Wh-Movement

For notational convenience, I have used traces (t_i, t_j etc.) to indicate copies throughout this handout.

1 *Wh*-Movement

Question formation involves fronting of the questioned element (e.g. in the Germanic, Romance and Slavic languages). Typically this fronting is obligatory.

(1)   a.   Who$_i$ does Martin like t_i?

    b.   *Martin likes who?

The * on (1b) refers to the fact that (1b) is not a possible information seeking question. It can be used as an *echo* question though.

The process of question formation in English involves two distinct movements: I-to-C movement and fronting of an interrogative phrase. The two movements are independent of each other. I-to-C movement can take place without interrogative phrase fronting and interrogative phrase fronting can take place without I-to-C movement.

(2)   a.   Y/N Questions: I-to-C but no fronting:
      Has Martin left?
      Did Martin leave?

    b.   Embedded Questions: fronting but no I-to-C:
      I wonder [who John will annoy today].
      ???/*I wonder [who will John annoy today].
      I wonder [who John annoyed today].
      ???/*I wonder [who did John annoy today].

Since most interrogative pronouns in English (the exception is *how*) start with *wh*, the process by which interrogative phrases are fronted is referred to as *wh*-movement.

1.1 Pied-piping

Wh-movement is triggered by the presence of an interrogative pronoun. We can assume that interrogative pronouns have a [+wh] feature that forces them to move.

(3)   Who$_i$ does Derek like t_i?

Wh-movement can also be triggered by *wh*-determiners.

(4)   [Which doctor]$_i$ does Derek like t_i?

Presumably the *wh*-determiner's [+wh] feature percolates and makes the entire phrase *which doctor* count as a *wh*-phrase.

Since possessors in English seem to occupy the same syntactic position as *wh*-determiners, it is not surprising that when interrogative pronouns function as possessors, their [+wh] feature percolates and makes the entire phrase into a *wh*-phrase.

(5)   a.   [Whose doctor]$_i$ does Derek like t$_i$?
           [[Which person]'s doctor]$_i$ does Derek like t$_i$?

        b.   [[Whose doctor]'s brother]$_i$ does Derek like t$_i$?
           [[[Which person]'s doctor]'s brother]$_i$ does Derek like t$_i$?

From a certain perspective, in (5), it is only *whose* or *which person* that needs to move. However in order to move *whose* or *which person*, we need to take along a bigger constituent that contains it. This process is called **pied-piping**.

In (5), if we try to move something smaller than the phrase that actually moves, we get ungrammaticality.

(6)   a.   *[Whose]$_i$ does Derek like [t$_i$ doctor]?
           *[Which person]'s$_i$ does Derek like [t$_i$ doctor]?
           *[Which]'s$_i$ does Derek like [[t$_i$ person]'s doctor]?

        b.   *[Whose doctor]'s$_i$ does Derek like [t$_i$ brother]?
           *[Whose$_i$ does Derek like [[t$_i$ doctor]'s brother]?
           *[[Which person]'s doctor]'s$_i$ does Derek like [t$_i$ brother]?
           *[Which person]'s$_i$ does Derek like [[t$_i$ doctor]'s brother]?
           *[Which]$_i$ does Derek like [[[t$_i$ person]'s doctor]'s brother]?

There are cases when pied-piping is optional. This is often the case with *wh*-phrases that are complements of prepositions. *wh*-complements of prepositions are also able to percolate their [+wh] feature to the entire PP.

(7)   a.   [To whom]$_i$ will Derek give a present t$_i$?

        b.   [On which table]$_i$ did Derek put the book t$_i$?

1.2   Preposition Stranding

Pied-piping of the preposition is not obligatory in (7). It is also possible to leave the prepositions behind and just move the *wh*-phrase.

(8)   a.   [Whom]$_i$ will Derek give a present to t$_i$?

        b.   [Which table]$_i$ did Derek put the book on t$_i$?

This process is known as **preposition stranding**.

Preposition stranding is not possible in Latin and in any Romance language.

(9)   French

        a. Stranding

           *Qui as-tu   parlé de?
           who have-you talked about

        b. Pied-piping

De   qui as-tu   parlé?
about who have-you talked

'Who have you talked about?'

(10)   Italian

    a. Stranding

      *Cui hai   parlato di?
      who have-you talked about

    b. Pied-piping

      Di   cui hai   parlato?
      about who have-you talked

      'Who have you talked about?'

Preposition (or rather postposition) stranding also does not seem to be an option in any postpositional language such as Japanese, Korean, Hindi, Kashmiri etc.

Prescriptive grammarians suggest that it is to be avoided in English too, but there seems to be little other reason to avoid it. In fact, in certain environments pied-piping of prepositions that could have been stranded feels artificial and stilted.

Sometimes the pull of prescriptive grammar (pied-pipe, don't strand!) and the syntax of English (strand!) is met simultaneously in curious sentences like the following.

(11)   a. [To whom] did you give the book to __ ?

    b. [To whom] are you referring to __ ? (M. Key p.c.)

2   Island Phenomena

Wh-Movement is unbounded i.e. a *wh*-phrase can move unboundedly far from the clause where it is merged.

(12)   a. Who$_i$ does Magnus like t$_i$?

    b. Who$_i$ did Loida think that Magnus liked t$_i$?

    c. Who$_i$ did Agustin believe that Loida thought that Magnus liked t$_i$?

    d. . . .

However, it is not always possible to move a *wh*-phrase from one location to another. Configurations from which extraction is not possible are called **islands**.

2.1   Adjunct Islands

An important class of island consists of *adjunct clauses*. Adjunct clauses are very robust islands and do not allow any kind of expression to be extracted out of them.

Extraction out of Adjunct Clauses:

(13)   *because* clauses

    a. John is unhappy because Sally likes Molly.

b. *Who$_i$ is John unhappy because Sally likes t$_i$?

(14) *when* clauses

    a. John is unhappy when Sally hits Molly.

    b. *Who$_i$ is John unhappy when Sally hits t$_i$?

(15) *if* clauses

    a. John will be unhappy if Sally hits Molly.

    b. *Who$_i$ will John be unhappy if Sally hits t$_i$?

(16) Relative clauses

    a. Olafur likes the artist who composed *Hyperballad*.

    b. *What$_i$ does Olafur like the artist who composed t$_i$?

2.2 Complex NP Islands

The term Complex NP refers to NPs that contain a complement CP. (17a) involves a Complex NP, while (17b) does not.

(17) a. [the [$_{NP}$ [$_{N^\circ}$ claim] [$_{CP}$ that Bill is insane]]]

    b. [the [$_{NP}$ [$_{NP}$ claim] [$_{CP}$ that Bill made]]]

We have already seen that relative clauses are islands. Next we see that Complex NP are also islands:

(18) a. Olafur believes [the claim [that Björk composed *Hyperballad*]].

    b. *What$_i$ does Olafur believe [the claim [that Björk composed t$_i$]]?

    c. Olafur believes [that Björk composed *Hyperballad*].

    d. What$_i$ does Olafur believe [that Björk composed t$_i$]?

The minimal pair formed by (18b) and (18d) shows that it is the extra NP layer in (18b) that is responsible for the island.

2.3 *Wh*-islands

Another class of island is exemplified by the *wh*-islands shown below. These islands are *weak* in that extraction of arguments seems to only cause degradation and not ungrammaticality.

(19) a. I wonder [whether to invite Preston].

    b. ?Who$_i$ do you wonder [whether to invite t$_i$]?

    c. Mary wonders whether Will invited Preston.

    d. ?? Who$_i$ does Mary wonder whether Will invited t$_i$?

Infinitival *whether* questions are the weakest *wh*-islands. Finite *whether* questions are a little harder to extract from, but still much better than extraction from non-*whether* questions.

(20) a. Tina is wondering [what to give to Mona for Xmas].

        b. ???Who$_i$ is Tina wondering [what to give to t$_i$ for Xmas]?

        c. Tina is wondering [what Lisa gave to Mona for Xmas].

        d. ???/*Who$_i$ is Tina wondering [what Tom gave to t$_i$ for Xmas]?

In general long-extraction of adjuncts in possible - since in principle, a *wh*-moved adjunct could be associated with either the matrix or the embedded clauses, cases like the following are ambiguous (at least in principle).

(21) (adjunct can be associated with either the matrix clause or the embedded clause)

        a. When did John say that Mary left?

        b. Where did John say that Mary left?

        c. How did John say that Mary left?

        d. Why did John say that Mary left?

But extraction of adjuncts out of *wh*-islands, however, leads to ungrammaticality.

(22) a. Mark is wondering [whether to eat lunch in the park].

        b. ???/*Where is Mark wondering [whether to eat lunch]?

        c. Mark wonders [whether she should fix her car today].

        d. ???/*When$_i$ does Mark wonder [whether she should fix her car t$_i$]?

        e. Mark wonders [whether to thoroughly clean his car today].

        f. *How$_i$ does Mark wonder [whether to t$_i$ clean his car today]?

        g. Mark is wondering [whether to clean his car [to impress Tom]].

        h. *Why$_i$ is Mark wondering [whether to clean his car t$_i$].

Because of this asymmetry (arguments vs. adjuncts), *wh*-islands are sometimes called selective-islands.

The existence of *wh*-islands can be related to the fact that deriving these involves skipping an already filled [Spec,CP] position. This is similar to what we found for A-movement. Note though that the argument-adjunct asymmetry that we find with *wh*-islands does not follow directly from the 'do not skip intervening [Spec,CP]' requirement on *wh*-movement.

2.4 Subject-Object Asymmetries

Subject-Object Asymmetries: All arguments are not created equal. It seems to be easier to extract objects rather than subjects. Further it seems to be impossible to extract from subject but it is possible to extract out of objects.

2.4.1 Comp-trace Effects

Comp-trace effects: It is not possible to extract from the subject position in the presence of on overt Complementizer.

(23) *_that_-trace

    a. Who$_i$ do you think t$_i$ likes Mary?

    b. *Who$_i$ do you think that t$_i$ likes Mary?

    c. Who$_i$ do you think that Mary likes t$_i$?

    d. Who$_i$ do you think Mary likes t$_i$?

(24) *_for_-trace

    a. Ásta would prefer for Einar to marry Hafdis.

    b. *Who$_i$ would Ásta prefer for t$_i$ to marry Hafdis?

    c. *Who$_i$ would Ásta prefer t$_i$ to marry Hafdis?

    d. Who$_i$ would Ásta prefer for Einar to marry t$_i$?

(25) *_if_-trace

    a. Tim wonders [if [Maya will marry Mira]].

    b. *Who$_i$ does Tim wonder [if [t$_i$ will marry Mira]]?

    c. ?Who$_i$ does Tim wonder [if [Maya will marry t$_i$]]?

    d. *Who$_i$ does Tim wonder [ϕ [Maya will marry t$_i$]]?

    (_if_ is an interrogative Y/N question complementizer.)

Interestingly, even though _whether_ is typically located in [Spec,CP] (as opposed to C^0), it causes Comp-Trace effects along the lines of _if_.

(26) *_whether_-trace

    a. Tim wonders [whether [Maya will marry Mira]].

    b. *Who$_i$ does Tim wonder [whether [t$_i$ will marry Mira]]?

    c. ?Who$_i$ does Tim wonder [whether [Maya will marry t$_i$]]?

    d. *Who$_i$ does Tim wonder [ϕ [Maya will marry t$_i$]]?

These effects seem to be even more general:

(27) a. Tim wonders [who will review his book].

    b. ?Which book$_i$ does Tim wonder [$_{CP}$who$_j$ [t$_j$ will review t$_i$]]?

    c. Tim wonders [[which book]$_i$ [Mark will review t$_i$]].

    d. *Who does Tim wonder [[which book]$_i$ [t$_j$ will review t$_i$]]?

(27d) can be ruled out by locality considerations. However, a wider conclusion is also possible:

(28) One cannot extraction from a subject position if the immediately higher C-domain (C^0 or [Spec,CP]) are filled.

6

2.4.2 Sentential Subjects

Extraction from out of a clause in subject position: we know that the clausal arguments of adjectives can appear after the adjective (in the object position) or in the subject position. It turns out that extraction out of such clauses is possible only if they appear in the object position.

(29) a. It is important to invite Will to our party.

      b. (?) Who$_i$ is it important to invite t$_i$ to our party?

      c. To invite Will to our party is important.

      d. * Who$_i$ is to invite t$_i$ to our party important?

(30) a. It is probable that Bill likes Einar.

      b. Who$_i$ is it probable that Bill likes t$_i$?

      c. That Bill likes Einar is probable.

      d. *Who$_i$ is that Bill likes t$_i$ probable?

However, there is convincing evidence that clauses cannot appear in subject position i.e. the TPs in (29/30c) are actually not in subject position, but in an adjoined position from where they bind a trace/null pronoun in subject position. See Koster (1978) for details.

• Evidence from inversion in Y/N questions:

(31) a. Is it important [to invite Will to our party]?

      b. *Is [to invite Will to our party] important?

      c. Is [inviting Will to our party] important?

(32) a. Is it probable [that Bill likes Einar]?

      b. *Is [that Bill likes Einar] probable?

      c. Is [Bill's liking Einar] probable?

In contrast to finite/non-finite clauses, gerunds (which are NPs) allow inversion.

• Lack of embedding:

(33) No sentential subjects in sentential subjects:

      a. [That [[the answer] was so obvious]] upset Ora.

      b. *[That [[that the code was a Ceaser cipher] was so obvious]] upset Ora.

      c. [That [[the code's being a Ceaser cipher] was so obvious]] upset Ora.

(34) No sentential subjects in embedded complement clauses:

      a. *Aniko thinks [that [[that [[the answer] was so obvious]] upset Ora]].

      b. Aniko thinks [that [[[the answer] being so obvious] upset Ora]].

2.4.3 Extraction out of NP

Extraction out of a clause embedded in an NP in subject position: Extraction from a clause embedded in an NP leads to degradation. We find the familiar argument-adjunct asymmetry at work - extraction of arguments leads to a minor degradation while extraction of adjuncts leads to ungrammaticality.

(35) Complex NP Islands (in object position)

    a. John heard [a rumor that you had read the Sandman comics].

    b. ?[Which book]$_i$ did John hear [a rumor that you had read t$_i$]?

    c. John announced [a plan to fix the red car].

    d. [Which car]$_i$ did John announce [a plan to fix t$_i$]?

    e. *How$_i$ did John announce [a plan to fix the red car t$_i$]?

However, in all of the above examples, the NP from which we were extracting was in object position. If the relevant NP is placed in subject position the previously marginal but grammatical example becomes wholly ungrammatical.

(36) Complex NP Islands (in subject position)

    a. [A rumor that you read the Sandman comics] has been circulating.

    b. *[Which book]$_i$ has [a rumor that you read t$_i$] been circulating?

Extraction out of PPs embedded inside NPs displays the same pattern. Extraction from subject NPs leads to ungrammaticality while extraction from object NPs is grammatical (though perhaps slightly marginal).

(37) a. What$_i$ should I bring [a bottle of t$_i$]?

    b. *What$_i$ should [a bottle of t$_i$] be brought?

3 The Basics of *wh*-Movement

(38) Who$_i$ does John think [that Mary likes t$_i$]?

    a. [$_{CP}$ that [Mary likes *who*]]

    b. [$_{CP}$ who$_i$ that [Mary likes *who*]]

    c. John think [who$_i$ that [Mary likes *who*]]

    d. I^0+C^0 [John think [who$_i$ that [Mary likes *who*]]]

    e. [$_{CP}$ Who I^0+C^0 [John think [who$_i$ that [Mary likes *who*]]]?

• The *wh*-phrase is merged in its θ-position.

• If it needs to move for EPP reasons, it does.

• After having received Case, the *wh*-phrase A'-moves. A'-movement, like A-movement, is successive cyclic. It moves through all intervening [Spec,CP] positions.

• The movement of the *wh*-phrase is triggered by a C^0 with a strong [uWh] feature. The moved *wh*-phrase ends up occupying the [Spec,CP] of the C^0 that triggers the movement.

This can be seen in the following example where either the matrix C^0 or the embedded C^0 can be [+Q].

(39) a. Missy knows [$_{CP}$[which car]$_i$ C^0[+Q] [Mary bought t$_i$]].

   b. (?) [Which car]$_i$ does[+Q] [Mary know [$_{CP}$t$_i$ C^0[-Q] [Mary bought t$_i$]]]?

4 Handling Island Effects

4.1 Strong Island Effects

Extraction out of adjunct clauses and out of subjects triggers strong island effects.

• The notion of the **verbal spine**.

• Only elements on the verbal spine can be extracted.

• Though subjects and adjunct clauses are themselves on the verbal spine, XP's inside subjects and adjunct clauses are not on the verbal spine. Thus they cannot be attracted. In other words, they are not 'visible' to the attractor.

4.2 Weak Island Effects

There are syntactic environments out of which extraction of arguments is degraded but is not impossible. Extraction of adjunctions is, however, impossible. Such environments are often referred to as weak or selective islands.

Wh-islands and Complex NP-islands are both weak islands.

(40) *wh*-islands

   a. Argument extraction:
      ? Who$_i$ do you wonder [whether PRO to invite t$_i$]?

   b. Adjunct Extraction:
      * When$_i$ do you wonder [whether PRO to invite Bill t$_i$]?

(41) Complex NP-islands

   a. Argument extraction:
      ? [Which book]$_i$ did John hear [a rumor [that you had read t$_i$]]?

   b. Adjunct extraction:
      * When$_i$ did John hear [a rumor [that you had read LGB t$_i$]]?

The variable behavior of arguments and adjuncts has been handled in the literature through two independent principles, the ECP, and Subjacency.

(42) **The Empty Category Principle**: empty categories must be either head governed or antecedent governed.

The definition of the ECP makes reference to the notion of **government**. In current terms, government can be thought of as identification. Arguments are subcategorized and thus when they are moved, the absence of an overt element is visible. On the other hand, this is not the case with adjuncts. This distinction between adjuncts and arguments is captured by the proposal that predicates head-govern the copies of their arguments but not the copies of adjuncts.

Antecedent Government is the idea that a moved phrase cannot be *too* far from its copy. A moved phrase that is near its copy antecedent governs its copy. By 'near', we mean within the smallest NP/CP.

The notion of Antecedent Government also reappears in the related principle of Subjacency.

(43) **Subjacency**: Two consecutive links of a chain can be separated by at most one NP/IP node.

If a movement violates subjacency, then there is no **antecedent government** between the two links of the chain that violate subjacency.

Subjacency seems to be a weak constraint. As long as the movement chain only violates subjacency and not the ECP, we only find a minor degradation in acceptability.
The ECP, on the other hand, triggers a strong violation leading to outright ungrammaticality.

Now, we can explain why there is an argument vs. adjunct asymmetry with *wh*-islands/Complex NP islands. Objects are sisters to a head (i.e. **head-governed**), so they do not need **antecedent government** to satisfy the ECP. Long-movement of objects as we see below violates subjacency, which is responsible for the degradation in acceptability.

(44) Subjacency violations, No ECP violation

   a. ?**Which car** is [$_{IP}$ John wondering [$_{CP}$ whether C^0 [$_{IP}$ PRO to fix *which car*]]]?

   b. ?**Which car** did [$_{IP}$ John announce [$_{NP}$ a plan [$_{IP}$ PRO to fix *which car*]]]?

Adjuncts, however, are not properly governed. So for adjunct chains to satisfy the ECP, each link must be antecedent governed by the immediately higher link. If we long-move an adjunct, the antecedent government requirement fails and the ECP kills the derivation.

(45) Subjacency violation and ECP violation

   a. *****How** is [$_{IP}$ John wondering [$_{CP}$ whether C^0 [$_{IP}$ PRO to fix the red car *how*]]]?

   b. *****How** did [$_{IP}$ John announce [$_{NP}$ a plan [$_{IP}$ PRO to fix the red car *how*]]]?

5   Other Environments for A'-Movement

• Relative Clauses

(46) Finite Relative Clauses

   a. the man who Roland met

   b. the man who Susan thinks that Roland met

   c. *the man who Susan likes the boy who gave a book to

   d. ??the car that Bill knew how John had fixed

(47) Infinitival Relative Clauses

   a. I found a book for you to read.

   b. I found a book for you to arrange for Mary to tell Bill to give to Tom.

   c. *I found a book for you to arrange for Mary to meet the boy who gave to Tom.

   d. ???I found a book for you to wonder whether to read.

- Topicalization

(48)   a.   This book, I really like.

      b.   This book, I asked Bill to get his students to read.

      c.   *This book, Susan likes the boy who gave to Roland.

      d.   ??This book, I wonder who read.

- *It*-Clefts, Pseudoclefts

(49)   *it*-clefts

      a.   It is this book that I really like.

      b.   It is this book that I asked Bill to get his students to read.

      c.   *It is this book that Susan likes the boy who gave to Roland.

      d.   ??It is this book that I wonder who read.

- *Tough*-movement

Tough-movement is the name given to a certain kind of displacement found in complements of adjectives like *easy/tough* etc.

(50)   a.   John is easy for us to please.

      b.   John is easy for us to convince Bill to do business with.

      c.   *John is easy for us to introduce Mary to the woman who loves.

      d.   *What is John easy to give to?
         (* compare with: John is easy to give presents to *)

In addition to the above constructions, A'-movement is also found in comparatives, and degree clauses (e.g. 'John is tall enough for you to see.'). The element that A'-moves in many of these constructions is a covert element, sometimes called a **null operator**. The constructions where a null operator appears are called **null operator constructions**.

6   Some Properties of Movement

- Islands

6.1   Properties of A'-Movement

- Strong and Weak Crossover

Strong Crossover: a pronoun cannot bind a *wh*-chain it c-commands.

(51)   a.   *Who$_i$ does he$_i$ think t$_i$ left?
         (* bad on the reading: who is such that he thinks that he left? *)

      b.   *Who$_i$ does he$_i$ think you saw t$_i$?
         (* bad on the reading: who is such that he thinks that you saw him? *)

      c.   Who$_i$ t$_i$ thinks that he$_i$ left?

      d.   Who$_i$ t$_i$ thinks that you saw him$_i$?

Weak Crossover: If a *wh*-chain and a pronoun are co-indexed, the tail of the *wh*-chain must c-command the pronoun.

(52)   a. Who$_i$ t$_i$ loves his$_i$ mother?

        b. *Who$_i$ does his$_i$ mother love t$_i$?
           (* bad on the reading: Who is such that his mother loves him? *)

Recall that weak-crossover is also found with quantifiers.

(53)   a. Every boy$_i$ likes his$_i$ mother.

        b. *His$_i$ mother likes every boy$_i$.
           (* bad on the reading that (a) had. *)

This (among other things) has led people to propose that quantifiers also move by A'-movement. However, this movement is covert and takes place at LF (the level of **Logical Form**). At this level the configurations with quantifiers and *wh*-phrase are identical.

(54)   a. Every boy$_i$ [t$_i$ likes his$_i$ mother].

        b. *Every boy$_i$ [his$_i$ mother likes t$_i$].

A-movement, on the other hand, does not trigger WCO.

(55)   Every boy$_i$ seems to his$_i$ mother [t$_i$ to be intelligent].

• Licensing of Parasitic Gaps

(56)   Which book$_i$ did John file t$_i$ [without reading t$_i$]?

The second gap, inside the *without reading* clause, is called a **parasitic** gap because it depends upon the main gap (associated with **file**) for its existence. This can be seen below:

(57)   a. *John filed *Oresteia* [without reading *pg*].

        b. John filed *Oresteia* [without reading it].

Only A'-movement is able to license parasitic gaps. A-movement is not able to license parasitic gaps.

(58)   a. *This book was filed [without reading *pg*].

        b. *This book seems to have been filed [without reading *pg*].

• Case Requirement on the launch site of A'-movement:
A'-movement is not case-driven. The *tail* of an A'-chain must always receive case. This is in contrast to the *tail* of a non-trivial A-chain, which must not receive case.

The case-requirement is nicely exemplified by relative clauses in which there is null-operator movement.

(59)   a. * the student [Op$_i$ [Mary is fond t$_i$]]

        b. * the student [Op$_i$ [Mary is fond of t$_i$]]

References

Koster, J. (1978) "Why subject sentences don't exist," in S. J. Keyser, ed., *Recent Transformational Studies in European Languages*, Linguistic Inquiry Monographs 3, MIT Press, Cambridge, MA, 53–64.