Some remarks concerning the locality-economy principles and biolinguistic explanation
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Abstract

Locality constitutes a ubiquitous notion in current linguistic theorizing. Its role has been further highlighted by the emerging Minimalist Program that seeks to explain linguistic behavior by relying on general supramodal locality-economy properties of the human brain. In this article the prevailing view is challenged by arguing that both Agree (morphosyntactic relations like case assignment) and Move (displacement phenomenon) have properties which remain mysterious under the locality-economy view. From a conceptual point of view, the article argues that it is difficult to delineate a notion of economy-locality that has empirical substance but is sufficiently distinct from tautologies such as “grammatical restriction” or “grammatical constraint”. A nonlocal many-to-one probe-goal relation following a Moravcsik-style multiple government system is proposed that approximates the locality-economy principles in the limit due to an activity condition. According to the proposed analysis, it is the activity condition that constitutes the more fundamental property of grammar while the economy-locality properties are derived as theorems.

keywords: locality, optimality principles, minimalism, Finnish, syntax, economy principles

1 Introduction

In recent years, linguists and cognitive scientists have shown much interest in locality, economy, or optimality principles. Linguist in particular have evoked principles which all have certain localist character (Manzini, 1994; Koster, 1978; Prince & Smolensky, 1997; Rizzi, 1990). Thus, “locality is a pervasive property in natural-language syntax. If there is no upper limit to the length and depth of structural representations, a fundamental core of syntactic processes are bound to apply in local domains” (Rizzi, 1990, ix). Locality restricts the algorithm responsible for human linguistic behavior and possible grammatical configurations: it makes certain “short” grammatical dependencies possible while ruling out the “long” ones.

During the early 1990s, an attempt was made to handle this situation by assuming that linguistic computations are “as economical as possible” (Chomsky, 1995, 150). Because computations are economical, or because they achieve their goal with the least effort possible, linguistic dependencies are local. In addition, there exists a body of literature outside linguists that advances the hypothesis that the brain performs optimization (Friston, 2010; Todorov, 2004; Wolpert & Ghahramani, 2000). We might be dealing with a superprinciple that applies throughout the cognitive science(s).

I emphasize that the putative locality-economy characteristics are meant as constituting real principles of the language faculty, or human brain functioning more generally. Once we get to the bottom of things, the theory says, we will end up with the locality-economy principles. The locality-economy principles could in turn be explained as an offshoot of intrinsic properties of biological systems; thus they would constitute “principles of structural architecture and developmen-
tal constraints that enter into canalization, organic form, and action over a wide range, including principles of efficient computation, which would be expected to be of particular significance for computational systems such as language” (Chomsky, 2005, 6). It is this realistic, biological interpretation of the locality-economy view that I have in mind here. Occam’s razor, elegance, or the economy of scientific theories in a more general sense have only indirect bearing on the matter. Similarly, it seems to me that the term “local” is sometimes used as a trendy synonym for “grammatically restricted” or “grammatically constrained”, but this sense of locality bears no empirical substance and might not be worthy of discussion. Epstein & Hornstein (1999) explain that instead of looking for general theory-parsimony, we are after “substantive, least effort economy notions” which “generalize themes that have consistently arisen in grammatical research” (p. xi). “The idea is that locality conditions and well-formedness conditions reflect the fact that grammars are organized frugally to maximize resources” (ibid.). Similarly, we will be concerned with concrete empirical hypotheses which claim that many properties of language derive from biology-based locality-economy principle(s).

I think that certain facts pose a challenge to the locality-economy view. This article presents those facts, shows why they remain mysterious under the propose framework and then proposes a way to handle them. Specifically, I argue that the activity condition of Chomsky (2000) together with the derivational-cyclic grammar is more fundamental to the human language than any of the locality-economy conditions. The activity condition makes elements inactive locally and thus makes them immune to nonlocal processes. Under some circumstances, however, elements may remain active for an extended period of time. When this occurs, nonlocal dependencies result.

Section 2 offers a brief tour into the realm of locality-economy principles, while Section 3 and Section 4 argue that we do not always see such properties in the domain of Agree (agreement) or in the domain of Move (displacement). Section 5 discusses the notion of intervention and its possible relation to locality-economy. Section 6 offers an alternative “multiple government” perspective akin to Moravcsik (1995) that is enriched with a notion of activation condition. Locality-economy effects are argued to derive from the latter as a theorem.

2 Locality-economy principles and linguistics

There are several grammatical principles which force locality restrictions and locality conditions on grammatical configurations. The following example illustrates. It is well known that a word or a phrase that typically occurs in a position A can also occur in a position B. Since the publication of Chomsky’s Syntactic Structures (Chomsky, 1957), linguists working within the biolinguistic framework have modeled this phenomenon by means of computational operations which rearrange elements in a given phrase-structure. These rearrangement operations have elements “move” from place B to place A. Ordinary wh-interrogatives, as illustrated in (21), provide a much-studied example.

(1) Who did Mary believe that John found ____?
The *wh*-interrogative pronoun occurs at the left periphery of the clause, while the gap ___ represents the position where the element is canonically spelled out. Observe, then, that the following variation of (21) does not belong to well-formed English:

(2) *Who did Mary wonder who found ___?

What’s wrong with (2)? Assume that there is a grammatical element at the left periphery of the clause, call it C(wh), which marks the whole clause an interrogative. As it goes doing this, it crawls through the structure downstream in order to find a matching *wh*-interrogative. We thus say that C(wh) functions as a probe. Once it locates the interrogative, it attracts it. We call the partner the goal. Hence the goal “moves” from place B to place A. Now assume that the probe can only detect the closest possible goal (Chomsky, 1995, 2000; Rizzi, 1990). Take (2) and imagine the C(wh) as it beings to probe downstream through the structure and locate the *wh*-interrogative. The first *wh*-interrogative that happens to be in its path is the subject of found, but the surface sentence is, apparently, derived by continuing search beyond the most local goal (3).

(3) C(wh) did Mary wonder who  
  probe  
  local-**wh**  
  nonlocal-**wh**  
  found who

If computations must be local, then the fact that (2) is ungrammatical is derived. In other words, (2) is ungrammatical because a locality condition is violated. Figure 1 illustrates the basic idea.
C(wh) did John believe that Mary found who

Who did John believe that Mary found ____

*Who did John wonder who found ... 
only the first wh-element constitutes
a legitimate target candidate for the
probe. This rule is violated here.

Figure 1 about here.

Figure legend: An ordinary *wh*-interrogative is formed by first locating the interrogative element, usually a pronoun (panel A) and then moving it to the left edge of the sentence (panel B).

However, the probe can only find the closest potential goal (panel C).

This restriction “can be intuitively construed as an economy principle in that it severely limits the portion of structure within which a given local relation is computed: elements trying to enter into a local relation are short-sighted, so the speak, in that they can only see as far as first potential bearer of the relevant relation” (Rizzi, 2004, 224). Rizzi further speculates that the principle could be attributed to the human cognition in a supramodal fashion. It “appears to be a natural principle of mental cognition [...] that we may expect to hold across cognitive domains: if locality is relevant at all for other kinds of mental computation, we may well expect it to hold in a similar form: you must go for the closest bearer of a given local relation” (Rizzi, 2004, 224). Martin & Uriagereka (2000) take the matter further and draw the following analogy between the above locality-economy explanation and physical fields:
For example, a field transmits information in a wavelike fashion; it does not make sense to speak of a classical magnetic field that skips a portion, so that a magnet attracts a nail across an intervening paper clip. One might conjecture that locality in language is, mutatis mutandis, of the same sort. Chomsky posits a “probe” element that relates to a “goal” in much the same terms. If, in its search down a phrase marker, the probe hits a matching foal, the search blindly ends. If that particular “agreement” relations (between “probe” and “goal”) happens to be what the system requires for convergence, everything is fine; otherwise, the derivation crashes. Crucially, derivations do not have the ability to “smartly” search for ways of bypassing the blind, fieldlike procedure just described. (p. 24).

Similar restrictions apply across the grammar. Thus, not only do we find that only the closest \textit{wh}-element can be fronted, but we also find that only the closest possible head provides a legitimate target for head raising. A-movement has similar properties. The situation was summarized by Marantz (1995, 352), whose words I would like to quote here:

First, certain locality principles seem to have a “least effort” flavor to them. Both NP- and \textit{wh}-movement seem to target the first potential position up from the source position of movement, from a slightly abstract point of view [...] NP-movement in passive and raising moves what appears to be the highest NP in a structure to the first A-position above this NP (the subject position); when this closest A-position is filled, movement to a still higher position is blocked. Here, only the shortest possible move, the one requiring the least effort, is allowed. Similarly, \textit{wh}-movement moves a \textit{wh}-constituent to the first available and appropriate A-bar position, usually the local spec of CP. Superiority effects [...] suggest that the highest among a set of \textit{wh}-phrases – the one closest to the spec of CP position – must move; \textit{wh}-island effects suggest that when the closest spec of CP position is filled, movement of a \textit{wh}-phrase beyond this position is blocked in some manner. In the Superiority case, the \textit{wh}-constituent that would make the least overt effort to get to spec of CP must be the one that moves; in the \textit{wh}-island case, the \textit{wh}-constituent seems to be penalized for making the effort to skip the closest possible landing site – the local spec of CP.

If it is the case that similar optimality principles can be demonstrated for other types of biological/neural systems, then the locality-economy hypothesis stands on a solid foundation.

Over time, several types of locality-economy principles have been proposed inside and outside linguistics. The \textit{Handbook of Contemporary Syntactic Theory} (Baltin & Collins, 2001) devotes a whole chapter to the syntactic economy-locality principles (Collins, 2001). Let’s delineate two scenarios that have figured prominently in recent literature. The “attract closest” system exhibited by the \textit{wh}-constructions above (lifted from Chomsky 1995, ch. 4) is one among many. It’s basic tenet is that closer elements \textit{intervene} in preventing nonlocal search; without intervention, longer search would be possible. A particularly noteworthy work exploring this intuition is Rizzi (1990).
According to this view, locality is relative. In Rizzi’s words, “a local relation is one that must be satisfied in the smallest environment in which it can be satisfied” (Rizzi, 2004, 223). Another influential proposal is the theory of phases (Chomsky, 2000, 2008). The guiding intuition of the phase theory is that grammatical derivation is executed in a number of smaller packages, phases, which allow little grammatical trafficking in and out:

At some point in the derivation, you’ve got a syntactic object, call it a “phase” by definition [...] The syntactic object is handed over to the interpretative systems; it’s transferred to the phonology and semantics. They do whatever they do to it, and then they’re finished with it, and they forget about it. You can then proceed with the derivation, creating a bigger syntactic object which at the next phase does the same thing—it doesn’t look back to the earlier product. (Chomsky, 2004, 152).

Because the derivation is done in a piecemeal fashion, linguistic relations have a localist character. They do not “see” the bigger picture, only their immediate local environment. In particular, it follows that syntactic dependencies cannot reach over a phase boundary. Thus, dependencies such as case assignment and $\varphi$-agreement (Agree) or operations such as movement (Move) are phase-internal. Apparent long-distance relations reduce to local cascades of phase-internal operations, an intuition that goes back to (Chomsky, 1973, 1977) and which has been pursued over time from multiple points of view (Manzini, 1994).

3 Agree

I will next discuss some facts which, I believe, challenge the locality-economy view. I emphasize the word “challenge” here. My intention is not to rebut decades of serious linguistic work; instead, I will try to bring forward certain facts and notes which I believe deserve attention inside the context of locality-economy theorizing. An alternative is sketched which relies on the notion of relativized activity condition (Chomsky, 2000) instead of locality-economy. I would also like to propose that the derivational-cyclic nature of grammar is more fundamental to the human language than locality-economy (Author citation here).

I will work with Chomsky’s phase theory at first. We will be assuming that several types of phrases constitute phases, independent packages of grammatical information. These packages are: CP (complementizer phases), $v$Ps (verbal layer containing a transitive verb and its arguments and adjuncts) and DPs (nominal arguments). According to the phase theory, the highest Spec-position of each phase and its head constitutes an edge, and the material that lies inside the edge is visible for the surrounding grammatical context; everything else is sealed off and is invisible. In other words, if HP is a phase, then Spec-HP and H are visible, but Comp-HP is invisible, to the grammatical operations outside HP. Some authors have argued that many more projections

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1Rizzi’s and Chomsky’s approaches differ on a number of dimensions, perhaps the most important being that while Rizzi formulates the relevant locality condition in representational terms, Chomsky captures it as a derivational condition.
behave like phases (Manzini, 1994), making locality even more strict, but this is inessential for the present point since, I believe, even the weaker theory can be shown to be inadequate.

The first empirical issue in our agenda concerns agreement, the process which distributes \( \varphi \)-features and case features. We call it Agree. Case assignment, which constitutes the first half of Agree (\( \varphi \)-agreement constitutes the other), is one of those realms where it is still almost universally assumed that some notion of locality plays a foundational role. Nonetheless, from a crosslinguistic point of view locality does not play a foundational role in case assignment. While some case assignment relations are local, some are not. One specimen of this type is illustrated in (4), which was first discussed in Toivonen (1995) and has been a topic of much subsequent work (Vainikka & Brattico, 2009). It is a standard feature of Finnish that its structural object case assignment is not clause-bound (Hakulinen et al., 2004; Brattico, 2010a, 2011; Ross, 1967; Kiparsky, 1998; Toivonen, 1995; Vainikka & Brattico, 2009).

(4) a. Me läpäisimme tentin [lukemalla kirjan]  
We.NOM passed.1PL examination by.reading book.ACC  
‘We passed the examination by reading a/the book.’  

b. Me läpäistiin tentti [lukemalla kirja]  
We.NOM passed.PASS examination by.reading book.NOM  
‘We passed the examination by reading a/the book.’

These sentences are identical in their syntax and semantics, save for two changes we’ll focus here: the finite matrix verb inflects for the \( \varphi \)-features of the subject in (4a) while a passive form is used in (4b); and, the direct object case inside an adverbial adjunct phrase is the accusative in (4a) while it is in the nominative in (4b). In other words, the direct object case of an adjunct clause changes as a function of the form of the matrix clause. Notice that the accusative is ungrammatical in (4b) while the nominative is ungrammatical in (4a). This is shown in (5a–b), which should be contrasted with (4a–b).

(5) a. *Me läpäisimme tentin [lukemalla kirja]  
We.NOM passed.1PL examination by.reading book.NOM  
‘We passed the examination by reading a/the book.’  

b. *Me läpäistiin tentti [lukemalla kirjan]  
We.NOM passed.PASS examination by.reading book.ACC  
‘We passed the examination by reading a/the book.’

It is a perfectly general feature of Finnish case assignment that it can transport a direct object case feature from the matrix clause into an adjunct or non-finite clause.

For those unfamiliar with the relevant portion of Finnish syntax, there are two more things to note. The first is the use of the passive form of the verb in (5b). The construction is not really a passive construction in the usual sense of syntactic passive; instead, the passive form is used in colloquial speech to express an active sentence with the first person plural pronoun subject. The form with plural first person agreement sounds hypercorrect and is used systematically only in written language. The second property to note is the form of the direct object: it is in the accusative
in (4a) and in the nominative in (4b). Some authors refer to the nominative variant as the zero-
accusative, since it bears the syntactic properties of direct objects.

Vainikka & Brattico (2009) argue based on a large number of contexts involving the same
case shift that the change is due to the agreement features at the matrix verb, not by the passive
morphology per se. Brattico (2010a) further shows that the same shift occurs if the direct object is
embedded, not inside of an adjunct, but inside another DP, as in the following example.

(6) a. Me teimme [sopimuksen ostaa auton]
   We.NOM made.1PL agreement to.buy car.ACC
   ‘We made an agreement to buy a/the car.’

b. Me tehtiin [sopimus ostaa auto]
   We.NOM made.PASS agreement to.buy car.NOM
   ‘We made an agreement buy a car.’

An in-depth analysis of all known remote case assignment relations in Finnish is presented in
Brattico (2010b), where the following three key points emerge: remote case assignment in Finnish
concerns all direct object cases (accusative and partitive), it is triggered by certain ϕ-related fea-
tures of functional heads (as in ex. 4), and it penetrates all grammatical boundaries except finite
CPs and tensed adjuncts (tensed non-finite complements being transparent, however). Thus, in
examples (4) and (6), it penetrates a non-tensed adjunct phrase and a DP-boundary. It also pene-
trates sequences of non-finite clauses, as already noted by Ross (1967).

All published work known to me concerning this phenomenon, including the most author-
itative and recent comprehensive grammar of Finnish (Hakulinen et al., 2004), take it simply as
their starting point that Finnish obeys genuine long distance case assignment. It is here, then, that
the locality-economy view starts to pressure us into the opposite direction. It is because linguists
believe in the locality-economy view that they might be disposed to disagree with what others
might take as plain facts. Thus we come to the point where it is possible to claim that such case
assignment relations cannot reach over a long distance, or that the plain facts are only apparent.
For instance, one possibility would be to say that the phenomenon is regulated by semantic, prag-
matic or discourse related properties, since such properties are known to have a global character.
But this idea moves nowhere and has no merit. The remote case assignment involves all direct
object cases. The alteration illustrated in (4) and (6) is regulated by uninterpretable ϕ-features at
c-commanding predicates, as argued by Vainikka & Brattico (2009), and it results in a shift in struc-
tural case assignment: the accusative case shifts to the nominative. Furthermore, the nominative
case is a structural finite subject case in Finnish and carries no semantic function (for Finnish case
systems, see Vainikka 1989; Nelson 1998; Kiparsky 1998). Notice that exactly the same principles
cover both local and nonlocal assignment. Local case assignment, which parallels the properties
of (4), is shown in (7).

(7) a. Me luemme kirjan
   We.NOM read.1PL book.ACC
   ‘We read the book.’
Thus, whatever mechanism assigns direct object case locally in Finnish also assigns direct object cases remotely. One could respond that the remote case assignment only concerns Finnish and therefore falls out of the crosslinguistic “big picture”. In many languages, case assignment is local, and in Finnish, too, there is case assignment that is not remote. For instance, neither semantic cases nor subject cases travel longer distances. Perhaps long-distance case assignment exists, but it is peripheral? But the argument can surely be dismissed without consideration. For linguists, no language is more peripheral than some other language. Moreover, since remote case assignment concerns all direct object cases, it does not constitute a peripheral or marginal phenomenon even in Finnish. What is required is a theory that is able to reconcile systematic nonlocal case assignment phenomenon with systematic local case assignment phenomenon.

There are some more interesting reasons to doubt the proposition that the phenomenon is marginal. Bošković (2007) argues convincingly that Agree is not constrained by phases. He cites evidence from Chuckee, where matrix v can agree with the direct object of an embedded finite clause (from Bošković 2007, ex. 43; data from Inénlikéj & Nedjalkov 1973):

\[(8) \text{anan qalyulu } \text{laorkao-nin-et } \text{qun 0-ratamov-nen-at qor-t]}
\]
\[\text{he regrets-3-PL that 3SG-lost-3-PL reindeer-PL}
\]
\[\text{‘He regrets that he lost the reindeers.’}\]

In an Algonquian language Blackfoot, agreement can similarly reach finite complementizer clause (Franz, 1978). The agreeing elements are italicized (from Bošković 2007, ex. 614):

\[(9)\]
\[\text{a. kits-iksstakk-a omá noxków m-áxk-itáp-aapiksistaxsi kiisóyí omi pokón-i}
\]
\[\text{2-want-3 my.son.3 3-might-toward-throw you ball-4}
\]
\[\text{‘My son wants to throw the ball to/at you.’}\]
\[\]
\[\text{b. nits-iksstata-wa noxkówá kí niistówá n-áxk-a’po’takss-innaani}
\]
\[\text{1-want-3 my.son.3 and I 1-might-work-1PL}
\]
\[\text{‘I want my son and myself to work.’}\]

Bošković 2007 also mentions wh-in situ languages, in which the wh-in situ element must, in violation of locality, undergo Agree with matrix C(+wh). Bhatt (2005) argues that Hindi-Urdu exhibits long-distance \(\omega\)-Agree. In this language a matrix verb can \(\varphi\)-agree optionally with an argument inside of its complement clause, provided that it does not at the same time agree with its own subject. This is shown in (10), where there is \(\varphi\)-agreement between the object of the complement clause and the matrix verb.

\[(10) \text{Vivek-ne } \text{[kitaab parh-nii] chaah-ii}
\]
\[\text{Vivek-ERG book.F read-INf.F want-Pfv.FSG}
\]
\[\text{‘Vivek wanted to read the book.’}\]

Bhatt (2005) proposes, in essence, that the probe (finite verbal element) searches for the closest possible goal which, in the absence of suitable subject for instance, can be found from within the
complement clause and which then delivers its $\varphi$-features to the probe. Similar phenomenon is attested in Tsez (Polinsky & Postdam, 2001). Polinsky (2003) cites evidence that a verb may agree with a constituent inside of its own argument, a phenomenon that we saw in connection with Finnish case assignment.\footnote{However, Polinsky & Postdam (2001) and Polinsky (2003) argue that long-distance $\varphi$-agree is illusory and involves mechanisms, such as clause restructuring, which are able to localize the apparent long-distance relations (see also Boeckx 2004; Chandra 2007). See Bošković (2007); Bošković (2003) and Bhatt (2005) for a contrary view, and Brattico (2010a) for an argument that these strategies do not apply to Finnish long-distance case assignment.}

I take it as a fact that the human grammar exhibits long distance Agree. Still, none of the above excludes the theoretical possibility that the facts were given an analysis in which the remote case assignment reduces, say, to a cascade of local relations. It may be that there is more to these constructions than meets the eye. At the same token, possibility of an analysis is not an analysis. If there were such an analysis, it would certainly be interesting to look into; so far all analyses of the Finnish long distance case assignment take it as their starting point that the phenomenon is real and that Finnish structural case assignment is not local. Until an alternative is presented, there is not much one can do with the claim that a different analysis is possible. But be that as it may, the fact that overt morphosyntactic relations are not apparently local should, in my view, be interpreted as presenting a challenge to the locality-economy theory. An even stronger conclusion would follow, namely, that it is precisely and only this type of data that could, in principle, challenge the theory head-on. The locality theory, if it was meant to have empirical substance, ought, I think, make the prediction that there are no such nonlocal phenomena. On the other hand, it makes no sense to reject the locality-economy view in its entirety, since the amount of data that does fall under that framework is surely impressive. We can therefore either (1) explain the data away and maintain the locality-economy hypothesis as it stands, or (2) propose a system which derives both the new data and the old data. I will return to points (1-2) later on.

## Move

Agree is not the only component of grammar which is claimed to exhibit locality-economy principles. Move constitutes another well-known case. It is not possible to review everything about this huge topic, but fortunately a perfect example is provided by Finnish snowball movement, originally discovered by Saara Huhmarniemi and reported in (Huhmarniemi, 2010, 2009). Finnish is a $wh$-movement language in the sense that one, and at most one, $wh$-word must occur at the left periphery of an interrogative clause. Two is impossible, and the in situ strategy is available only in certain very special circumstances and even then it is fairly marginal. Once we pay attention to the fact that $wh$-interrogatives must occupy a left peripheral position of a clause, it is easy to note that there are grammatical environments which do not allow the $wh$-interrogative to escape. These are called islands after Ross (1967). On the other hand, the impossibility of $wh$-movement out of a given phrase does not prevent one to construct a corresponding interrogative. There are various rescue strategies, one of them begin the abovementioned snowball movement. In a snow-
ball construction, the wh-interrogative is first moved to the left edge of the island, and then the whole island is moved (or, as this process is better known, pied-piped) to the left periphery of the finite clause.

(11) \[ \text{[minkä luettuaan ___], Pekka lähti kotiin ___ ?} \]

what after.read Pekka left home

‘After reading what Pekka went to home?’

An important point to note is that, as demonstrated by Huhmarniemi (2010), this process is iterative (see also Heck 2008). In order to reach the final scope position the interrogative is sometimes required to repeat this process. Thus it moves to the left edge of its own local island phrase, after which the whole phrase moves to the left edge of the next local island phrase, and so on, until the final position is reached. Instead of moving from the base position to the final position at “one fell swoop”, the wh-word is required to instantiate several local movement operations which are cascaded to yield the apparent long-distance movement. This is the rationale for assuming that Move obeys locality-economy principles.

Not all phrases are snowball phrases, only some are. In Finnish, for instance, DPs, PPs, many adjuncts, APs, and certain non-finite clauses constitute snowball phrases. On the other hand, numeral phrases, some non-finite clauses or vPs do not have the edge position which would, or could, receive the moving wh-interrogative. The wh-interrogative skips some projections and targets others. What makes some phrase XP such that it provides, or necessitates, an intermediate landing position for the wh-interrogative, while some other phrase YP does not have these properties? And here we face a difficult problem with the locality-economy theory. The operations are just restricted in some way or another, while it adds nothing new to declare that they are restricted by being local. Whatever the facts, one can almost always say that the operation was “local”.3 There might be no way to refute the locality hypothesis.

To see this point from a different angle, suppose a Martian would theorize about the movement of cars in a terrestrial city. He would take notice of the fact that, instead of moving from point A directly to point B, vehicles make regular stops along the way. Perhaps they make these stops because the drivers obey locality-economy principles? That’s a possible explanation, but it is still unclear why they stop precisely in certain junctions and not in others. Locality-economy principles don’t answer that question at all. What provides a key to this question are the traffic lights. Once the Martians have figured out the function of traffic lights, they can arrive at the correct answer. The stops are arranged because of traveling safety, not because of locality or economy.

Why we are tempted to “explain” restrictions on movement by relying on locality? One possibility is that the notion occupies a too central position in our theory. It has become so powerful

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3I can imagine one genuine counterexample: a situation in which the element moves directly into its target position. Suppose one were to say that wh-movement is local because it doesn’t target the final position right away. It would then follow that if there is an operation which does target the final position, locality would be falsified; but nobody has apparently drawn that conclusions either. On the other hand, this conclusion would force us to say that a genuinely local operation that targets the final position is not local after all. I will argue later that a much better way to depict the situation is to say that the operation is cyclic, not that it is local.
and all-embracing that we automatically apply it to every grammatical restriction observed and then believe that the restriction falls under an empirical generalization, whereas in reality it has become so central as to be virtually immune to refutation. The question of how the facts could ever turn out to falsify the hypothesis just never occurs and, in fact, it is hard to find serious discussion of facts from the current linguistic theorizing that might, even in principle, refute it.

Another reason might stem from the tendency to confuse two concepts, locality-economy and cyclicity (Author citation here). Finnish snowball phenomenon is related to cyclicity, although its relation to locality is questionable. Cyclicity refers to the fact that grammatical processes operate in a well-ordered cascade: outputs of the first stage constitute inputs for the second. As explained by Chomsky,

We now apply the linear sequence of singularly transformations in the following manner. First, apply the sequence to the most deeply embedded structure dominated by S in the generalized phrase-marker. Having completed the application of the rules to each such structure, reapply the sequence to the ‘next-higher’ structure dominated by S in the generalized phrase-marker. Continue in this way, until, finally, the sequence of transformations is applied to the structure dominated by the occurrence of S which initiated the first application of base rules, i.e., to the generalized phrase-marker as a whole. (Chomsky, 1964, 63)

Thus, as exhibited in Finnish snowball movement, after one wh-movement operation (and other operations) takes place inside a snowball phase, the same operation then targets the whole phrase at the next stage, and repeats itself, until some desired, final configuration is reached. This means that the operations at the second stage apply to the outputs of the first stage operations. In addition to wh-movement, many other grammatical rules operate in cyclic fashion. But cyclicity is a different property than locality-economy. It is perfectly possible to have a cyclic grammar where cyclic domains are not at the same time domains of locality (author citation). For instance, it is possible, and in the light of Finnish long distance case assignment must be possible, to derive constructions cyclically without confining morphosyntactic processes into the cycles. Indeed, the relation between cyclicity and locality-economy is usually worked out so that the locality-economy properties are thought to explain cyclicity. For instance, one can say that because grammar operates in local domains, say phases, movement must proceed from one small domain to the next. Another possibility is to claim that the cyclic derivation is more economical than a noncyclic one (Kitahara, 1997). The basic point is that while cyclicity is an undeniable property of the human ways of speaking, locality-economy is only one schema to explain this property.

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4The notion of cycle “asserts that once a stage of the cycle has been passed, we cannot introduce new material into it from the outside”, while grammatical “rules cannot in effect return to earlier stages of the cycle after the derivation has moved to larger, more inclusive domains” (Chomsky, 1973, 97). The cycle in effect “limits the ‘memory’ available to transformational rules” and “may be thought of as a limitation on the scope of the processes of mental computation that ultimately determine phonetic and logical form” (Chomsky, 1977, 112). The cycle appeared in (Chomsky, 1965) where it replaced the generalized transformations of the earlier theory.
Arguably there is precisely nothing “economical” in having a cyclic grammar. Instead of moving one small *wh*-word directly to its final scope position, a number of operations are tokened, some of which involve iterative movement of complex phrases. They might induce considerable burden to the parser. In addition, explaining such movement in terms of locality is in suspect. The movement operations are local only in the trivial sense that they are restricted. One could define economy so that it optimizes the *shortness* of steps at the expense of the *number* of steps, thus it “prefers short movement to long movement and thus requires the former where possible” (Chomsky, 1995, p. 146). Assuming that this principle is valid, and that it can itself be computed economically,\(^5\) it adds nothing to say that the operations that have to be short are economical or local. The operations are just restricted and, therefore, not unbounded; almost all grammatical dependencies are “short” in some sense.

There is possibly even a more deeper difficulty in putting forward a useful definition for “economy”. The difficulty is not in delineating an economy principle, but in the fact that the notion of “economy” does not impose clear restrictions on its own usage. Almost anything is economical in relation to some background. Thus, I agree with Stroik (2009) who points out that

> Over the last ten years of minimalist analysis, so many different economy conditions have come and gone [...] and so few have remained constant that we seem to be left with the general theoretical need to have economy conditions but without identifying any lasting economy conditions. This state of affairs raises some serious questions about the need to have economy conditions. (Stroik, 2009, 5)

One solution is to say that the properties of language are explained by relying on an economy principle, a principle whose exact content will be, it is hoped, the topic of much subsequent research activity (Marantz, 1995, 354-355). The various formulations, those cited above and found elsewhere, constitute empirical hypotheses of what the substantive economy principles are. But then, instead of alluding to unknown economy guidelines that can be applied to everything, we could just say what the substantive hypothesis is. Take again Finnish snowball *wh*-movement. A substantive hypothesis would be able to determine the exact positions of the moving *wh*-elements. Whether that is an economy principle (with an indefinite article) is a non-issue much like claiming

\(^5\)The transderivational computation of which derivations are economical and which are costly is itself very costly. This is a serious issue since the task is presumably not even feasible. It is pointless to posit a vastly uneconomical “economy principle” and still claim that the brain obeys economy principles (Johnson & Lappin, 1999). Collins (2001) further points out that applying this principle requires that grammar performs arithmetic counting when it compares various derivations, which is both implausible empirically and not feasible computationally. In addition, there are so many ways to do the counting that again the principle can be easily applied to everything. More recent theories have moved towards notions of “local economy” that seek to eliminate global transderivational comparisons in favor of comparisons which involve only few alternatives or no alternatives at all (Collins, 1997; Chomsky, 2008). This move could be right, but what the notion of “economy” then means if it is applied to derivations which do not compare alternatives, or which make only few comparisons? If there are no alternatives, the real question of any substance is when these operations apply and what the operations are; their economy in relation to a nonexistent reference set is a non-issue.
that it follows “a pattern” or instantiates “a regularity”. In addition, before there is a concrete hypothesis with some verifiable empirical backing to work with, it makes only so much sense to claim that linguistic computation is economic.

The matter is not novel and certainly not specific to linguistics. Consider the following debate. The controversy was triggered by an experiment on pigeons supposedly providing evidence against an optimality theory of animal choice behavior. The experiment was conducted and reported by Mazur (1981). Staddon & Hinson (1983) countered by pointing out that what the experiment could argue against, at best, is one particular optimizing mechanism, not a more general optimization theory which allows for a wide variety of actual optimization mechanisms. Interestingly, they then acknowledge that the optimality theory “in general is not testable, since any experimental result can be expressed as the optimal solution to some problem; what is testable is constrained optimization, the idea that animal behave optimally subject to specified constrains” (p. 976).6 However, Mazur (1983) counters the criticism by remarking that such relativized “theory strains both the usual meaning and the testability of the term ‘optimization’ ” and continues with the following thought experiment:

Consider a frog that is starving to death in a room full of dead flies (since the frog eats only flies it catches in midair). According to this theory, the frog is behaving optimally, because it is doing the best that it can, given the inflexibility of its food-seeking habits. I think few people other than optimization theorists would call the frog’s behavior optimal. Of course, optimization theorists can ignore common usage and define “optimization” any way they wish. But since any outcome can be defined as optimal after the fact [...] the concept of constrained optimization becomes a tautology, or more accurately a pretheoretical assumption not subject to experimental test.

I think that we should keep this point in mind. Chomsky writes that “‘good design’ conditions are in part a matter of empirical discovery, though within general guidelines of an a prioristic character, a familiar feature of rational inquiry” (Chomsky, 2001, 1). By attributing the optimal design philosophy neither to strictly empirical nor purely conceptual kingdoms Chomsky might be just emphasizing the relative character of the “good design” hypothesis. But surely he agrees that a priorism should not be interpreted as implying strict unfalsifiability. This will simply kill the whole hypothesis that the brain obeys economy principles. What is at stake, therefore, is whether the “good design” philosophy represents the correct intuition about the workings of the real system under investigation. In my view, the previous discussion concerning Agree and Move casts some doubt over whether the locality-economy system is able to provide a sufficient framework to work with.

6It is perhaps not too far-fetched to draw a parallel here with the linguistic economy principles, which, too, are normally stated as being economical relative to some independently justified background conditions, such as the language-external legibility conditions (Chomsky, 2000).
None of this implies that it would be impossible to formulate an economy-locality hypothesis in an empirically interesting way. Instead, my point is simply that it must be so formulated to be of any interest. Until it isn’t, the idea should not be entertained seriously.

5 Intervention

Let’s return to the issue of intervention. Suppose we have a grammatical dependency D between two elements X and Y. The intervention condition states that D will fail to materialize if there is another element Z between X and Y such that X may establish the same dependency with Z. Dependencies cannot “jump over” potential candidates. Intervention is related to locality-economy in the sense that the latter can be used to explain the former. For instance, if we say that only the most local potential candidate must be selected for a given dependency, then what we are suggesting is, in essence, that the intervention phenomenon follows from a locality-economy principle (Rizzi, 2004). Moreover, the computational task of finding the most local candidate downstream is presumably feasible, and it can be instantiated without doing global transderivational comparisons (see Chomsky 2000 and Chomsky 2008 for this system).

To find out whether, say, remote case assignment obeys an intervention condition, we will be looking for situations where a remote case assigner could, in principle, assign a case over another more local case assigner, and then observe whether it actually does. If remote case assignment still emerges, there is no intervention; if the more local case assigner blocks the higher nonlocal case assigner, intervention occurs. Rizzi (1990), for instance, assumes that in talk to John, the more local preposition intervenes between the object and the verb and so prevents the verb to govern the object (pp. 1–2). Let us take this exact example as our pivot, as it is conceptually and empirically as simple as it gets. One relevant experiment concerns the so called quantificational case construction, illustrated below (Brattico, 2011) but attested in a number of Finno-Ugric and Slavic languages (Babby, 1987; Franks, 1994; Nelson & Toivonen, 2003). In Finnish, a numeral (other than yksi ‘one’) assigns partitive case to its complement noun (and adjectives, if they are there), as shown in (12).

(12) kolme autoa
    three.0 car.PRT
    ‘three cars.’

Example (12) illustrates local case assignment. Notice that since the numeral assigns the partitive to its object, Rizzi’s hypothesis predicts that it should block case assignment originating higher in the structure. This hypothesis is verified in an elegant manner: if the noun phrase in (12) occurs in a context where it is assigned the accusative by the matrix verb (13a), this case assignment is outperformed by the more local, intervening numeral (13b):

(13) a. Minä nän auto-n
    I saw car.ACC
    ‘I saw a car.’
b. Minä nääin kolme auto-a
   I saw three car.PRT
   ‘I saw three cars.’

Yet the prediction is not always borne out. If the whole DP *kolme autoa ‘three cars’ is assigned a semantic case or the genitive case, then the local partitive-marking disappears; see (14a–b).

(14) a. kolme-n auto-n
    three-GEN car-GEN

b. *kolme-n auto-a
    three-GEN car.PRT

Apparently, the local case assigner does not “intervene” here, although it is capable of assigning case to the noun head and is able to intervene exactly as Rizzi predicts. Similarly, there are many languages in which a given noun phrase can be assigned several case features (Evans, 1995; Nordlinger, 1998; Plank, 1995a; Sadler & Nordlinger, 2006; Dench & Evans, 1988; Noonan, 2010).7 Vainikka & Brattico (2009) show that in Finnish it is possible for a nonlocal case assigner to affect the case marking over a more local case assigner. In fact, it is possible to show that exactly as in the case of quantificational case and case stacking, it is the interaction between the local and nonlocal case assigners which provides the end result.

One of the strongest case for intervention can be derived from *wh-movement. Contrasts (15a-b) and (16a–b) shows that it is not possible to front one *wh-element over another (the former represents standard *wh-island effect, while the latter exhibits a Superiority effect):

(15) a. Who does John believe that Mary loves ___?
    b. *Who does John wonder whether Mary loves ___?

(16) a. Who will buy what?
    b. *What will who buy?

It well-known that this condition is not at all absolute and that it may be “relaxed”. In English, *which-phrases violate the rule (Pesetsky, 1987):

(17) a. Which students will buy which book?
    b. Which book will which student buy?

Contrastive focus on the verb makes the rule less strong, as pointed out by Bolinger (1978):

(18) I know what everyone was supposed to do. But what did who actually do?

Kayne (1983) points out that adding a third *wh-word can weaken the effect:

(19) a. *What did who buy there?

7 Very likely the most complete list of languages exhibiting this pattern up to day is provided by Plank (1995b, 96–97), who includes Ancient Near East, Uralic, Altaic, Chukchi-Kamchatkan, Nilo-Saharan and Níher-Kordofanian in addition to those mentioned in the main text. The list contains 91 individual languages.
b. (?)What did who buy where?

Extraction out of infinitive and subjunctive *wh*-clauses is possible (Chomsky, 1986):

(20)  
a. Which of the new books do you wonder when to buy?  
b. Which pasta do you wonder how to cook?  
c. Which of the new books do you wonder when you should buy?  
d. Which pasta do you wonder how you should cook?

In Finnish, it is possible to front a *wh*-element over another provided that the *wh*-expression occupying the second position at the surface is suffixed with the clitic -kin, triggering the pair-reading of the multiple question:

(21)  
a. Kuka rakastaa ketäkin?  
who.NOM loves who.PRT  
b. Ketä kukakin rakastaa ___?  
who.PRT who.NOM loves ?  
c. Missä kukakin asuu ___?  
where who lives?  
d. %Ketä Pekka miettii että rakastaako Merja?  
who.PRT Pekka.NOM wonders that love.kO Merja  
‘Who Pekka wonders whether Merja loves?’

These “Superiority violations” are well-known from other languages, a fact that has prompted several formulations of the principle that are less strong (Pesetsky, 1982; Richards, 2001; Hornstein, 1995). In sum, intervention effects are real, but systematically violated too.

6 Discussion and an alternative

My sense is that there are actually two distinct usages of the locality-economy postulate that we should keep apart. According to the first interpretation, locality is just what grammatical restriction is. The intuition behind this usage is that once something is restricted in grammar, it is not unlimited and is, therefore, local. To illustrate, consider again the Finnish snowball “roll-up” movement. In this language, *wh*-elements target the edge positions of “local domains”, after which the whole domain implements the same operation, and so forth, until a final configuration is reached. There is nothing wrong with such usage, as long as we recognize that the hypothesis that some operation is restricted in some way cannot be falsified even in principle. Therefore, I think this version of the locality-economy hypothesis should not merit much attention.

The second usage is the claim that an empirical matter is at stake. At minimum, some concrete locality-economy property must be explicitly stated, as it is neither sufficient nor interesting to say that some unknown locality-economy principle (“an locality-economy principle”) exists. But then there must also be some conceived way of falsifying the hypothesis. The two major
locality-economy models currently on offer, the phase model and the intervention model, are explicit enough in this sense. Their strength is precisely in the way they make strong empirical predictions. They are empirical claims concerning the normal brain functioning, perhaps even concerning biological systems at large.

However, the main point I have tried to argue in this article is that, indeed, by now there does exist quite systematic evidence that runs directly against both models. I think such finding should only increase our interest in the locality-economy hypothesis. If one decides to take the issue seriously, we seem to have two theoretical options: to keep the locality-economy model and explain these conflicting data away, or to develop a more broader theory which derives the locality-economy phenomena and the nonlocal phenomena as theorems but takes neither as more fundamental. Either way, the locality-economy model is presented with an interesting challenge. In the first case, the challenge is to explain the data away—not by any means a trivial undertaking. In the second instance, the challenge is to construct the more broader theory. Let us examine the second option here; no doubt other linguists will find ways to work with the first option.

As soon as one probes deeper into the literature concerning locality-economy theories, it is difficult to fail to notice that many theories have a significant amount of redundancy in them concerning how they capture the locality-economy properties. Chomsky (2000), for instance, posits three different principles which overlap: the phase-theory, restricting the window of grammatical operations; activity condition, which makes elements inactive once they have been dealt with by local probes; and an intervention condition, which prevents probes to search beyond most local candidates. Their domain of application overlaps considerably in the sense that many of them make the same restrictions. Suppose that we take the evidence reviewed here at its face value and jettison tentatively the phase theory (because Agree is not restricted by phases) from our axiom block. Then we are left with the activity condition and intervention. However, the fact that the various locality conditions overlapped so much can now work into our favour. Indeed I think that Chomsky’s activity condition, together with the multiple government system proposed by Moravcsik (1995), will go some way towards the correct solution. The activity condition in turn must assume that grammar is derivational, and the Finnish $wh$-movement, among much other data, suggests that such derivation is cyclic. So I would like to propose that we keep the hypothesis that grammar is derivational-cyclic.

Suppose that agreement relations are established in tandem with the derivation. Once a suitable head, the probe, is merged to the structure, it will search for an agreement partner, the goal. Let us also assume that remote agreement is real, and that there are actually very few strong barriers which will always block such relations. That is, Agree may telescope over a considerable grammatical distance. But then we need something to balance the system. In most cases, agreement is local. To achieve this, let us posit the following activity condition (adopted from Chomsky 2000)\(^8\):

\[\text{Technically, the activity condition in (Chomsky, 2000) states that only elements with uninterpretable features can trigger operations. Once the relevant operations have taken place, those features are deleted, which then renders them inactive.}\]
Once a given goal is marked by Agree, it becomes inactive and oblivious to further probes. We can now derive a locality effect: when the first potential probe P for a goal G is merged, Agree(P, G) marks G and makes it immune to further operations.

Recall that in the case stacking languages, as well as in Slavonic and Finno-Ugric languages, several probes can affect the one and the same goal. This is why Moravcsik (1995) proposes that agreement, case assignment in particular, can take a many-to-one form or instantiate “multiple government” (p. 459). This leads to nonlocal agreement relations when the nonlocal probe has a say over the local one or where “a single constituent is ‘under obligation’ to signal grammatical information (case, number, person, etc.) for two or more distinct constituents” (Moravcsik, 1995, 460). Adopting Moravcsik’s insight, I propose the following:

A given goal may be marked by several probes.

The above many-to-one principle and the activity condition are in conflict. And this is, I believe, the key. If activity condition holds in most cases, we can explain why there is so much grammatical feature traffic that looks economical and local. But if it does not, for some reason, hold always, we can subsume all the data seen so far. Case stacking suggests that if a given language allows one goal to bear several case suffixes, then those goals can and do receive case information from several local and nonlocal probes. Locality, intervention, phases and the activity condition are absent. In Finnish where case stacking is not possible, certain case features, such as the partitive assigned by the numeral, can still be “outperformed” by nonlocal case probes. In a language where all case marking is local, probe-goal relations always result in inactivation and, therefore, local case marking.

To illustrate one such system (Brattico, 2011), suppose that a given element enters the derivation with an unvalued and uninterpretable case feature [uCase]. Later on, a c-commanding probe P is merged that assigns a case feature to [uCase]. Suppose that the genitive is assigned. The genitive case is assigned locally in Finnish. To capture this effect we rely on the activity condition which says that once the genitive case is assigned to [uCase], no further case assignment is possible. The element is now “inactivated” for the purposes of case assignment (and possibly for the purposes of certain other morphosyntactic operations). This property characterizes case assignment at large in language like English, and genitive, nominative and indirect case assignment in Finnish.

The accusative direct object case (as well as the partitive assigned by the numeral) has the peculiar property that it does not suffice to render the goal inactive when assigned. The goal remains active and can receive another case feature. Specifically, if a finite verb with \( \varphi \)-set is merged later, the zero-accusative case is replaced by the n-accusative; if the negation is merged, the accusative shifts to the partitive. We say that the accusative is therefore a “weak case” feature in Finnish. The paradigm is repeated once more in (24a–b).
Now consider the Finnish partitive case as it is assigned by the numeral inside a DP. If the DP itself is assigned the accusative, the DP-internal numeral assigns the partitive to the noun head. In this situation we observe a layered case assignment: accusative goes for the “higher” elements inside the DP and the partitive for the “lower” elements. But if the DP is assigned the genitive/indirect case, the partitive is eliminated and replaced by the nonlocal case. We conclude that also the partitive-by-numeral must be a “weak” case feature in Finnish. Returning to the accusative, we now know why the accusative case cannot eliminate the partitive-by-numeral: the accusative, like the partitive-by-numeral, is a weak case feature on the basis of the long distance case assignment phenomenon. A weak feature cannot outperform another weak feature, only strong feature can. In other words, the weak/strong distinction allows us to uncover a connection between two phenomena that at first seem entirely distinct, long-distance accusative assignment and the partitive assignment by the numeral.

In sum, I propose that the human grammar incorporates a multiple government system that is restricted by an independent factor, the activity condition. Specifically, the activity condition makes elements inactive in tandem with the derivation and leads to the locality effects. At least, this principle together with the derivational-cyclic model automatically implies that many grammatical dependencies are bound to local domains. On the other hand, since the agreement component is not constrained by locality, whenever the activity condition fails, nonlocal agreement relations result.

The hypothesis discussed in the first section that locality-economy might provide a hypothesis with wide, possibly supramodal domain of application, has received some attention in print and seems to constitute one motivating factor behind the hypothesis itself. On the other hand, it is difficult to see why such attributes are associated so enthusiastically with the locality-economy postulate and not, say, with the notions of derivation and cyclicity. I can’t for the life of me see any reason why the notions of derivation and cyclicity could not have broader application in the human cognition as well. Why not? The former states that there are laws which regulate the build-up of mental representations, not only the finished products (“input-output conditions”), while the latter states that certain rules are applied to those representations in well-defined stages. To me these principle appear as exceptionally promising candidates for supramodal, general cognitive properties.
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