On the Order of Syntactic Operations

Lecture 4: Gaps in the Parameter Space: Restrictions on Cross-Linguistic Variation

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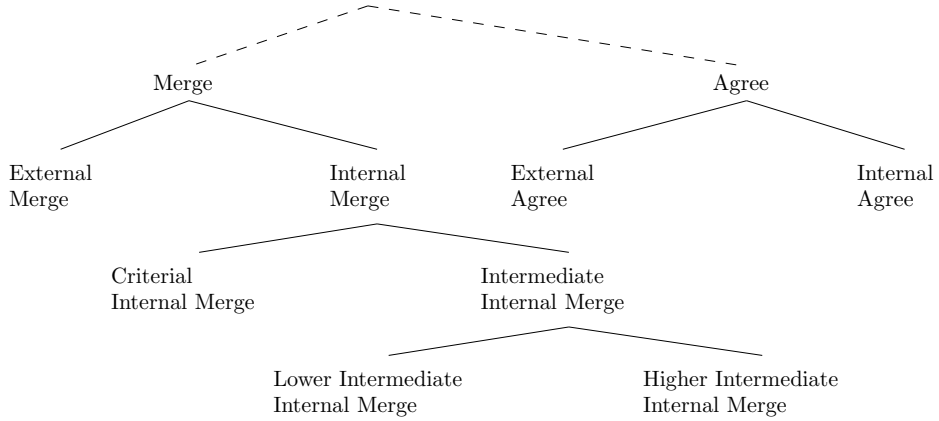
1. Introduction

Evidence concerning ordering as it has emerged so far:

- Merge vs. Agree: extrinsic (parochial) order (lectures 2, 3).
  Both orders are possible; decisions are made on a lanaguage-particular basis (or at least uniformly for the nominal and verbal domains of a language).
- External Merge vs. Internal Merge: fixed order: Merge before Move (lecture 1; lecture 2).
- Criterial Move vs. Intermediate Move: Criterial Move precedes intermediate Move (lecture 1).
- External Agree vs. Internal Agree: Specifier-Head Bias, External Agree before Internal Agree (lectures 2, 3).

Proposal:
Apart from Merge and Agree, there is *no* parochial ordering among elementary syntactic operations.

(1) *The Order of Syntactic Operations*:



(2) *Hypothesis*:
(i) The order of Merge and Agree is determined parochially.
(ii) All other orders are fixed: left precedes right.

Two Questions:

1. What does the evidence for the fixed orders look like?
   (And how can apparent counter-evidence be addressed?)
2. What do the fixed orders follow from?

2. Fixed Orders

2.1 External Merge before Internal Merge

Note:
This is Chomsky's (2000) Merge before Move principle; see lecture 1.
Merge before Move (Chomsky (2000), Frampton & Gutmann (1999)):
Suppose that the derivation has reached stage Σ_n, and Σ_{n+1} is a legitimate instance of Merge, and Σ'_{n+1} is a legitimate instance of Move. Then, Σ_{n+1} is to be preferred over Σ'_{n+1}.

2.1.1 Expletive Constructions in English

(3) *Expletive constructions in English*:
a. There$_1$ seems [$_{\text{TP}}$ t$_1$ to be [$_{\text{PP}}$ someone$_2$ in the room]]
b. *There$_1$ seems [$_{\text{TP}}$ someone$_2$ to be [$_{\text{PP}}$ t$_2$ in the room]]

Recall from lecture 2:
Merge before Move plays a role in the analysis of the ban on ergative movement developed in Assmann et al. (2012). In order to ensure that there an accusative pattern of argument encoding does not arise with multiple movement in an ergative system, Merge of the external argument must precede Move of the internal argument to Specv (so that it occupies a higher specifier).

Note:
There is more evidence for Merge before Move; see Frampton & Gutmann (1999), Hornstein (2001; 2009), Castillo, Drury & Grohmann (2009), Boeckx, Hornstein & Nunes (2010), Drummond (2011), Weisser (2013), Witkoś (2013), among others.

2.1.2 Control into Adjuncts

An argument for Merge before Move from object control (Hornstein (2001; 2009), Boeckx, Hornstein & Nunes (2010)):
Merge before Move, together with the Movement Theory of Control (MTC) and the idea of sideward movement, predicts that objects cannot control into adjuncts, whereas subjects can.

(4) *No object control into adjuncts*:
John$_1$ saw Mary$_2$ [before PRO$_{1,*2}$ leaving the party]

Hornstein's analysis of the impossible derivation:
(i) At the relevant point in the derivation, there are two workspaces: *[before $PRO_{1,*2}$ leaving the party]* is in the first one, *saw* is in the second one; $John_1$ is still in the numeration.
(ii) For object control, $Mary_2$ would have to sideward-move out of the adjunct and attach to the main verb *saw*; given Merge before Move, the preferred option will be Merge of $John_1$ from the numeration, followed by movement of $Mary_2$ to matrix subject position, yielding subject control.

(5) *Object control into complements* (minimality):
$John_1$ persuaded $Mary_2$ [$PRO_{*1,2}$ to leave]

2.1.3 Left-Subordinating and-Constructions

Another argument for Merge before Move: Weisser (2013) on extraction from second conjuncts in the English *left-subordinating and-constructions*.

(6) *Left-subordinating and-constructions: conditional interpretation* (Culicover & Jackendoff (2007)):
(You drink) one more can of beer and I'm leaving

Observation:
The construction permits asymmetric extraction from only one conjunct; either the left one (which is irrelevant in the present context) or the right one.

(7) *Extraction in apparent violation of the Coordinate Structure Constraint*:
a. ?This is the loot Op_1 that [you just identify t_1] and [we arrest the thief on the spot]
b. ?This is the thief Op_2 that [you just identify the loot] and [we arrest t_2 on the spot]
c. *This is the thief OP_2 that [you have identified the loot] and [we have arrested t_2 on the spot]

Weisser's analysis:
(i) The construction involves two TPs, TP_1 and TP_2.
(ii) Initially, TP_1 is a part of TP_2.
(iii) TP_2 is first merged with &:*and*.
(iv) TP_1 undergoes movement out of TP_2 to Spec&.

(8) *Structure of English left-subordinating 'and'-constructions*:
$[_{\&P}\ TP_1\ [_{\&'}\ \&\ [_{TP_2}\ T\ [_{vP}\ t_1\ [_{vP}\ \ldots\ ]]]]]$

(9) *Coordinate Structure Constraint* (based on Ross (1967)):
In a coordinate structure $[_{\&P}$ A $[_{\&'}$ & B]], no conjunct may be moved, nor may any element contained in a conjunct be moved out of that conjunct.

Why (7-b) is possible:

Movement from TP_2 (first to an intermediate phase edge, viz. Spec&P) precedes movement of TP_1 to Spec&; such an extraction happens at a stage of the derivation when there is no coordinate structure yet in the sense of (9).
(This is thus an instance of *counter-bleeding*: Raising of TP_1 would bleed (further) extraction from TP_2 (via creation of a CSC island), but it doesn't because it comes too late.)

Question:
Why is this option not available for regular coordination, given that there should also be a stage of the derivation where the second conjunct has merged with &, and the first conjunct is not yet present?

Answer:
For regular coordination, such a derivation is blocked by *Merge before Move* because the first conjunct is generated by Merge.

Final question:
There is a lot of evidence for Merge before Move; is there evidence for Move before Merge in the literature? Perhaps there is (Shima (2000), LI, e.g.); but there is certainly much less around, and it can arguably all be accounted for in some other way.

2.2 Criterial Internal Merge before Intermediate Internal Merge

Recall from lecture 1:

Criterial vs. intermediate movement steps (Georgi (2013)):

- There are two types of internal Merge: criterial internal Merge and intermediate internal Merge.
- Internal Merge may bleed Agree with a subject (e.g., anti-agreement in Berber).
- Either both types of internal Merge bleed Agree, or none of them does, or criterial internal Merge does and intermediate internal Merge does not; but the fourth possibility seems to be generally unavailable:
  - Criterial internal Merge, intermediate internal Merge > Agree
  - Agree > criterial internal Merge, intermediate internal Merge
  - Criterial internal Merge > Agree > intermediate internal Merge
  - *Intermediate internal Merge > Agree > criterial internal Merge

Observation:
Phenomena like anti-agreement with movement may hold for both criterial movement and intermediate movement, or for none of them, or they may hold for criterial movement, but not for intermediate movement steps.

(10) *Anti-agreement in Berber* (Ouhalla (1993)):

a. zri-n imhdarn Mohand
saw-3PL students Mohand
'The students saw Mohand.' reg. agreement

b. man tamghart ay yzrin Mohand
which woman COMP see.PART Mohand
'Which woman saw Mohand?' default agreement

c. *man tamghart ay t-rza Mohand
which woman COMP 3.SG.FEM-saw Mohand
'Which woman saw Mohand?' reg. agreement

d. man tamghart ay nna-n qa t-zra Mohand
which woman COMP said-3PL that 3SG.FEM-saw Mohand
'Which woman did they say saw Mohand? reg. agreement

(11) *Anti-agreement in Fiorentino* (Ouhalla (1993)):

a. Quante ragazze gli ha parlato con te ?
how.many girls CL.3SG have.3SG spoken to you
'How many girls (it) has spoken to you?'

b. *Quante ragazze le hanno parlato con te ?
how.many girls CL.3PL have.3PL spoken to you
'How many girls have spoken to you?'

c. Quante ragazze tu credi che gli ha telefonato ?
how.many girls you think that CL.3SG have.3SG phoned
'How many girls do you think have phoned?'

d. *Quante ragazze tu credi che le hanno telefonato ?
how.many girls you think that CL.3PL have.3PL phoned
'How many girls do you think have phoned?'

Georgi's approach in terms of specificity (Sanders (1974), Pullum (1979), van Koppen (2005), Lahne (2012)):

- Criterial internal Merge (triggered by specific features) is inherently more specific than intermediate internal Merge (triggered by general edge features).
- This predicts a universal ordering of criterial and intermediate Merge.

2.3 Lower Intermediate Internal Merge vs. Higher Intermediate Internal Merge

(12) *Freezing with traces in moved items*:

a. *Was$_1$ denkst du [$_{VP_2}$ t$_1$ gelesen] hat keiner t$_2$?
what think you read has no-one

b. *Was$_1$ hat [$_{VP_2}$ t$_1$ gelesen] keiner t$_2$?
what has read no-one

(13) *Anti-freezing with traces in moved items*:

a. [$_{VP_2}$ t$_1$ Gelesen] hat das Buch$_1$ keiner t$_2$
read has the book no-one

b. [$_\alpha$ t$_1$ Zu lesen]$_2$ glaubte sie [$_{CP}$ t$'_2$ habe keiner [$_{NP}$ das Buch]$_1$ t$_2$
to read believed she has$_{subj}$ no-one the book
versucht]
tried

c. ??[$_\alpha$ t$_1$ Zu lesen]$_2$ weiß ich nicht [$_{CP}$ was$_1$ sie t$_2$ versucht hat]
to read know I not what she tried has

(14) *A constraint on remnant movement*:

a. *dass [$_\alpha$ t$_1$ zu lesen]$_2$ keiner [das Buch]$_1$ t$_2$ versucht hat
that to read no-one the book$_{acc}$ tried has

b. *dass [$_\alpha$ t$_1$ zu lesen]$_2$ [das Buch]$_1$ keiner t$_2$ versucht hat
that to read the book$_{acc}$ no-one tried has

Generalizations:

1. *Freezing*:
A trace in a moved item leads to illformedness when its antecedent is outside of the moved item and c-commands the trace. *transparent interaction*

2. *Anti-Freezing*:
A trace in a moved item does not have to lead to illformedness when its antecedent is outside of the moved item and does not c-command the trace. *remnant movement, counter-bleeding*

3. *Müller-Takano Generalization* (cf., e.g., Pesetsky (2012); based on Müller (1993), Takano (1994)):
Remnant XPs cannot undergo Y-movement if the antecedent of the unbound trace has also undergone Y-movement.

Observation:
If there are no intermediate traces (except for those in SpecC), the generalizations can straightforwardly be derived from standard assumptions about movement.

(15) *Condition on Extraction Domain* (CED; Huang (1982), Chomsky (1986), Browning (1987), Cinque (1990)):

a. Movement must not cross a barrier.
b. An XP is a barrier iff it is not a complement.

(16) *Strict Cycle Condition* (Chomsky (1973), Perlmutter & Soames (1979)):
Within the current cyclic node α, a syntactic operation may not target a position that is included within another cyclic node β that is dominated by α.

- *Freezing*:
Movement of XP_2 must precede movement of XP_1 (which targets a higher position). This violated the CED or the Strict Cycle Condition.

- *Anti-freezing*:
  Movement of XP_2 must follow movement of XP_1 (which targets a lower posiiton). This respects both the CED and the Strict Cycle Condition.

- *Müller-Takano Generalization*:
  If movement of XP_2 and XP_1 is triggered by the same feature, XP_2 is invariably closer to the attracting head, and must therefore move first. Early movement of the lower XP_1 would give rise to a violation of the Minimal Link Condition (an instance of a *relativized* A-over-A principle as it has been proposed in Chomsky (1973), Bresnan (1976), Fitzpatrick (2002)). Therefore, a CED effect is unavoidable. See Kitahara (1994), Fox (1995), Koizumi (1995), Müller (1998).

Problem:

- Given the PIC, and given that vP and CP are phases, at least some of the relevant movement types will have their landing sites beyond the minimal phase. If all XPs qualify as phases, virtually all movement types will have their ultimate landing sites in a higher phase.
- In the legitimate cases, extraction of XP_1 from XP_2 will have to take place immediately to an intermidate phase edge position, before XP_2 undergoes an intermediate movement step itself.
- In the illegitimate cases, extraction of XP_1 from XP_2 will have to follow the first intermediate movement step of XP_2.
- Thus, the problem is that the right decision must be made at a point when the relevant information does not yet seem to be present.

(17) *Anti-freezing*:

a. $[_{Y'}\ Y\ [_{XP_2{}^a}\ XP_1{}^b\ [_{X_2'}\ X_2\ ...\ ]]\ ]]$
b. $[_{Y'}\ XP_1{}^b\ [_{Y'}\ Y\ [_{XP_2{}^a}\ t_1\ [_{X_2'}\ X_2\ ...\ ]]\ ]]$
c. $[_{YP}\ [_{XP_2{}^a}\ t_1\ [_{X_2'}\ X_2\ ...\ ]]\ [_{Y'}\ XP_1{}^b\ [_{Y'}\ Y\ t_2\ ]]]$

(18) *Freezing*:

a. $[_{Y'}\ Y\ [_{XP_2{}^b}\ XP_1{}^a\ [_{X_2'}\ X_2\ ...\ ]]\ ]]$
b. $[_{Y'}\ [_{XP_2{}^b}\ XP_1{}^a\ [_{X_2'}\ X_2\ ...\ ]]\ [_{Y'}\ Y\ t_2\ ]]$
c. $*[_{YP}\ XP_1{}^a\ [_{Y'}\ [_{XP_2{}^b}\ t_1\ [_{X_2'}\ X_2\ ...\ ]]\ [_{Y'}\ Y\ t_2\ ]]$

(19) *Müller-Takano Generalization*:

a. $[_{Y'}\ Y\ [_{XP_2{}^a}\ XP_1{}^a\ [_{X_2'}\ X_2\ ...\ ]]\ ]]$
b. $[_{Y'}\ [_{XP_2{}^a}\ XP_1{}^a\ [_{X_2'}\ X_2\ ...\ ]]\ [_{Y'}\ Y\ t_2\ ]]$
c. $*[_{YP}\ XP_1{}^a\ [_{Y'}\ [_{XP_2{}^a}\ t_1\ [_{X_2'}\ X_2\ ...\ ]]\ [_{Y'}\ Y\ t_2\ ]]$

Proposal:
Enough information is already present for the first intermediate steps, given that these steps are triggered by *edge features* which are generated in response to structure-building features on heads waiting in the numeration (Müller (2011)); in a sense, the edge features are *flavoured*, indicating the ultimate target position (Abels (2012a;b)).

Conclusion:

- Low intermediate movement is movement that will ultimately target a low position in the clause.
- High intermediate movement is movement that will ultimately target a high position in the clause.
- Against this background, the correct generalization seems to be that low intermediate movement takes place before high intermediate movement.
- If both intermediate movement will ultimately target a position of the same height in the clause, movement of the more inclusive category XP_2 takes place before movement of the more embedded category XP_1.

2.4 External Agree vs. Internal Agree

2.4.1 The Specifier-Head Bias

Recall:
The Specifier-Head Bias played a crucial role in the analyses of argument encoding and the ban on ergative movement.

(20) *Specifier-Head Bias*:
Spec/head Agree is preferred to Agree under c-command.

(20) follows if there is a general fixed order of External Agree (= Agree with the specifier) before Internal Agree (= Agree with an item in the c-command domain).

2.4.2 Ergative displacement in Basque as a potential counter-argument?

Observation (Béjar & Řezáč (2009)):
In Basque, it looks as though there is preferred prefix agreement on the auxiliary with DP_{int}; DP_{ext} can only be the target of prefix agreement if the probe on v is frustrated by DP_{int}'s features. The systems instantiates *person hierarchy*-driven agreement.

(21) *Ergative displacement in Basque*:

a. ikusi *z*-in-t-u-da-n
   see *2*-x-PL-have-1-PST
   'I saw you.' 1>2 → 2
b. ikusi *n*-ind-u-en
   seen *1*-x-have-PST
   'He saw me.' 3>1 → 1
c. ikusi *n*-ind-u-zun
   seen *1*-x-have-2-PST
   'You saw me.' 2>1 → 1

d. ikusi *n*-u-en
seen *1*-have-PAST
'I saw him.' 1>3 → 1

Note:
"x" is inverse morphology that shows up in (21-abc), but not in (21-d).

Béjar & Řezáč's (2009) analysis:

- Person features: $[\pi] = 3$, [part] = 1/2, [part] entails $[\pi]$.
- In Basque, v can in principle agree with both DP_{int} and DP_{ext}.
- However, there is a *Head-Complement Bias*: Agree under c-command is preferred to Agree with a specifier.
- Agree with a specifier is only possible if the probe on v is frustrated by DP_{int}.
- Technically, in that case, the probe is percolated upwards, to v′ (so there is no genuine m-command required). M-command as a dispreferred option would work just as well, though.
- The agreement probe on v in Basque is specified as [*part*]; it is frustrated if DP_{int} is $[\pi]$ only.
- There are two cycles for agreement: Agree on the first cycle (under c-command) triggers inverse marking (x); Agree on the second cycle (with the specifier) does not; in general, second cycle morphology can be different.
- If a probe remains unchecked throughout all cycles, it does not cause further problems; it is simply deleted.

(22) *Béjar & Řezáč's (2009) analysis of Basque*:

DP_{ext}	DP_{int}	agreement controller	inverse morphology	cycle
3	1/2	DP_{int}:1/2	yes	first cycle
1/2	1/2	DP_{int}:1/2	yes	first cycle
1/2	3	DP_{ext}:1/2	no	second cycle
3	3	–	no	–

Note:
There is actually also suffixal agreement with the remaining argument throughout; this does not play a role in the core analysis.

2.4.3 Accusative displacement in Itonama

Observation (Popp (2013)):
Itonama (isolate, Bolivia; Crevels (2010)) behaves almost exactly like Basque in all relevant aspects, but shows a preference for agreement with the specifier.

(23) *Accusative displacement in Itonama*:

a. *de*′-ka-kikïwa′-na yota′-na ubuwa
*2*PL-face-know-NEUT DEM-NEUT person
'You all know that person.' 2>3 → 2
b. *sih*-k′-ma-doh-ne upa′u
*1*PL.EXCL-INV-hand-bite-NEUT dog
'The dog bit us on the hand.' 3>1 → 1
c. kumani *a*′-k′i-pachïhï′-ke kopone
last.night *2*SG-INV-bother-PL rooster
'The rooster was bothering you last night.' 3>2 → 2
d. wase′wa *de*′-kewa-na-he-mo
yesterday *2*PL-face.see-NEUT-DIST-1
'Yesterday you saw all of us.' 2>1 → 2

Popp's (2013) analysis:
more or less exactly as Béjar & Řezáč's (2009) analysis of Basque, except for a Specifier-Head Bias replacing the Head-Complement Bias. (Assumption about parametrization: The preferred search space for a probe can be the specifier *or* the complement domain.)

(24) *Popp's (2013) analysis of Itonama*:

DP_{ext}	DP_{int}	agreement controller	inverse morphology	cycle
3	1/2	DP_{int}:1/2	yes	second cycle
1/2	1/2	DP_{ext}:1/2	no	first cycle
1/2	3	DP_{ext}:1/2	no	first cycle
3	3	–	no	–

Note:
In Popp's (2013) approach, inverse morphology is marked: It shows up only with second cycle Agree. In contrast, in Béjar & Řezáč's (2009) approach, inverse morphology is unmarked: It shows up with first cycle Agree.
This means that in the analysis of Basque, v probes do not expect the prototypical case; they are usually surprised (and frustrated); in the analysis of Itonama, v probes do expect the prototypical case; they are surprised (and frustrated) when a non-prototypical subject shows up.

Hypothesis:
One can accomodate the Basque data to a Specifier-Head Bias approach if the probe is *always* frustrated by its first search, e.g., because it has a super-person feature that not even 1/2 can match. However:

General conclusions:
(i) Basque has an ergative system of case assignment, i.e., an order Merge before Agree.
(ii) Itonama has an accusative system of case assignment, i.e., an order Agree before Merge.
(iii) Therefore, the agreement (displacement) effects require additional assumptions

anyway.
(iv) It might be best to treat these (often marginal, and variable) phenomena in a post-syntactic morphological component, where orderings of elementary operations may in principle be reversed (see Kiparsky (1982)), and where various other factors can intervene; see Arregi & Nevins (2012).

3. The No Tampering Condition

Hypothesis:
All the fixed orders can be shown to follow from a third-factor principle of efficient computation, viz., a version of the No Tampering Condition (NTC, Chomsky (2007; 2008; 2013)) that incorporates Pullum's (1992) assumptions about the origins of the Cyclic Principle.

Observation:
According to the original NTC, Merge of two syntactic objects leaves these objects unchanged. Arguably, this should be generalized, but then it cannot be *catgorical* anymore (the more liberal Strict Cycle Condition, in contrast, is categorical): Operations like feature valuation by Agree, and generation of copies by Move (or adding an additional mother if multidominance is adopted) *do* change syntactic objects (see Branigan (2013), among others).

(25) *Pullum's evolutionary motivation*:
   a. "Complex structures in language are assembled from well-formed parts which may be modified in the process of being concatenated [...] but retain much of their structural integrity." (p. 227)
   b. "The only way to make a complex object that exhibits stability in the face of disruptions and accidents is to give it a hierarchical structure." (p. 230)

(26) *No Tampering Condition* (NTC, new version):
Minimize changes to existing structures.
(The more deeply embedded the affected area is, the more the structure as a whole is changed.)

- *Merge vs. Agree*:
  The NTC must not discriminate between two operations that are radically different, like Merge and Agree (structure-building vs. modification of structures).
- *External Merge vs. Internal Merge*:
  External Merge adds an item at the top of the current structure; internal Merge requires access to a lower part of the existing structure (even though access is typically quite local, given the PIC).
- *Criterial Internal Merge vs. Intermediate Internal Merge*:
  Criterial movement steps typically (though not always, as in raising followed by wh-movement) imply that the moved item stays in place for the rest of the derivation. In contrast, intermediate movement steps, by definition, will lead to a disruption of existing structure on the next cycle.
- *Lower Intermediate Internal Merge vs. Higher Intermediate Internal Mege*:
  Intermediate movement steps for lower features will lead to fixed structures (i.e., criterial positions) earlier than intermediate movement steps for higher features. (This does not hold if the lower feature finds its criterial position in an even higher clause; but these derivations are typically ruled out as involving improper movement, e.g., by the Williams Cycle (lecture 3).)
- *Müller-Takano Generalization*:
  Other things being equal, moving the more inclusive category affects less structure. (Cf. number of c-command reversals. Possible extension: Minimality effects in general.)
- *External Agree vs. Internal Agree*:
  All Agree operations are dispreferred by the NTC, but Agree with a specifier affects less structure than Agree with, or into, the complement, so the former is preferred to the latter.

Overall conclusion:
(i) If there are elementary operations like Merge, Move, and Agree, they will interact; interaction has empirical consequences.
(ii) Such interaction leads to opacity effects (counter-bleeding, counter-feeding), which are ubiquitous in grammar, and which thus support a derivational approach to syntax.
(iii) Either all logically possible orders of operations are available (parochial ordering as a parameter), or there are restrictions. Assuming the latter, the parameter space can be significantly reduced.
(iv) A plausible third-factor principle that restricts possible orders of operations is the No Tampering Condition.

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