > (62b) (p < .01); (62d) > (62b) (p < .01); between (62a) and (62c) (n.s.); and then (62c) and (62d) (n.s.). Similarly, the main effect within sentence types (63a-d) is significant (F (3, 108) = 6.766, MSe = 1.958, p < .01): (63a) > (63b) (p < .01); (63a) > (63d) (p < .05); (63c) > (63b) (p < .05); between (63a) and (63c) (n.s.); and then (63b) and (63d) (n.s.).

The negative JLE scores of -1.05 for (62b) and -0.54 for (63b) suggest that learners reject sentences which violate universal constraints like the Constituency Condition. The negative JLE scores of -0.16 for (62d) and -0.14 for (63d) are consistent with the view that many learners treat *how much* and *how many* as compound quantifiers and obey the universal Excorporation Constraint (40) which bars extraction out of a compound head. The positive JLE score of 0.22 for (62c) and of 0.43 for (63c) suggest that the relevant learners treat *how much* and *how many* as compound quantifiers which function as the specifiers of the nominals they modify (as in 39b above), and that the parameterized Left Branch Condition is inoperative in JLE grammars. Finally, the high positive JLE scores of 1.24 for (62a) and 0.81 for (63a) are consistent with the view that *how much/how many* are compound quantifiers which head their containing QPs and are barred by the universal Chain Uniformity Condition from moving on their own.

5. 3 GJT results for *wh*-possessors

Table 14 below presents the results for sentences containing a nominal goal of the form WH-POSSESSOR + ADJECTIVE + NOUN.

Table 14: Test sentences used to test for pied-piping with a wh-possessor

Response type	Participant Group	
	JLE	NSC
(64) *Which* + N *'s* + N		
(a) Which teacher's lessons do you enjoy?	0.86	1.70
(b) Which actor's did you meet children?	0.03	-1.40
(c) Which producer do you like's films?	0.03	-1.60
(d) Which do you like golfer's trousers?	0.76	-1.40
(65) *Whose* + Adj + N		
(a) Whose new car do you like best?	0.97	1.60
(b) Whose new were you visiting house?	-0.97	-2.00
(c) Whose do you prefer new shoes?	0.30	-1.80
(d) Who did you borrow's new i-pod?	0.11	-1.60

The main effect within the sentences (64a-d) is significant (F (3, 108) = 4.358, MSe = 1.755, $p <$ .01), but there is no significant difference among the JLE scores for sentences (64a-d). The relatively high JLE score of 0.86 to for (64a) is consistent with the JLEs analysing possessive as in (42) above. The low JLE scores of 0.03 for (64b,c) can be attributed to (64b) violating the universal Constituency Condition (3) by moving a non-constituent string, and (64c) violating the universal Affix Attachment Condition (24) by leaving possessive *'s* stranded[11]. Conversely, the higher acceptance rate for sentences like (64d) suggests that some learners treat *which* as a QP-specifier and that the parameterised Left Branch Condition is inoperative in JLE grammars, so allowing *which* to undergo solo Wh-Movement.

The main effect within the sentences (65a-d) is significant (F (3, 108) = 16.002, MSe = 1.505, p < .01): (65a) > (65b) ($p <$ .01); (65c) > (65b) ($p <$ .01); (65d) > (65b) ($p <$ .01); (65a) and (65c) (n.s.); (65a) and (65d) (n.s.), and (65c) and (65d) (n.s.). The fact that sentence (65b) was judged least acceptable is consistent with the claim that the JLEs are unwilling to accept sentences

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[11] Participants who accept (64b) may treat *'s* as a suffixal genitive postposition attached to the QP *which actor*, with the resulting constituent *which actor's* serving as the specifier of a null D. Participants who accept (64c) may treat *'s* as an unselective affix.

which violate universal conditions like the Constituency Condition. The low positive acceptability score of 0.30 for (65c) would suggest that a small number of learners treat *whose* as a DP-specifier (as in 48 above), and so allow *whose* to be fronted on its own, thereby obeying the universal CUC but violating the parameterised LBC. The even lower positive acceptability score of 0.11 for (65d) may mean that elementary learners who accept such structures treat possessive *'s* as an *unselective* affix which simply attaches to whatever word immediately precedes it (in this case, the verb *borrow*) and have yet to learn that in (standard) Native English it is a *selective* affix which can only attach to an immediately adjacent c-commanding possessor. In this context, it is interesting to note that even some native speakers can treat *whose* as comprising the possessor *who* and an unselective *'s* affix which attaches to any word immediately preceding it – as in the following sentence reported by Radford (1988: 526) to have been produced by a radio presenter in a London superstore:

(66)   That's the guy *who* I think *'s* sister is the lead singer in a new band

It would seem that some learners may initially treat possessive *'s* as an unselective affix and at some later stage learn that it is a selective affix.

5. 4 GJT results for prepositional *wh*-complements

Table 15 below contains the results for sentences designed to test whether JLEs know that the parameterised P-Stranding Constraint in (8) is inoperative in English.

Table 15: Test sentences used to test for preposition stranding/pied-piping

Response type	Participant Group	
	JLE	NSC
(67) P Pied-piping/Stranding (*What*)		
(a) *In what street* does he live?	-0.11	0.60
(b) *In what* was he hiding *town*?	-0.62	-1.90
(c) *What hotel* did you stay *in*?	1.05	1.40
(d) *What* does he live *in town*?	-0.05	-2.00
(68) P Pied-piping/Stranding (*Whose*)		
(a) *In whose car* did he come?	-0.35	1.50
(b) *In whose* did he travel *car*?	-0.68	-1.80
(c) *Whose house* does he live *in*?	1.03	1.80
(d) *Whose* is he staying *in apartment*?	-0.05	-1.40

The main effect within sentences (67a-d) is significant (F (3, 108) = 10.949, MSe = 1.683, $p <$ .01). There are significant differences respectively between (67a) and (67c) ($p <$ .01), (67b) and (67c) ($p <$ .01), and also (67c) and (67d) ($p <$ .01). On the other hand, there is no significant difference between (67a) and (67b), (67a) and (67d), or (67b) and (67d). The main effect within the sentences in (68a-d) is significant (F (3, 108) = 14.739, MSe = 1.370, $p <$ .01). There are significant differences respectively between (68a) and (68c) ($p <$ .01), (68b) and (68c) ($p <$ .01), and also (68c) and (68d) ($p <$ .01). On the other hand, there is no significant difference between (68a) and (68b), (68a) and (68d), or (68b) and (68d).

There were (high) positive JLE scores of 1.05 on (67c) and 1.03 on (68c) suggesting that the JLEs treat the parameterised P-Stranding Constraint as inoperative in English. There were low negative JLE scores of -0.62 for (67b) and of -0.68 for (68b), and these are consistent with the view that learners reject sentences which violate universal constraints such as the Constituency Condition. As for the near-zero overall score of -0.05 for both (67d) and (68d), it might have been expected that these scores would have been lower, because movement of *what* on its own violates the universal Chain Uniformity Condition if *what* is the head Q of its QP, and movement of *whose* on its own violates the universal Constituency Condition if *whose* comprises a specifier *who* and a head *'s* (as in 23); however, if some learners treat *what* and *whose* as specifiers (as in 33 and 48 above), they would be extractable out of PP, and this would result in a group score which is not as low as might otherwise have been expected. Finally, the negative scores of -0.11 for (67a) and -0.35 for (68a) suggest that learners obey the universal Attract Smallest Condition,

and hence don't pied-pipe the preposition along with the wh-word because they receive positive evidence that the parameterised P-Stranding Constraint is inoperative in English.

6. Summary and discussion of our main results

The research reported here set out to test whether the choice of goals for wh-movement in L2 grammars is constrained by universal principles (like the Constituency Condition) and parameterized constraints (like the P-Stranding Constraint and the Left Branch Condition). The overall results for violations of these three constraints which we obtained on our EPT and GJT studies of Japanese learners are presented in summary form in Tables 16 and 17 below[12]:

Table 16: Frequency of Constraint violations by Japanese Learners on the EPT task

Constraint Violation	Frequency
Constituency Condition Violation/CCV	0/247 (0.0%)
P-Stranding Violation/PSV	58/58 (100.0%)
Left Branch Violation/LBV	94/216 (43.5%)

Table 17: Mean JLE Acceptability Scores for Constraint violations on the GJT task

Constraint Violation	Mean score
Constituency Condition Violation/CCV	-0.68
P-Stranding Violation/PSV	1.04
Left Branch Violation/LBV	0.42

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[12] In Table 16, CCV figures are derived from Tables 2-7 and 9-10, PSV figures from Tables 9-10, and LBV figures from Tables 2-7 and 10. In Table 17, CCV scores represent the means of the scores for (60b, 61b, 62b, 63b, 65b, 67b, 68b), PSV scores are the means for (67c, 68c), and LBV scores are the means for (60c, 61c, 62c, 63c, 64d, 65c).

In Table 17, a statistical comparison of the mean overall acceptance rates for the three conditions (-0.68 for Constituency Condition Violations/CCV, 1.04 for Preposition Stranding Violations/PSV, and 0.42 for Left Branch Violations/LBV) using a one-way ANOVA employing the Bonferroni Method showed no significant difference within overall mean scores for each condition. The main effect within the three mean JLE scores in Table 17 is significant (F (2, 72) = 46.833, MSe = 0.600, p < .01). There are significant differences respectively between CCV (-0.68) and PSV (1.04) (p < .01), CCV (-0.68) and LBV (0.42) (p < .01), PSV (1.04) and LBV (0.42) (p < .05: p = .010).

In the light of the results summarized above, we return to consider the central question which the research reported here set out to investigate, namely whether universal and parameterized constraints operate in L2 grammars. In relation to universal constraints, the answer seems to be straightforward. There were no (0/247) violations of the universal Constituency Condition produced by the overall group of learners on the EPT experiment, and structures violating the Constituency Condition received a very low overall acceptance score of -0.68. Furthermore, as our discussion in the main text shows, the structures produced by the learners can be argued to conform to other universal constraints as well.

Our experiments also yield strong evidence that neither of the two parameterised constraints discussed here (viz. the P-Stranding Constraint and the Left Branch Condition) operate in JLE grammars. In relation to PSC, we find that the JLEs never pied-piped prepositions along with a preposed wh-object in the EPT experiment, and that they awarded a high mean acceptance score of 1.04 for preposition-stranding structures on the GJT task. In relation to LBC, we find that 43.5% of the structures produced by the JLEs on the EPT task involved Left Branch violations, and that the JLEs showed a positive overall acceptance score of 0.42 for Left Branch violations on the GJT task. How can these results be accounted for?

Consider first whether they can be accounted for by an input-based model of L2 parameter setting, under which parameters are set purely on the basis of positive evidence from the L2 input which learners receive (perhaps using a parameter-setting strategy along the lines of 'Assume that constraint C is operative in language L unless you have strong positive evidence

from input that L permits C to be violated'). If JLEs assume that PSC is operative unless they have strong positive evidence from input that PSC violations are permitted, we can provide a relatively straightforward account of how JLEs come to assume that PSC is inoperative in English. Since, as we see from Table 8, the overwhelming majority (79.3%) of clauses in their coursebooks containing a fronted prepositional wh-object show preposition stranding, JLEs have abundant positive evidence from P-stranding in their input that PSC can be violated (and so is inoperative) in English[13]. However, what is more difficult to account for if L2 parameter-setting is purely input-driven is why JLEs assume that LBC is inoperative in English and so produce (and accept) left branch violations. After all, if learners adopt a parameter-setting strategy for LBC along the lines of 'Assume that LBC is operative unless you have strong positive evidence that Left Branch extraction is permitted', then since they receive no positive evidence from their input that English allows Left Branch extractions, a purely input-based model of parameter-setting would lead us to expect that they will assume that LBC is operative in English, and hence not produce or accept Left Branch violations. In short, an input-based model of parameter-setting provides a straightforward account of why PSC is inoperative in JLE grammars, but not of why LBC is also inoperative.

By contrast, the assumption that parameter-settings are transferred from L1 to the initial grammars developed by L2 learners can provide a more straightforward account of the LBC violations produced and accepted by JLEs, in that because LBC is inoperative in Japanese, JLEs assume that LBC is also inoperative in English. However, by the same token, we would expect JLEs to initially transfer the positive setting for PSC in their L1 Japanese (viz. 'PSC is operative') into their L2 English, and so not to produce or accept P-stranding structures. But this is not the case, since we have abundant evidence that JLEs produce and accept P-stranding structures. Why should this be? A plausible answer is that L2 learners can re-set parameters if they receive sufficient positive evidence from their input to suggest that the L1 setting for a given parameter is inappropriate for L2. It follows from this assumption that exposure to P-stranding in their input provides them with positive evidence that PSC is inoperative in

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[13]   Note, however, that we have to assume that (during early stages of acquisition at least) they disregard the minority of utterances in their input which show preposition-pied-piping. This may be because they operate with the assumption (for which there is robust evidence in the simplified input that their coursebooks provide them with) that wh-questions in English always begin with a wh-word.

English. By contrast, the only direct evidence they could in principle receive which would enable them to deduce that LBC is operative in English is the absence of left branch extractions in their input: but such evidence is negative by nature and hence unavailable to language learners (if learning is driven by positive evidence only)[14].

The three main conclusions which the research reported here leads us to are (i) that universal constraints operate in L2 grammars, (ii) that the settings of parameterized constraints are initially transferred from L1 to L2, and (iii) parameters can only subsequently be re-set where L2 input provides sufficient positive evidence of the need to do so. Our overall conclusions are thus compatible with *Full Transfer Full Access* model developed of Schwartz and Sprouse (1994, 1996) and White (2003), under which L2 learners have full access to universal constraints and transfer all parameter settings from their L1 grammar to their initial L2 grammar.

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[14] A question raised by our analysis is how more advanced learners eventually come to realise that left branch extractions are not permitted in English. One possibility is that JLEs could learn a condition extensionally equivalent to LBC as part of their explicit knowledge, e.g. from having left branch extractions corrected by their teachers. This would imply that explicit (but not implicit) knowledge could be acquired on the basis of negative evidence. An alternative possibility is that learners exposed to structures like *What colour would you like?* receive indirect positive evidence that LBC is operative in English. After all, doesn't the fact that the noun *colour* is pied-piped along with the wh-quantifier *what* provide indirect evidence that LBC must prevent *what* from moving on its own? The answer is 'Not necessarily', because Wh-Movement serves the semantic function of focusing the fronted constituent, so that the noun *colour* could be fronted because it is focused rather than because LBC would be violated if it were stranded.

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