Local blocking and minimal violation

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1 Introduction

In the framework of generative phonology developed in Chomsky & Halle (1968) and subsequent work in the same tradition (henceforth *SPE*), phonological rules are ordered as if on an assembly line, with each rule only having access to the representation that is passed down the line from the previous rule (or from the beginning of the line, the underlying representation). A rule $\mathcal{R}$ must determine whether the representation that is submitted to it meets the conditions for its application. If so, $\mathcal{R}$ applies to that representation. If not, $\mathcal{R}$ does not apply.

By this definition, a rule can fail to apply only if the representation submitted to it does not meet its structural description. But Chomsky & Halle (1968) identified other conditions under which a rule may fail to apply, even when the representation submitted to it meets its structural description: when the rule is structurally related in one of a small number of ways to another applicable rule.[1] Anderson (1969, 1974) and Kiparsky (1973) proposed to subsume this diverse set of *disjunctive rule-blocking conditions* under a single, now well-known principle, which Kiparsky dubbed the Elsewhere Condition (henceforth the EC). The most-cited version of the EC is that of Kiparsky (1982), reproduced in (1).

(1) The Elsewhere Condition (the EC; Kiparsky 1982: 8)
Rules A, B in the same component apply disjunctively to a form Φ iff
 (i) The structural description of A (the special rule) properly includes the structural description of B (the general rule).
 (ii) The result of applying A to Φ is distinct from the result of applying B to Φ.
In that case, A is applied first, and if it takes effect, then B is not applied.

The issue I address in this paper is the following. Suppose that a form ϕ contains some set S of potential loci of application for the general rule B, and that only a proper subset $s \subset S$ of these are potential loci of application for the special rule A. Under what I will here call the *local interpretation* of blocking, B is blocked from applying only to the proper subset of loci s; under what I will call the *global interpretation*, B is blocked from applying to the entire set of loci S. Attested cases of blocking follow the local interpretation: B is only blocked from applying to the specific loci in the proper subset s to which A has applied, and is otherwise free to apply to the complement set s', the remainder of the potential loci of B in S.

[1] Among these, abbreviability via the parenthesis and alpha notations. Subsequent work proposed more such structural relationships, including abbreviability via the mirror-image notation.

This local interpretation of blocking must be stipulated under the assumptions of the *SPE* framework supplemented with the EC. The question comes down to how 'application of A' is encoded in the derivation so that B can be correctly blocked. It can either be encoded globally, at the level of the entire form ('A has applied to this form, so B may not apply to it') or locally, at the level of the individual loci in the form ('A has applied to this locus, so B may not apply to it'). The latter is of course the empirically correct way to encode 'application of A' for the purposes of blocking, but it does not follow from any other property of the *SPE* framework.

On the other hand, the correct local interpretation of blocking follows directly from the *minimal violation* property of Optimality Theory (OT; Prince & Smolensky 1993). In OT, the members of an inclusive set of candidate outputs for a given input compete against a set of ranked and violable constraints; the actual ('optimal') output is the "form that, for every pairwise competition involving it, best satisfies the highest-ranking constraint on which the competitors conflict" (Grimshaw 1997: 373). The 'best satisfies' wording in this prose definition expresses the minimal violation property of the framework: all higher-ranking constraint concerns being equal, a candidate that violates a constraint n times is better than another candidate that violates that constraint any number of times greater than n.

Now consider what this means for EC-type blocking interactions. For purposes of more direct framework comparison, I assume here that 'failure to apply a non-vacuously applicable rule $\mathcal{R}$' in *SPE* corresponds to 'violation of a markedness constraint $\mathbb{M}$' in OT, where $\mathbb{M}$ is violated once for each substring matching $\mathcal{R}$'s structural description.[2] The markedness constraint corresponding to the special rule A must dominate the markedness constraint corresponding to the general rule B in order to have any effect in the grammar at all.[3] In the evaluation of a form with at least one more potential locus of application for B than for A, local blocking of B is guaranteed to win over global blocking. This is shown schematically in (2).

(2) Local blocking follows from minimal violation

Candidates	*STRDSCR(A)	*STRDSCR(B)
a. *no blocking of B*	n !	
b. ☞ *local blocking of B*		n
c. *global blocking of B*		$n+x$!

The candidate in (2a), in which only the general rule B has applied to all relevant loci, incurs n violations of *STRDSCR(A) — one violation for each locus to which the special rule A could have applied but did not. *STRDSCR(A) is satisfied by the local blocking candidate in (2b), in which A has applied to all n of its potential loci; B has been blocked from applying to these n loci but has applied to all x of the remaining loci, thus violating *STRDSCR(B) only n times. The global blocking candidate in (2c) is guaranteed to be worse than the local blocking candidate in (2b), because A has applied to all n of its potential loci and B has been blocked from applying not only to these n but also to the remaining x loci. The global blocking candidate in (2c) thus incurs the same n violations of *STRDSCR(B) as the local

[2]Modulo the common but often unnecessary practice in *SPE* of minimizing rule specifications such that a rule's structural description includes strings to which the rule applies vacuously.

[3]By Pāṇini's Theorem on Constraint-ranking (Prince & Smolensky 1993, §5.3).

blocking candidate in (2b) does, and in addition x more. Minimal violation — 'best satisfaction' — of *STRDSCR(B) thus ensures the optimality of local blocking.

2 Spanish nasal place

2.1 The rules

Spanish provides a straightforward example of a local blocking interaction between a special rule (nasal place ASSIMILATION, (3A)) and a general rule (nasal place NEUTRALIZATION, (3B)), both of which affect syllable-final nasals.[4] I arbitrarily represent these syllable-final nasals as underspecified /N/ in underlying forms; whether they actually have some place of articulation underlyingly is irrelevant.

(3) Rules affecting nasal place in Spanish

A. [+nasal] $\longrightarrow$ [αplace] / __ $]_\sigma$ [αplace] (ASSIMILATION)
e.g., /kaNpo/ $\longrightarrow$ [kámpo] 'field', /baNko/ $\longrightarrow$ [báŋko] 'bank'

B. [+nasal] $\longrightarrow$ [+coronal] / __ $]_\sigma$ (NEUTRALIZATION)
e.g., /paN/ $\longrightarrow$ [pán] 'bread', /balkoN/ $\longrightarrow$ [balkón] 'balcony'

2.2 Assessment by the EC

The rules in (3) clearly stand in the appropriate relationship to be subject to disjunctive ordering by the EC. The NEUTRALIZATION rule (3B) is the general rule, affecting all syllable-final nasals; the ASSIMILATION rule (3A) is the special rule, affecting only those syllable-final nasals followed by a consonant. With respect to sequences of syllable-final nasals followed by noncoronal consonants, the result of applying ASSIMILATION (3A) is distinct from the result of applying NEUTRALIZATION (3B); the former rule changes the nasal to a noncoronal while the latter rule changes it to a coronal. The EC thus correctly predicts that ASSIMILATION (3A) will apply and thereby block NEUTRALIZATION (3B) from applying to syllable-final nasals followed by a noncoronal consonants.

2.3 Local vs. global blocking

The intended generalization behind the rules in (3) is that (A) syllable-final nasals have the same place of articulation as a following consonant and that (B) syllable-final nasals are coronal *elsewhere*. But now consider a form in which there is **both** a syllable-final nasal followed by a (noncoronal) consonant **and** a syllable-final nasal not followed by a consonant — e.g., /riNkoN/ $\longrightarrow$ [riŋkón] 'corner (of a room)'. The two possible derivations of interest for this form are shown in (4).

[4] Harris (1984) proposes a three-rule analysis: (i) debuccalization of all syllable-final nasals, (ii) spreading place to debuccalized nasals from a following consonant, and (iii) supplying coronal place to remaining debuccalized nasals. Even if we grant this analysis (*cf.* Baković 2001), rules (ii) and (iii) are still correctly related by the EC and the point made in the text is not materially affected.

(4) *Local blocking* *Global blocking*

UR	/riNkoN/	UR	/riNkoN/
(3A)	ŋ	(3A)	ŋ
(3B)	⊗ n	(3B)	⊗ ⊗
SR	[riŋkón]	SR	*[riŋkóN]

On the left is the local blocking derivation, where ASSIMILATION (3A) applies to the first nasal and thus blocks NEUTRALIZATION (3B) from applying to that particular locus — but this latter rule is still free to apply to the second nasal, thus resulting in the correct surface representation. On the right is the global blocking derivation, where again ASSIMILATION (3A) applies to the first nasal, but in this case NEUTRALIZATION (3B) is incorrectly blocked from applying to both nasals, resulting in the wrong surface representation.

In the global blocking derivation, the general NEUTRALIZATION rule (3B) is incorrectly blocked from applying to the second nasal simply because the special ASSIMILATION rule (3A) has applied *somewhere else in the form*, to the first nasal. This is clearly not the right interpretation of disjunctive blocking by the EC, and yet nothing in the *SPE* framework prevents this possibility in principle.

2.4 Minimal violation guarantees local blocking

The markedness constraints defined in plain English prose in (5) below are violated by candidates to which the respective rules in (3) can apply nonvacuously. (It may be that one or both of these constraints can be defined more generally than this, but these definitions are appropriate to our framework-comparison purposes here.)

(5) Conflicting markedness constraints for Spanish nasal place

A. Constraint corresponding to ASSIMILATION: AGREENC(place)
A syllable-final nasal and a following consonant must share place.

B. Constraint corresponding to NEUTRALIZATION: CODANAS=COR
A syllable-final nasal must be [+coronal].

CODANAS=COR is only forced to be violated locally (6b); that is, only insofar as satisfaction of higher-ranked AGREENC(place) is at stake (6a). Global blocking (6c) involves an additional, avoidable violation of CODANAS=COR.

(6) Local blocking follows from minimal violation of CODANAS=COR

Input: /riNkoN/	AGRNC(pl)	CODANAS=COR	*comment*
a. [rinkón]	* !		*no blocking*
b. ☞ [riŋkón]		*	*local blocking*
c. [riŋkóN]		** !	*global blocking*

The minimal violation property of OT thus ensures that the correct, local interpretation of blocking is the only possible one. Whenever two constraints conflict in OT, the higher-ranked constraint has priority over the lower-ranked one — but the lower one must still be satisfied to the extent that the higher one is not at stake.

2.5 Leaving the EC behind

There are three alternative rule-based solutions to the problem of local/global blocking ambiguity, all of which essentially give up on the EC as a disjunctive ordering principle. One is to assume that there is **accidental complementarity** between the two rules; that is, to assume that NEUTRALIZATION applies *word*-finally, not syllable-finally, thus applying only to non-preconsonantal syllable-final nasals — not by disjunctive ordering with ASSIMILATION but by simple definition.

Another alternative is to assume **blocking by specification**; that is, to assume that the relevant rules are strictly *feature-filling*.[5] Under this alternative, syllable-final nasals must lack a specification for place before the rules apply.[6] Then ASSIMILATION applies, specifying place on all preconsonantal nasals and thus limiting the application of NEUTRALIZATION to only the remaining syllable-final nasals.

The third alternative is to simply assume **conjunctive ordering** of the two rules; that is, to assume that NEUTRALIZATION simply applies before ASSIMILATION. Syllable-final nasals preceding noncoronal consonants would thus undergo both rules nonvacuously: they would first become coronal by NEUTRALIZATION, and then they would become noncoronal by ASSIMILATION.

Any of these three solutions will work for this particular example, but there are other examples for which these solutions are inadequate. One such example is the interaction between assimilation and deletion in Diola Fogny.

3 Diola Fogny

3.1 The rules

In Diola Fogny (Sapir 1965, Kiparsky 1973, Ito 1986), nasals assimilate in place to following noncontinuants and preconsonantal consonants otherwise delete.

(7) Diola Fogny assimilation (A) and deletion (B)

A.	/ni+gam+gam/	⟶	[nigaŋgam]	‘I judge’
	/ku+bɔn+bɔn/	⟶	[kubɔmbɔn]	‘they sent’
	/na+tiːŋ+tiːŋ/	⟶	[natiːntiːŋ]	‘he cut (it) through’
	/na+miːn+miːn/	⟶	[namiːmmiːn]	‘he cut (with a knife)’
B.	/na+laɲ+laɲ/	⟶	[nalalaɲ]	‘he returned’
	/na+jɔkɛn+jɔkɛn/	⟶	[najɔkɛjɔkɛn]	‘he tires’
	/na+waɲ+aːm+waɲ/	⟶	[nawaɲaːwaɲ]	‘he cultivated for me’
	/let+ku+ʤaw/	⟶	[lekuʤaw]	‘they won’t go’

Kiparsky (1973) proposes the following two rules, disjunctively ordered by the EC. Note that DELETION (8B) is stated in a maximally general form, deleting all preconsonantal consonants, but it is disjunctively blocked from applying to nasals preceding noncontinuants, which are instead subject to ASSIMILATION (8A). Like the Spanish rules in (3), these rules stand in the appropriate relationship to be subject to disjunctive ordering by the EC. The DELETION rule (8B) is the general rule,

[5] It is only necessary for NEUTRALIZATION to be feature-filling, but I proceed in the text under the view, explicitly adopted (*mutatis mutandis*) by e.g. Harris (1984), that both rules are.

[6] In Harris’s (1984) analysis, this is accomplished by the debuccalization rule noted in fn. 4.

affecting all consonant clusters; the ASSIMILATION rule (8A) is the special rule, affecting only those clusters the first member of which is a nasal and the second member of which is a noncontinuant. With respect to such clusters, the result of applying ASSIMILATION (8A) is distinct from the result of applying DELETION (8B); the former rule simply changes the place of the nasal while the latter rule deletes it. The EC thus correctly predicts that ASSIMILATION (8A) will apply and thereby block DELETION (8B) from applying to such clusters.

(8) Diola Fogny disjunctively-ordered rules (adapted from Kiparsky 1973)

A. $\begin{bmatrix} \text{C} \\ \text{+nasal} \end{bmatrix} \longrightarrow [\alpha\text{place}] \,/\, \_\_ \begin{bmatrix} \text{–cont} \\ \alpha\text{place} \end{bmatrix}$ ASSIMILATION

B. $\text{C} \longrightarrow \text{Ø}/\ \_\_\ \text{C}$ DELETION

3.2 The alternatives

Kiparsky (1973) explicitly argues against the **conjunctive ordering** alternative to this analysis, because the corresponding rules would have to be stated as in (9).

(9) Diola Fogny conjunctively-ordered rules (adapted from Kiparsky 1973)

B′. $\begin{bmatrix} \text{C} \\ \langle\text{+nasal}\rangle \end{bmatrix} \longrightarrow \text{Ø}/\ \_\_ \begin{bmatrix} \text{C} \\ \langle\text{+cont}\rangle \end{bmatrix}$ DELETION′

A′. $\text{C} \longrightarrow [\alpha\text{place}] \,/\, \_\_ \begin{bmatrix} \text{C} \\ \alpha\text{place} \end{bmatrix}$ ASSIMILATION′

The fact that the following consonant must be [–cont] in the ASSIMILATION rule in (8A) is a natural condition on nasal place assimilation rules (see e.g. Padgett 1994); the condition on DELETION′ rule in (9B′) — that the following consonant must be [+cont] if the consonant-to-be-deleted is [+nasal] — is not similarly justified, and is certainly not worth the apparent gain in the corresponding simplification of the ASSIMILATION′ rule in (9A′). It should now be obvious why the **accidental complementarity** alternative is also inadequate in this case: the deletion rule would have to be stated just as in (9B′), with no corresponding simplification of the assimilation rule, which would have to be stated just as in (8A).

The **blocking by specification** alternative is also inadequate in this case, as it requires something beyond the feature-filling / feature-changing distinction that was sufficient for the Spanish case in §2. Deletion is the rule needing to be blocked in Diola Fogny; this rule does not specify a feature but rather deletes an entire segment. The only alternative is to restrict deletion to 'unlicensed' (≈ unassimilated) consonants (as in Ito 1986), which essentially builds accidental complementarity into the statement of a clearly more general consonant cluster simplification rule.

3.3 Local blocking

Having established the superiority of the disjunctive blocking analysis in (8), we can consider data showing that DELETION is blocked locally, not globally. Consider first the underlying form /nu+maNʤ+il+maNʤ/, corresponding to the surface form [numaɲʤiːmaɲʤ] 'you know them'. Even though DELETION (8B) is blocked from applying to the two nasals to which ASSIMILATION (8A) applies (represented as /N/ in the underlying form), the /l/ of the morpheme /il/ is still deleted.[7] A direct comparison of local and global blocking in this case is shown in (10).

(10)

	Local blocking		*Global blocking*
UR	/numaNʤi l maNʤ/	UR	/numaNʤi l maNʤ/
(8A)	ɲ ɲ	(8A)	ɲ ɲ
(8B)	⊗ Ø ⊗	(8B)	⊗ ⊗ ⊗
SR	[numaɲʤiː maɲʤ]	SR	*[numaɲʤi l maɲʤ]

On the left is the local blocking derivation, where ASSIMILATION (8A) applies to the two instances of /Nʤ/ and thus blocks DELETION (8B) from applying to those nasals — but this latter rule is still free to apply to the /l/, thus resulting in the correct surface representation. On the right is the global blocking derivation, where again ASSIMILATION (8A) applies to the two instances of /Nʤ/, but in this case DELETION (8B) is incorrectly blocked from applying to the /l/, resulting in the wrong surface representation. Again, global blocking is not the right interpretation of disjunctive blocking by the EC, and yet nothing prevents it.

3.4 Minimal violation

The OT analysis in this case requires more discussion, for the simple reason that satisfaction of a surface-oriented AGREENC(place)-type constraint can be had either by assimilation or by deletion of the nasal: assimilation satisfies the *consequent* of the constraint (if there is an NC sequence, *then it must share place*) whereas deletion satisfies the *antecedent* (there being no NC sequence if the N is deleted).[8] There is thus no conflict between this kind of AGREENC(place) constraint, meant to correspond to the ASSIMILATION rule in (8A), and a more general markedness constraint against consonant clusters designed to correspond to the DELETION rule in (8B): both can be satisfied in principle by deletion, and given that the set of strings subject to the latter constraint properly includes the set of strings subject to the former, the activity of the latter effectively subsumes the activity of the former.

But, as it happens, there is another otherwise somewhat puzzling fact about the interaction between assimilation and deletion in Diola Fogny that provides some independent evidence for a somewhat different formulation of the constraint responsible for assimilation, one that cannot be satisfied by deletion of the nasal. This fact is familiar from the analysis in Ito 1986 and problem sets based thereon, and is exemplified by the form /na+maNʤ+maNʤ/, which surfaces as [namamaɲʤ] 'he knows'. Given that assimilation is otherwise expected to occur before nasals (recall /na+miːn+miːn/ ⟶ [namiːmmiːn] 'he cut (with a knife)' from (7A)), this form might be expected to surface as *[namammaɲʤ], with deletion of the /ʤ/ and (subsequent) assimilation of the preceding nasal to the now-following nasal. Instead, this form undergoes 'double deletion' of both the /ʤ/ and the preceding nasal.

I propose to account for these facts with a special definition of the constraint responsible for assimilation in Diola Fogny, here called $\oint$AGREENC(place) for

[7] Note the independent compensatory lengthening of the vowel preceding the deleted /l/.

[8] This is true even if MAX-C $\gg$ IDENT(place) universally; see Baković 2007 for discussion.

expedience. It is defined somewhat formally in (11A) below; somewhat more informally, this constraint requires that, given an *underlying* NC sequence the C part of which has a [–cont] correspondent in the output, the N part must have an output [+nasal] correspondent that shares place with that [–cont] correspondent of C.

(11) Conflicting markedness constraints for Diola Fogny

A. Constraint corresponding to ASSIMILATION: $\oint$AGREENC(place)
Given NC $\in$ *input*, if C $\mapsto \begin{bmatrix}\text{–cont}\\ \alpha\text{place}\end{bmatrix}$, then N $\mapsto \begin{bmatrix}\text{+nasal}\\ \alpha\text{place}\end{bmatrix}$.

B. Constraint corresponding to DELETION: NO-CC
Consonant clusters (including geminates) are disallowed.

Note that the constraint NO-CC in (11B) is stated here as a constraint against clusters rather than one against codas, side-stepping the independent and for our purposes irrelevant fact that codas are tolerated word-finally in Diola Fogny. The only tolerated violations of this constraint that we are concerned with here are those forced by the dominance of the $\oint$AGREENC(place) constraint in (11A).

$\oint$AGREENC(place) differs from AGREENC(place) in some substantive, far-from-standard ways. It has a complex, two-part antecedent, the first part of which refers directly to the input (‘Given NC $\in$ *input*’); markedness constraints are generally assumed to be able to refer only to output structures. The second part of the antecedent (‘if C $\mapsto \ldots$’) refers to the input-output mapping, to ensure that the consonant-to-be-assimilated-to has not been deleted (and if that’s the case, to ensure that it surfaces as [–cont]). Finally, the consequent (‘then N $\mapsto \ldots$’) also refers to the input-output mapping, requiring both that the nasal surface and that it assimilate; this is how this constraint cannot be satisfied by deletion.[9]

It is not my intention to defend this unorthodox constraint beyond demonstrating how it works to account both for local blocking of deletion via enforcement of minimal violation of NO-CC, as shown in (12), and for the optimality of double deletion where it actually occurs, as shown in (13). First, local blocking. The optimal candidate in (12b) violates NO-CC twice, once for each (assimilated) NC cluster, but across-the-board (ATB) deletion of the nasals as well as the /l/ (12a) violates $\oint$AGREENC(place) twice because the C of each underlying NC cluster has surfaced but the N has not. Global blocking of deletion (12c) is no help, as it incurs an additional and avoidable violation of NO-CC.

(12) Local blocking follows from minimal violation of NO-CC

Input: /nu+maNʤ+il+maNʤ/	$\oint$AGRNC(pl)	NO-CC	*comment*
a. [numaʤiːmaʤ]	** !		*ATB deletion*
b. ☞ [numaɲʤiːmaɲʤ]		**	*local blocking*
c. [numaɲʤilmaɲʤ]		*** !	*global blocking*

Next, double deletion. The optimal candidate in (13b) violates NO-CC due to the word-final (assimilated) NC cluster, but ATB deletion of this nasal as well as

[9]By deletion *of the N*, that is. Deletion of the C is still a possible way to satisfy this constraint — crucially, in fact, to allow for double deletion — but I assume that this does not happen more generally due to the ranking MAX-C $\gg$ IDENT(place) (which may be universal; see fn. 8).

the word-internal NC cluster (13a) again violates ∮AGREENC(place). The otherwise expected deletion + assimilation candidate in (13c) incurs an additional and avoidable violation of NO-CC — another example of minimal violation in action.

(13) Double deletion also follows from minimal violation of NO-CC

Input: /na+maNʤ+maNʤ/	∮AGRNC(pl)	NO-CC	*comment*
a. [namamaʤ]	* !		*ATB deletion*
b. ☞ [namamaɲʤ]		*	*double deletion*
c. [namammaɲʤ]		** !	*del. + assim.*

Even with a stipulated solution to the local vs. global blocking problem in hand, Kiparsky's (1973) EC analysis of the interaction between ASSIMILATION (8A) and DELETION (8B) makes the wrong prediction with respect to the double deletion facts. Because ASSIMILATION applies first, it is expected to apply to /na+maNʤ+maNʤ/ to produce the intermediate representation *namaɲʤmaɲʤ*. Then DELETION applies, deleting only the first ʤ because it is disjunctively blocked from affecting either of the two nasals. The result is *[namaɲmaɲʤ], with the first nasal having assimilated to the deleted ʤ. Either a second, unblockable deletion rule is necessary to delete this incorrectly assimilated first nasal, or deletion of the ʤ must somehow 'unblock' DELETION and allow it to apply to this nasal.[10]

4 Concluding remarks

The justifiably well-regarded Elsewhere Condition, which is meant to block a general rule when a more specific rule applies, leaves open the possibility that the general rule could be blocked globally, unable to apply anywhere in a form to which the more specific rule has applied. This global interpretation of blocking is empirically incorrect, but there is no way to disallow global blocking except by stipulation in the ordered-rule-based *SPE* framework. The correct, local interpretation of blocking follows directly from the minimal violation property of OT, and is thus a point in favor of this ranked-constraint-based framework.

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[10]A somewhat roundabout autosegmental solution along both of the lines suggested in the text may be possible. ASSIMILATION spreads the Place node from the ʤ to the nasal, but when DELETION applies to the ʤ, this Place node is also deleted; the nasal is left unlicensed and is stray-erased. (Why there isn't spreading from the following nasal instead of stray erasure is anybody's guess.)

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