**Eliminating the Competition**

**Introduction**

In the last 30 years, appeals are often made to principles of economy, optimality and blocking based on notions involving a competition that produces a winner which excludes the losing competitors. The appeal of such principles applying to derivations, numerations, and representations has diminished over the years, but nothing in minimalist theory prevents a return to such ideas (or a continuation of them) because it is possible, under current assumptions, to formulate competitive algorithms of the sorts just listed. I argue that a change in how copies are tracked proposed by Safir (2019) has the consequence that all of the competition-based principles that refer to numerations can no longer be formulated. Examples of competition-based proposals will be drawn from the literature to illustrate the sorts of principles and algorithms that are no longer formulable within minimalist theory. This principled decrease in the descriptive power of the theory requires a different approach to some of the phenomena long assumed to be regulated by a competition of some sort and these consequences are briefly presented.

**2.0 The role of numerations in competition-based principles**

Many of the competitive algorithms that are used to determine what is possible in narrow syntax appeal to numerations. Numerations were introduced in Chomsky (1995) to provide a means of tracking copies that result from movement as well as to provide a defined set that could be held constant for competition-based principles and/or algorithms (see in particular, Chomsky, 1995: 227). This particularly true of non-deterministic derivations, i.e., those where the relations between numerations and outputs or between numerations and derivations are not one-to-one. Competitive algorithms of the following sorts can be formulated.

1a) **Numerations in competition –** What’s the best numeration for achieving a particular

meaning? If LF1 results from a derivation on the numeration N6 and there is another

numeration N7 that also results in LF1, then perhaps the ordered pair <N6, LF1> is in

competition with <N7, LF1> or any other pair consisting of a distinct numeration and

LF1. Certain Optimality Theory proposals imply competitions of this sort.

1. **Derivations in competition –** Given a target output LF and a given input numeration, what is the best way to derive the desired LF? If there is more than one series of operations SeO1, SeO2,…SeOn on numeration N6 that results in <N6, LF1>, then for all triplets <N6, SeO, LF1> where only the values for SeO vary, derivations are in competition, as in posited economy of derivations.
2. **Representations in competition –** If one representation competes with one another, how do we measure that one representation is better than another? Suppose there are a variety of representations R1, R2, …Rn that could be built using N6 as input. Presumably, if the Rs have different meanings, we probably don’t want representations to compete with each other or else cheap representations will block a wide variety of meanings. Representations with different lexical contents are unlikely to lead to comparable LFs, so the numeration must be kept constant. So we might say that for all triplets <N6, R, LF1>, where only R varies, if there is a preference for one sort of R over another, then that is how Rs compete, i.e., economy of representations.

I will show more explicitly that there proposals in the literature that correspond to competitions in (1a-c), although solutions like these, all global computations, are out of favor for the very reason that they are computationally complex. Yet they remain in the toolbox of modern linguistic theory. The key point here is that if there are no numerations/lexical arrays in the theory, then none of these competitions can be defined – we can empty this portion of the toolbox on principled grounds.

1. **The demise of numerations**

In Safir (2019), it is argued that there are no numerations or lexical arrays. Safir needed a way of distinguishing nodes to enable his Peak Novelty Condition to be formulable, a matter of no concern to us here, but to justify the ‘term indices’ notation he needed for his condition, he argued that his term indices are a simpler and more effective way to track copies than lexical (sub)arrays, numerations and numeration indices.

Safir points out that numeration indices are not an efficient way to track copies, especially when copies are structurally and lexically complex.

1. Which of the three guys who Mary said knew three other guys here was Alice talking about [*which of the three guys who Mary said knew three other guys here.*]

To know that the fronted phrase and its italicized copy are exactly the same it is necessary to verify that every lexical item in one of the copies bears the same numeration index in the same position as every corresponding lexical item in the other copy. Notice that we must be able to distinguish two different selections from the lexicon for the items *three* and *guys* internal to the moved constituent, but we must treat the selections in the fronted phrase as identical to the selections that introduce those lexical items in the copy. Numeration indices make these distinctions, but the computation it takes to verify that the two large constituents are copies of one another could be as large as any constituent, that is to say, potentially infinite. The old trace theory did not have this problem because there was one matching index on the top of the fronted phrase that matched the trace. Positing term indices indirectly restores this desirable feature of trace theory.

Thus numerations and lexical arrays can be eliminated from the theory if we introduce **‘term indices’** instead of numeration indices. Term indices function as follows:

3a) Every time two syntactic objects are merged, each mergee is assigned a unique term

index.

b) Internal merge is where one of the mergees already has a term index *i*, so that term

index *i* is preserved (no tampering) when it is merged with something that is receiving a

new term index by virtue of being a term in an instance of merge.

Since lexical items (LIs) can be terms, whenever an LI is chosen more than once from the lexicon for use in a derivation, it will get a unique index each time it is chosen by virtue of being a newly merged term. Similarly, phrases (nonterminals) are terms in a merge operation so phrases can be recognized as copies if they bear the same term index. The internal structure of a phrase is not examined to see if it is indeed a copy – copies bear the same term index. Nothing below the node bearing the term index needs to be examined. Thus determining whether two constituents are copies of one another is maximally simple and efficient. Consequences of introducing term indices instead of numeration indices include the following.

4a) There is no preselected set of lexical items, i.e., no lexical array, that must be assembled

and assigned numeration indices before any other operation of the derivation.

b) Thus there is no SELECT operation that builds a lexical array. All that needs to be said is

that tokens from the lexicon can be syntactic objects and each time they are accessed they will get a novel term index.

A derivation proceeds as follows;

5a) [A1 B2]

b) [C3 [A1 B2]4]

c) [D5 [C3 [A1 B2]4]6]

d) [**[C3 [A1 B2]4]6** [D5 **[C3 [A1 B2]4]**6]7]

Each time a SO enters the derivation, it gets a term index, while the resulting SO does not. When internal merge applies, as in (5d), the copied SO retains its index “6”, but what it is merged with gets a term index (“7”). Nothing inside of the two bolded “6” SOs needs to be evaluated to determine they are copies. It is fair to say that term indices violate Chomsky’s Inclusiveness Condition, which does not permit any new information to be introduced in the course of a derivation, but numeration indices were only exempted from Inclusiveness on a technicality. The SELECT operation that applies for a particular derivation prior to merge operations was not considered to be part of the derivation, though it is the first operation and is specific to each derivation in that theory. In the term index theory, the lexicon has terms (SOs) that can be merged and nothing more needs to be said.

The consequence of interest here is that no numeration or lexical array is necessary or possible if term indices are adopted.[[1]](#footnote-1) If there are no numerations, then none of the competitions formulated by appeal to numerations as in (1a-c) are possible.

**3.0 Eliminated competitions**

Over the last 30 years, a variety of competition-based principles and theories have been proposed that rely on the existence of numerations.

Consider first, Last Resort (Chomsky, 1995), which allows certain operations that would otherwise not be allowed to take place if it is necessary for convergence (i.e., for a successful LF or PF output). At its inception, Last Resort was seen to motivate movement on the assumption that external merge would always be cheaper than movement, but movement would become licit if it is the only path to convergence. The intuition is to capture the notion, “this derivation would not converge unless a less than licit operation takes place at this point, other things being equal”. Consider what has to be equal: To know whether or not an operation O will result in a successful output, it is necessary to look ahead to the output, and then look back at alternatives to O, operations that would not be otherwise precluded, and the outputs of derivations including only licit operations would produce. For such a comparison to be made, it would be necessary to hold constant all of the steps of the derivation up to the point where O applies and all of the derivations that have the same numeration. Otherwise, derivations which introduced different lexical items after O would have to be considered in the calculation of whether O is licit, clearly an untenable calculation; It misses the intuition behind Last Resort and requires competition amongst an infinite set of derivations. Last Resort is not formulable in a theory where term indices replace numerations and numeration indices.

Optimality theory (OT) syntax is unformulable without a fixed set of lexical items at some point in the computation of what is optimal. Either the calculation aims to achieve the optimal syntactic output given candidates generated on the basis of a given numeration, in which case different meanings derivable from the same lexical set would be irrelevant to the OT calculation (a bad result, where thematic and scopal differences are influenced by syntactic form). Alternatively, the OT calculation could be designed to achieve the best possible syntax for a given LF output, in which case different candidate sets of lexical items have to be part of the input to the calculation (assuming there is a way to determine that different inputs can yield the same LF). The most coherent version of an OT syntax would require the optimal syntax for an input that included a particular set of lexical items and a target LF (though this would require LF as input to syntactic calculations, rather than its output, so the metalanguage of the LF would have to be non-syntactic in the input). In any of these scenarios, the equivalent of a numeration limiting the candidates in competition is required. Whatever the other obstacles are to formulating an OT syntax, no OT syntax is possible in a theory without numerations.

Several syntacticians have appealed to competition-based principles to deal with complementary distributions, particularly in the domain of anaphora. Accounts of this sort see Principle B effects, for example, as the result of a lost competition to support an anaphoric reading. That is, because *himself* is available in *John criticized himself* to represent the reflexive reading, *John criticized him* cannot represent that reading. In competitive terms, this means that *himself* is more highly valued to achieve this reading where both forms are available. One approach of this kind, Safir (2004), is very explicit about the sort of competition that would have to take place for this sort of an account to work, based on his Form-to-interpretation Principle.

6) Form-to-Interpretation Principle: If

a) X c-commands position Y,

b) *z* is the lexical form or string that fills Y,

c) *w* is a single form more dependent than *z*,

d) both *w* and *z* could support the same identity-dependent interpretation

e) so if Y were exhaustively dependent on X,

then (the referential value for) Y ***cannot be* *interpreted as identity dependent on X***.

Essentially, the potentially anaphoric forms are ranked and the best one available in the context will then be the one that must be used to support the relevant reading. The FTIP algorithm is designed to achieve this result.

7) **FTIP Algorithm**: The input is a given numeration and the resulting LF that contains a nominal A potentially dependent on and c-commanded by a nominal B. Substitute the next most dependent form for the lexical content of A (the target) in the given numeration. If the new test numeration permits an LF to be derived that permits the same dependency relation without crashing, then a dependent reading on B for the target form is unavailable, but if the test derivation crashes, then repeat the process with an even more dependent form substituting for the target until there is no more dependent form to be tested. If there is no substitution of a more dependent form for the target that permits the derivation to converge, then the dependent reading is indeed available for the target.

The FTIP is designed to keep an LF representation and the derivation that produced it constant while varying a single term in the numeration. Whether or not the FTIP approach to complementarity effects is the right way to account for anaphora is not our concern here, but the first six words, “the input is a given numeration”, disqualify the FTIP algorithm as an operation that could be defined on a narrow syntax with term indices.

The view that representations could be in competition was originally introduced by Chomsky (1995) as a restriction on superfluous structure in LF, that is, there should be no structure in LF that is not necessary for interpretation. That proposal assumes that an LF based on a particular numeration cannot have superfluous elements in the representation that are not interpreted. This is not necessarily a competitive computation, insofar as it was not posited that there are representations with meaningless structure that are well-formed only because they are better than other representations, based on the same numeration, which have more meaningless structure. Instead Chomsky’s proposal is couched in terms of Full Interpretation, namely that any representation must contain all and only what is necessary for interpretation. This should rule out any representation with meaningless structure absolutely and is not subject to the numeration critique presented here. However, the existence of expletive elements like *there* (assumed to be inserted at PF, for example)and the structure they occupy, which are assumed to lack any interpretive force in Chomsky’s account, are unexpected, unless they are part of an LF that is the best that is possible. Although this approach was advocated before numerations were introduced, an appeal to economy of structural representation that compares LF representations must keep lexical inputs constant to see if the insertion of *there* is required to meet a structural necessity. Nothing in the theory with term indices keeps track of a set of lexical inputs.

In a later account of the distribution of expletive *there*, Chomsky (2000) suggested that representations are constructed phase by phase with a lexical ‘subarray’ dedicated to each phase by the SELECT operation. The existence of *there* in a subarray meant that it had to be used. Any theoretical claim that all the elements of a numeration must be used in the course of a derivation is now undermined as well, if there are no numerations.

When Chomsky (2004) introduced Merge as a single operation that encompassed both external merge and internal merge (movement), certain forms of economy calculations lost their meaning. In particular, movement could not be more expensive than external merge because they are the same operation – neither one is cheaper than the other. Thus any version of Last Resort or Least Effort that plays on a preference for external over internal merge or vice versa appears to no longer make sense because the same operation cannot be in competition with itself. However, an economy principle based on numerations could still easily distinguish the two, as in (8).

8a) At any point in a derivation, an operation that results in using more of the numeration

to form a single constituent is preferred over one that uses less of the numeration.

b) At any point in a derivation, an operation that results in using less of the numeration

to form a single constituent is preferred to one that uses more of the numeration.

While (8a) could be used to discourage movement, (8b) could be used to prioritize it. Removing numerations from the theory diminishes its descriptive power by eliminating the possibility of formulating constraints like these by appeal to readily available theory-internal concepts.

Collins (1997) also argues against global constraints in favor of ‘local economy’ constraints. He defines Local Economy as follows (Collins, 1997: 5)

9) **Local Economy:** Given a set of syntactic object Σ which is part of derivation D, the decision about whether an operation OP may apply to Σ (as part of an optimal derivation) is made only on the basis of information available in Σ [which is the point in D where the decision is made - Author].

On this definition, there is no reference to numerations and no reference to the output of the whole derivation which would have to be conditioned on the numeration that is part of what defines the whole derivation. Collins’ program is to argue that it is never necessary to appeal to global operations, and in this we completely agree.

Perhaps the strongest reason to adopt local economy is that it places a strong constraint on possible economy conditions. This sharply limits the theoretical possibilities in giving an economy analysis of any particular phenomenon, which is desirable. (Collins, p.5)

However, Collins’ appeal to abandon global economy constraints is based on the thesis that they are too powerful and not necessary. His theory asserts that global constraints are not to be appealed to, but it does not follow from the existence of local economy constraints that a global constraint could not be formulated. Moreover, he explicitly assumes the existence of numerations. The elimination of numerations from the theory via term indices derives Collins’ exclusion of global economy as a theorem and, in effect, completes his program.

**4.0 The future of other competitions**

There are doubtless other constraints or conditions that might be ruled out by the elimination of numerations from the theory, but there are also a variety of competition-based or preference principles that do not appeal to numerations and thus are untouched by the introduction of term indices, local economy constraints among them, depending on how they are formulated. . These alternatives can be used, or can continue to be used, to model distributions that are sensitive to what intuitively appears to be a competition or blocking effect.

It is notable that Collins (1997) still assumes the existence of numerations. He appeals to a constraint that limits the choice of operations that can take place at any point in a derivation where some structure has been built. Thus Shortest Move requires, at a given point in a derivation, that movement cannot be longer than is necessary to satisfy whatever the motivation for movement is. Thus if A c-commands B, C is a landing site for movement that will c-command both A and B, and movement to fill C is required, then other things being equal, A must move to position C because A is closer to C than B is.

The point of this Shortest Move discussion, however, is that no motivation for movement that is evaluated at a later point in the derivation can be appealed to, since that evaluation would have to appeal to a lexical set kept constant. It is possible that one could retrieve lexical items at the end of a derivation and limit alternative derivations to those that use all the morphemes in the output of the actual derivation, but the retrieval of the lexical items in the derivation would violate the Phase Impenetrability Condition, which forbids retrieving information from phases cyclically sent to spell-out. Thus the nonexistence of numerations has real consequences for what sorts of economy constraints can be formulated.

Another competition-based economy constraint is Fox’s (2000) Scope Economy, which essentially says don’t move a quantifier unless it changes the scope interpretation of structure where it applies. Thus if a quantifier has moved to a position where it has scope over all other scope sensitive elements, Scope Economy would block it from moving to a yet higher position (unless the movement is driven by non-scopal considerations). This would rule out structures where a quantifier keeps raising in structures like (11), on the assumption that movement, or at least scopal movement, is not feature-driven.

11) [TP *everyone* [TP *everyone* [TP *everyone* likes someone]]]

On the reading that for each person, there is someone that they like (e.g., different persons liked for each liker), the position of the first *everyone* is enough to establish scope. One might claim that the first movement (the intermediate copy) is necessary to form the appropriate quantifier-variable relation (where the lowest *everyone* is interpreted as a variable), but there is certainly no justification on the basis of scope for any further movement to the position of the highest, leftmost copy position in (11). Notice that Scope Economy does not have to appeal to numerations. For example, what a quantifier has scope over can be recorded each time that quantifier moves. If, after operation O1 applies, a quantifier Q has the set of scope relations Σ, then O2 applying to Q is blocked if Σ is unchanged. Such a constraint would not appeal to numerations and thus licit under the theory proposed here.

Most economy-based accounts of blocking effects face no difficulty from the elimination of numerations. These include theories that choose the best candidate for late insertion into a position predefined by a syntactic derivation, specifically when there is no appeal the history of a derivation or reference to other lexical choices that the derivation might have used. Theories like these, Distributed Morphology, for instance, select the best candidate for lexical insertion without reference to derivational history.

The key point to be made with respect to local economy constraints is that they are not excluded by the absence of numerations as long as they do not surreptitiously appeal to interpretations that can only be garnered from the outputs of derivations rather than the information available at a point in the derivation.

**Conclusion**

It is always a good strategy to remove unwanted descriptive power from the theory so that the remaining principles are forced to play a more explanatory role. I have shown here that the elimination of numerations, an independently motivated simplification of the theory, also eliminates a wide variety of global constraints and conditions from the toolbox of minimalism.

**References**

Bobaljik, Jonathan. 2002. A-chains at the PF-interface: Copies and ‘covert’ movement. *Natural Language and Linguistic Theory* 20: 197-267.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge: MIT Press.

Chomsky, Noam. 2000. Minimalist inquiries: The framework. In *Step by Step: Essays on minimalist syntax in honor of Howard Lasnik*, Roger Martin, David Michaels and Juan Uriagereka, eds, 89-155. Cambridge: MIT Press.

Chomsky, Noam. 2004. Beyond explanatory adequacy. In *Structures and beyond: The cartography of syntactic structures, vol. 3*, ed. by Adriana Belletti, 104–131. Oxford: Oxford University Press.

Chomsky, Noam. 2013. Problems of projection. *Lingua* 130: 33-49.

Collins, Chris. 1997. *Local Economy*. Cambridge: MIT Press.

Fox, Danny. 2000. *Economy and semantic interpretation*. Cambridge: MIT Press..

Richards, Norvin. 2001. Featural cyclicity and the order of multiple specifiers. In *Working Minimalism*, Samuel David Epstein and Norbert Hornstein, eds., 127-158. Cambridge: MIT Press.

Rizzi, L. 2006. On the Form of Chains: Criterial Positions and ECP Effects. In *Wh-movement moving on*. Lisa Cheng and Norbert Corver, eds, 97-134.Cambridge: MIT Press.

Safir, Ken. 2004. *The syntax of anaphora*. Oxford: Oxford University Press.

Safir, Ken. 2014. One true anaphor. *Linguistic Inquiry* 45:91-124.

Safir, Ken. 2019. The A-A’-distinction as an epiphenomenon. *Linguistic Inquiry* 50.2.

1. It is certainly possible to add an operation to the theory that would take the output of a derivation and form a set of all the LIs that have unique indices – call it a ‘collocation’. The claim about numerations and their role in competitions is that the numeration came for free as a consequence of the device that tracks copies. Collocations do not come for free once term indices are introduced. [↑](#footnote-ref-1)