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Understanding Cyclic Spell-Out

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Understanding Cyclic Spell-Out

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SOAS & USC

1. Introduction

In Chomsky (1998) the interesting suggestion is made that syntactic structures may be phonetically interpreted in successive stages rather than at a single point, and that the input to occurrences of this “cyclic Spell-Out” process are phase constituents of type ν P and CP. The cyclic Spell-Out/CSO hypothesis of the relation of syntax to phonology has been considerably influential since its introduction and is now widely adopted in Minimalist approaches to syntax. Notwithstanding this success, certain aspects of CSO still remain poorly understood and there has been little evidence of the right phono-syntactic kind available to throw light on the basic mechanics of such a procedure. The present paper now shows how the interaction of syntax and phonology in tone sandhi patterns found in Taiwanese provides a potentially useful window into the process of CSO and in certain cases allows one to observe very clearly how such an operation applies to a syntactic input form. The patterning observed leads to a number of new insights into CSO and suggests the conclusions that (a) the linear order of elements inside a syntactic unit interpreted by CSO may not be necessarily fixed by the CSO process in any fully final way, and (b) the regular input to CSO may only be fully propositional CP constituents and not smaller ν P structures, contrary to what has frequently been assumed.

The structure of this paper is as follows. Section 2 provides an overview of relevant aspects of CSO and the notion of phase as introduced in Chomsky (1998). Section 3 then presents Taiwanese data originally considered in Simpson & Wu (2002) which lays the groundwork for a reconsideration of the notion of CSO. This is done in section 4, where the Taiwanese patterns are shown both to provide positive evidence for the idea of CSO and to lead a clearer understanding of what may be involved in such an operation. The section also discusses how the patterns observed interact with related phenomena observed in English *wh*-constructions studied in Bresnan (1971), and notes that the Taiwanese and English constructions both seem to lead to similar conclusions concerning the nature of CSO. Section 5 finally considers what consequences such conclusions may have for the Minimalist system proposed in Chomsky (1998/99).

2. Chomsky (1998), phases and cyclic Spell-Out.

In Chomsky (1998) many changes to the Minimalist system set forth in Chomsky (1995) are proposed. Among the innovations argued for, it might seem that certain critical mechanisms are introduced in order to deal with the problem posed by successive cyclic movement/SCM for the earlier 1995 Minimalist model (henceforth MP95). In MP95 it is assumed that operations of movement are commonly triggered to satisfy feature-checking requirements of an attracting functional head, allowing for a description of overt *wh*-movement to a +Q Comp position as being caused by strong *wh*-features present in the +Q C^0 , and subject movement to SpecTP as resulting from the presence of a strong categorial feature in T^0 etc. What is somewhat problematic for such a general approach is however the conclusion that movement sometimes proceeds in a successive cyclic fashion via intermediate positions in which the presence of strong attracting features is far less easy to justify. While cases of successive cyclic NP-movement through intervening subject positions (as in (1)) can be justified by the assumption that there are strong categorial features in every T^0 projected in a syntactic structure, instances of long *wh*-movement are more difficult to account for, as in (2), where the *wh*-phrase is assumed to raise through the intervening -Q Comp position before reaching the higher +Q Comp:

- (1) John_i seems [_{t_i} to have been cheated _{t_i}]
 (2) What_i do you think [_{t_i} that Mary bought _{t_i}]?

Whereas in the long NP-movement case it is not unreasonable to claim that every T^0 requires its Spec position to be filled with some element (i.e. the EPP), and hence that the NP 'John' from the lower clause moves through the lower SpecTP to satisfy this requirement, it is significantly more difficult to plausibly justify the SCM in (2). The claim cannot be made that every C^0 has some kind of *wh*-feature to be checked in order to motivate the assumed movement through the lower -Q Comp, as -Q Comps clearly occur in non-interrogative sentences where there is no opportunity for such *wh*-features to be checked on C^0 s that are present. It therefore has to be supposed that C^0 heads may only *optionally* contain relevant features which will allow for the attraction of a *wh*-phrase, and these optional features will occur on an intervening C^0 in cases of long *wh*-movement such as (2). Such an approach is however rather unsatisfactory as it leaves unexplained why such features cannot be optionally selected on the -Q C^0 in examples such as (3), attracting the lower *wh*-phrase:

- (3) *Who_i _{t_i} thought [what_k you bought _{t_k}] ?

It also leaves unexplained why the relevant 'optional' *wh*/C features apparently have to be *obligatorily* selected for -Q C^0 s in instances of long *wh*-movement such as (2). The phenomenon of SCM in *wh*-structures consequently raises a number of difficult problems, and yet there seems to be a range of cross-linguistic evidence which indicates that successive cyclic *wh*-movement through intervening -Q Comp positions does indeed occur. Two simple examples of this are the quantifier stranding observed to be possible in West Ulster English in McCloskey (2000), as in (4), where movement of the *wh*-phrase through intervening Comps results in possible stranding of the quantifier, and the *wh*-copy movement phenomenon found in certain varieties of German, as in (5), where successive

cyclic *wh*-movement clearly seems able to leave behind a copy of this movement in the intervening –Q Comp:

- (4) What_i do you think [_{CP} (all) that he'll say [_{CP} (all) that we should buy t_i]]?
 (5) Wen_i willst du, wen_i Jakob t_i besticht?
 whom want you whom Jakob bribes
 'Whom do you want Jakob to bribe?'

The solution to the problems of SCM proposed in Chomsky (1998) (henceforth MP98) is essentially to suggest that SCM occurs because certain syntactic constituents are opaque and disallow/block an attraction-type relation between a higher functional head and a lower matching XP/X⁰ which occurs inside constituents of the non-transparent type. Chomsky then suggests that if an XP/X⁰ located inside an opaque constituent undergoes raising to the periphery/'edge' of such a constituent, it will become visible to higher functional heads, and it is this critical visibility requirement which results in the surface phenomena of SCM. In the case of *wh*-movement, for example, raising of the *wh*-phrase in (2) to the intermediate SpecCP position is suggested to bring it to a position at the periphery of the lower CP where it will be visible for attraction by the higher +Q C. This intermediate movement is therefore not caused by the need to check/license any optional *wh*-features on the lower –Q C⁰, but instead takes place so that the *wh*-phrase can be visible to and ultimately satisfy the requirements of the higher +Q C⁰ and its *wh*/Q-feature specification.¹

The critical constituents which MP98 identifies as being potentially opaque in the way described are CPs and also *v*Ps, and these are referred to as 'phases' (of a derivation). Though it is easy to see how it may be useful to treat CPs as opaque constituents, so as to explain the SCM phenomena frequently observed in Comp positions, it is perhaps less obvious why *v*Ps should qualify as opaque XPs, as *v*Ps do not seem to be so clearly associated with SCM, and no full explanation is offered for why *v*Ps might be assumed to pattern (empirically) as opaque constituents.² Instead it is briefly suggested that:

"Perhaps the simplest choice is to take SO (= syntactic object = phase) to be the closest syntactic counterpart to a proposition: either a verb phrase in which all theta roles are assigned or a full clause including tense and force. Call these objects "propositional"." (Chomsky 1988:20)

The suggestion that *v*P constituents might be phases and potentially opaque in a way similar to CPs can therefore be noted to be rather tentative and exploratory in kind, and more of a working hypothesis than the conclusion of extended argumentation.

Phases are schematized as (potentially) being able to project the structure in (6). Here EA represents a semantically selected 'external argument' (found with *v*P but not CP), H is the head of the phase, hence *v* or C, YP is the complement of H, and XP is an extra Specifier position which is taken to be licensed by the categories C and *v* in addition to any

¹ For a similar CP-edge visibility analysis of partial *wh*-movement in German and Hungarian and the conclusion that feature-checking may be a relation between a functional head and a non-local XP/X⁰ (i.e. an analogue to Chomsky's (1998) suggestions concerning Agreement), see Simpson (1995, chapters 2 and 3).

² On p.22 of MP98 there is a passing reference to reconstruction effects and parasitic gap constructions as being potential evidence for phase opacity. However, this is not explained further in the text, and it is not clear whether such phenomena might be taken to be evidence for CPs or *v*Ps as phases (nor why they would suggest phase opacity).

selected external argument (EA). Non-selected Specifiers of this second type are assumed to host raised *wh*-phrases (SpecCP), and shifted objects (SpecvP):

- (6) [XP [(EA) H YP]]

The opacity of phase constituents is then described as a “phase impenetrability condition”, phrased as in (7):

- (7) In phase \forall with head H, the domain of H is not accessible to operations outside \forall , but only H and its edge. (Chomsky 1998:22)

The ‘edge’ of a phase is described as corresponding to the specifier positions projected by a head H. (7) then signifies that all elements inside the complement YP of the head of a phase are inaccessible (i.e. invisible) to elements higher than the phase, and a functional head external to YP will consequently not be able to attract any element located inside YP, nor enter into other syntactic operations with elements in YP. In cases where an element located inside a phase such as CP does raise to a higher phase-external position, as for example with the long movement of the *wh*-phrase from within the lower phase CP to the higher +Q Comp in (2), it is suggested that this element will first raise to the edge of the relevant phase and there become visible to a higher head which can attract the element further. Such raising to the edge of phases is therefore taken to cause the array of SCM effects found across languages where there is evidence that elements move to intermediate positions before reaching their final landing-sites.

The second innovation introduced in Chomsky (1998) which will be particularly relevant in this investigation is the suggestion that there is not a single point of phonetic Spell-Out (as in MP95) but rather multiple applications of Spell-Out and that syntactic derivations are interpreted by phonology in a sequence of cycles rather than all at once. Such an innovation again seems to have been inspired by a problem which Chomsky perceived to be present and unsatisfactorily solved in the earlier 1995 Minimalist model. The area of concern noted by Chomsky in MP95 (fn 50, p.385) is the observation that although –interpretable features are assumed to have to delete during the course of a syntactic derivation so as to avoid the derivation crashing at LF, such features nevertheless (frequently) have an overt phonetic reflex (e.g. they may show up as agreement morphology), and might then perhaps be taken to be present at PF. Earlier in MP95 it was suggested (fn 50, p.385) that the phonetic reflex of (deleted) features could be simply stripped away from the underlying syntactic derivation and therefore that the observation of overt agreement morphology does not indicate the continued presence of undeleted syntactic features. In MP98 however, it is assumed that the presence of overt feature-related morphology should in fact be taken as indication that the underlying features have not been deleted, and that such a conclusion is a problem for the single Spell-Out model of MP95: the presence of overt morphology related to features which are –interpretable may indicate that such features have survived deletion and therefore might be expected to cause LF forms to crash. As derivations with overt movement and overt agreement morphology do however seem to converge, the reasoning is that some other explanation must be sought for their well-formedness. Chomsky’s proposal here is that there is a critical sequencing of movement, phonetic interpretation and feature-deletion. The suggestion is that movement may sometimes take place and feed phonetic interpretation/Spell-Out mid-derivationally *before* the syntactic derivation then continues further with deletion of the relevant features

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and further applications of movement and structure building. –Interpretable features could then be assumed to have reflexes at PF but still be deleted before LF as PF forms would be built up and created in incremental parts during the course of a syntactic derivation by multiple occurrences of phonetic Spell-Out. After each occurrence of cyclic Spell-Out, deletion of –interpretable features having reflexes in the PF form could be deleted in the ongoing syntactic derivation and so would not cause any crash in the final syntactic forms presented at LF.

Though there is no fully necessary logical connection between the idea of phase constituents and the positing of a model with cyclic Spell-Out, the tentative suggestion is made that the input to occurrences of Spell-Out may perhaps be phases:

“The natural conclusion is that Spell-Out is associated with agreement. Deleted features are literally erased, but only after they are sent to the phonological component along with the rest of the structure E - *possibly at the phase level* (emphasis: AS&ZW). Spell-Out therefore applies cyclically in the course of the (narrow syntactic) derivation.” (Chomsky 1998:48)

The hypothesis of cyclic Spell-Out, phases, and the suggested interaction between the two represents an interesting and provocative step forward in the Minimalist approach to modeling UG. It also has to be recognized as a set of proposals that have largely been initiated/prompted by theory-internal considerations and so still remains as a hypothesis to some extent. Consequently, in order for such theory-led proposals to be realized as being genuinely headed in the right direction, one would like to be able to find empirical data of an appropriate phono-syntactic kind showing that phonology really does interact with syntactic derivations in the way suggested, and one would hope to discover aspects of phonology which indicate both that Spell-Out applies in a cyclic way and that it applies to phase-type constituents, if this is indeed correct. Somewhat surprisingly (to the best of our knowledge), in the four year period since the introduction of the notion of phase and cyclic Spell-Out in MP98, clear and strong phono-syntactic arguments for CSO and its application to phase-level constituents have actually not been presented. Though there have been a number of purely syntactic analyses which are fully compatible with CSO and the idea of phases as outlined in MP98/99, and even syntactic analyses which seem to be well-stated in terms of CSO and phases, what is oddly still missing is a good range of phonological evidence for the CSO/phase interaction and information from phonological phenomena on how CSO might be expected to apply.³ The aim of the remainder of this paper is therefore to provide one such strong positive argument in favor of CSO based on phonological phenomena, and then to show how an examination of the patterns observed sheds further light on the process of CSO and how CSO operates on syntactic strings as input forms. In order to do this, we will now in section 3 present the relevant facts in Taiwanese, as noted and analyzed in Simpson & Wu (2002), and then in section 4 show how these patterns critically bear on the issue and form of CSO.

³ McGinnis (2001) presents an interesting argument from vowel-lengthening patterns in applicative constructions that is certainly consistent with a CSO/phase approach, but the patterns do not seem to unambiguously force a CSO treatment and could also arguably be captured in a single Spell-Out model applied to the representation created by the syntax. This will be shown not to be possible in the patterns considered in sections 3 and 4.

3. Taiwanese

What follows is a brief summary of certain patterns found in Taiwanese relating to the syntax and phonology of a newly grammaticalized complementizer *kong*. Extended discussion of the paradigm can be found in Simpson & Wu (2002) (henceforth S&W). Here for present purposes and reasons of space we simply provide the main facts relevant for further discussion in part 4.

Taiwanese is a variety of Chinese which is grammatically similar to Mandarin Chinese. Like Mandarin, Taiwanese is SVO in its basic word order and shows a highly dominant head-initial ordering across its syntactic categories. Taiwanese is also a variety of Chinese with significant tone sandhi phenomena, and the seven tones of Taiwanese are all subject to regular change when they occur in syllables in certain environments. Essentially, the citation/lexical tone of a syllable undergoes change to a fully predictable sandhi tone when a syllable precedes some other tone-bearing syllable in the same tone sandhi domain. For example, in (8) below the third tone of the verb *khi* 'go' changes to a tone 2 when followed by an overt object which itself has a tone. Were the object not to be present (and occur perhaps as a *pro*) or were there to be an overt element following the verb which had 'neutral-tone'/no tone as in (9), there would be no change in the citation tone of the verb, i.e. no tone sandhi/TS:

- | | | | |
|-----|--|-----|---|
| (8) | <u>khi3</u> pak8kiang1 → <u>khi2</u> pak8kiang1
go Beijing
'go to Beijing' | (9) | <u>zau2</u> a-NT → <u>zau2</u> a-NT
run already
'already ran' |
|-----|--|-----|---|

Because there needs to be a positively specified trigger for TS to occur in a syllable (i.e. a syllable has to be followed by an element with a non-neutral tone for there to be TS in the preceding syllable), TS clearly never occurs in an element/syllable in sentence-final position, as there is no overt S-internal element to trigger TS in the final element in a sentence (and TS is not triggered across sentence boundaries).

Sentence-internally there are other TS domains and every syllable in such a domain changes its tone apart from the last syllable. Here three generalisations can be noted. First of all an overt complement consistently triggers tone sandhi on the head which selects it, indicating that a head and its complement are in a single TS domain. Secondly, a head does not trigger tone sandhi on the final syllable of its specifier, indicating that the specifier of a head constitutes a TS domain independent of the head. Thirdly, the final syllable of an adjunct does not undergo tone sandhi, so adjuncts may also be considered to be self-contained tone sandhi domains.

With this background, we are now in a position to consider the element *kong* in Taiwanese. This element is found to occur regularly as a simple verb meaning 'to say' as in (10) (note that from this point on, syllables which undergo TS are followed by a dot symbol in the example sentences):

- (10) A•-hui kong• A•sin m• lai.
A-hui say A-sin NEG come
'A-hui said A-sin is not coming.'

Kong also now occurs grammaticalized as an embedding complementizer following verbs of communication and cognition as in (11). The grammaticalization of complementizers

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from general verbs of saying is a common cross-linguistic phenomenon and frequently occurs in languages when a serial verb construction of a specific verb of communication followed by a general verb of communication becomes reanalyzed as a V C sequence, as schematized in (12):

- (11) A[•]-hui siong[•] kong[•] A[•]-sin m[•] lai
 A-hui think KONG A-sin NEG come
 'A-hui thought that A-sin was not coming.'
- (12) Verb1 Verb2 → Verb(1) Complementizer
 shout say → shout that

Examples such as (11) show that where a new C⁰ occurs grammaticalized in the syntactic structure, it naturally occurs in a pre-IP position following the regular head-initial ordering in Taiwanese.

What is less expected but ultimately more interesting is the observation that *kong* also seems able to occur as a grammaticalized complementizer in clause-final position following its IP complement, as in (13). This clause-final position is puzzling and seems to go against the general headedness of Taiwanese and also does not correspond to any serial verb position from which *kong* could have naturally grammaticalized as a complementizer.

- (13) A[•]-hui siong[•] A[•]-sin m[•] lai kong[•]
 A-hui think A-sin NEG come KONG
 'A-hui thinks A-sin is not coming.'

The puzzle which *kong* poses becomes deeper when one examines the tone sandhi in *kong*-final sentences. Where *kong* is S-final as in (13) there are two unexpected tone sandhi patterns. First of all the embedded IP-final element *lai* preceding *kong* does *not* undergo TS; if this IP is the leftward complement of *kong* in a final C position, this should mean that the IP and the C and are in the same TS domain (heads and their complements otherwise constitute a TS domain, as noted above) and it is expected that this should result in sandhi occurring between the C⁰ and the element left-adjacent to it in this TS domain, i.e. the final syllable of the IP, but this does not happen.

The second unusual TS patterning in *kong*-final sentences is that the *sentence-final* element *kong* does in fact undergo TS. This is quite unexpected as no other elements in sentence-final position undergo tone sandhi, simply because the sentence is a self-contained TS domain, as already noted. These two facts are recorded in (14):

- (14) IP – *kong* unexpected complement before head order, unexpected TS changes
 (i) final syllable in IP does not undergo tone sandhi
 (ii) *kong* does undergo tone sandhi

S&W suggest that both patterns may have a simple explanation. The unexpected TS patterns in *kong*-final forms can be significantly noted to be fully parallel to the TS patterns which occur when the complementizer *kong* occurs *before* its complement IP as in (11). Here the overt embedded complement IP triggers TS on the head which precedes it, i.e. *kong* in C⁰, and the final syllable in the sentence *lai* does not undergo TS, again as expected as it is the final element in its TS domain. This patterning with pre-IP *kong* is noted in (15):

- (15) *kong* – IP expected complement before head order, expected TS changes
 (i) final syllable in IP does not undergo tone sandhi
 (ii) *kong* does undergo tone sandhi

There are consequently cases of *kong* preceding its IP complement, which is an expected order, and one gets just the kind of TS modification one would expect, as in (15), and there are also cases of *kong* following its IP-complement, which is an unexpected order given the dominant head-initial order of Taiwanese, and one gets quite unexpected TS, as in (14). Finally it can be noted that the unexpected patterns in (14) are significantly exactly the same as those in (15) where *kong* precedes its IP complement. The interesting conclusion is therefore that for TS purposes, sequences where *kong* follows its IP complement behave exactly as if they were sequences with *kong* preceding the IP.

Syntactically to capture this parallelism S&W suggest that surface *kong*-final forms are actually the result of an IP-raising operation applying to underlyingly fully regular sequences in which *kong* precedes its IP complement. If the TS rules are assumed to apply before this IP-raising, the unexpected TS patterns in *kong*-final patterns can be simply explained: in such an underlying order *kong* will precede its IP complement and so naturally undergo TS, similar to pattern (15ii), and the IP-final element will be in sentence-final position at this point and so *not* be eligible for TS, just as in (15i).

The suggested occurrence of IP-raising also clearly accounts for the odd clause-final position of *kong* following its complement in a position which does not correspond to any earlier serial verb construction sequence, which otherwise is quite unexplained. Two different sets of facts about *kong*-final sentences therefore seem to converge on the same conclusion that the position of *kong* following its IP complement is derived in such sentences from a much more regular underlying form where *kong* precedes the IP.

Given the observation in (11) that *kong* occurs as a grammaticalized complementizer also in pre-IP position in embedded clauses, it might now be expected that the IP-raising in *kong*-final sequences would occur in the embedded CP as in (16):

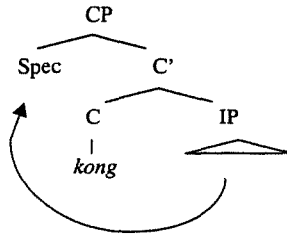
- (16) A•hui siŋŋ• [CP [IP₂ A•-sin m• lai]_i kong• t_i]
 ↑
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However, S&W point out that there are two good reasons to think that this is not exactly right. First of all, it is possible for there to be a *kong* in the embedded C position as well as an S-final *kong*, as in (17). Secondly, S-final *kong* can also occur in *mono-clausal* sentences as in (18). This suggests that *kong* actually occurs in a *matrix clause* C position rather than the embedded C, and that mono-clausal and bi-clausal sentences with a final *kong* are derived as in (19) and (20):

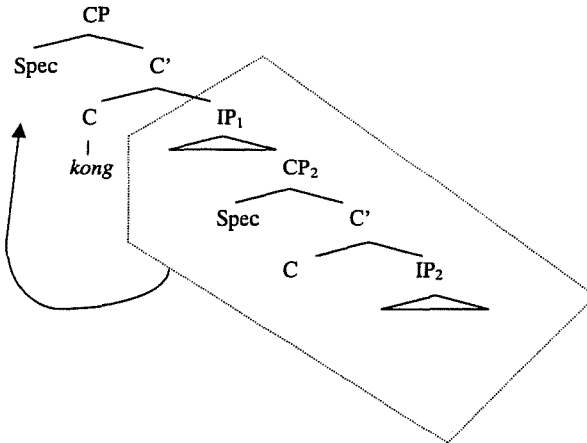
- (17) A•hui liau•chun• **kong**• A•sin si• tai•pak• lang **kong**•
 A-hui thought KONG A-sin is Taipei person KONG
 'A-hui thought that A-sin is from Taipei.'
- (18) A•sin m• lai kong•
 A-sin NEG come KONG
 'A-sin's not coming.'

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(19)



(20)



Furthermore, it can be noted that when *kong* occurs preceding an embedded IP complement in cases such as (11), it adds nothing extra to the meaning of the sentence, but when *kong* occurs in S-final position it does add clear extra meaning, and encodes a speaker-related emphatic assertion of the sentence which in English can often be naturally glossed with the expression 'I'm telling you X!' where X is the content of the sentence. In (21) this emphatic assertion implies an interpretation something like: "A-sin has written in his letter saying he is coming, so why do you think that he won't come?"

- (21) A•-sin e• phoe sia• kong• bin•a•chai beh• lai kong•
 A-sin GEN letter write KONG• tomorrow want come KONG
 'A-sin wrote that he will come tomorrow, (I'm telling you!).'

This aspect of the informational structure of *kong*-final sentences also allows for an explanation of the motivation for the IP-raising. Basically the content of the IP is information that is commonly presupposed and entertained as possible to different degrees by speaker and hearer. The function of *kong* is to emphatically re-assert the contents of IP, just as in English forms like (22):

- (22) He's gone, I'm telling you!

The contents of the IP is therefore topic-like and the focus of attention is on the assertion of IP with the use of *kong*. The IP-movement in *kong*-final sentences can therefore be seen as occurrence of defocusing/topicalization movement, leaving *kong* in prominent S-final position where it is interpreted as the focus.

Finally it can be noted that emphatic-assertive *kong* occurs in complementary distribution with both yes/no question particles and also *wh*-phrases in Taiwanese. This complementary distribution with question particles is expected if *kong* and question particle elements occur as alternative competing instantiations of the same basic C^0 head position, with *kong* and question particles encoding opposite semantic values – declarative assertion vs. interrogative +Q. If *kong* encodes a declarative/non-interrogative value of C^0 , it will also naturally fail to license *wh*-phrases which require an interrogative C^0 to be present. Such patterns therefore further strengthen the assumption that *kong* is a C^0 element.

4. S-final *kong* and cyclic Spell-Out

The patterning observed in section 3 and the analysis which seems to be necessary to capture the properties found now allows for certain interesting theoretical conclusions. Above it was noted that the particular TS patterns found in *kong*-final sentences can only naturally be explained if TS modification is critically assumed to apply BEFORE the IP undergoes raising. Such a necessary sequencing of TS and movement now provides important and useful information about the interaction of syntax and phonology. Because tone sandhi rules alter the phonetic interpretation of elements, they can be taken to constitute a phonological-type process which should therefore apply in PF. As the IP-raising in *kong*-final sentences however has to critically follow application of the TS rules, this might suggest that the operation of IP-raising also takes place in PF as an instance of PF-movement, as indicated in the derivation in (23):

- (23) [CP [C *kong* [IP A-sin m lai]]
- ↓
- Spell-Out**
- ↓
- PF - tone sandhi rules apply** (changing the tone on *kong* and maintaining
the citation tone on *lai*)
- [CP [C *kong*• [IP A-sin m• lai]]]
- ↓
- IP-raising**
- [CP [IP A-sin m• lai]_i [C *kong*•] t_i]

Such an approach however encounters a problem. There is a common assumption that movement which occurs only in PF should not be associated with interpretative effects and should not have any effect upon interpretation, as the results of such movement will not be present in the LF input to interpretation. IP-raising in *kong*-final sentences is however clearly associated with a particular interpretation of topic and emphatic focus-assertion, which therefore suggests that the IP raising should in fact occur in the syntax and *not* PF, so that its effects are present at LF.

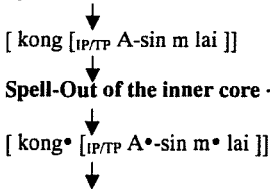
The older Y-model of grammar offers no way to resolve such a paradox, which consequently suggests that a different interaction between syntax and phonology should be assumed. As reviewed in section 2, a model with multiple Spell-Out and a cyclic interaction of syntax and phonology has indeed recently been proposed in Chomsky (1998) and subsequent works.⁴ Such a model now allows for a rather simple second explanation of the sequencing of TS and IP-raising in *kong*-final sentences. The element *kong* has been argued to be grammaticalized as a C⁰ element in complementary distribution with question-particles, instantiating a declarative/non-interrogative value of C⁰ which will not license *wh*-phrases. *Kong* therefore occurs as the head of one of the constituents identified by Chomsky as being phases and hence inputs to CSO - a CP constituent. Assuming the general possibility of CSO, after the phase headed by *kong* and its IP complement is constructed, it can be suggested that this sequence is then given phonetic interpretation and is spelt-out in PF, with the result that the elements in the [C+IP] sequence undergo TS modification. Following this, the syntactic derivation can be assumed to continue further with leftward raising of the IP. In such a CSO approach the IP-raising will occur as a regular *syntactic* movement, and movement at PF need not be assumed. The apparent paradox that IP-raising has to take place in the syntactic component yet after the application of certain phonological rules can therefore be captured rather simply, and to the extent that *only* such an approach seems able to capture the patterning, the *kong* paradigm then clearly offers strong empirical support for such a view of syntax and phonology.

The *kong* paradigm also allows for certain further conclusions about cyclic Spell-Out and a finer understanding of the nature and potential type of phases. As noted in section 2, Chomsky (1998) suggests that phases may have the structure in (6), where EA is a specifier semantically selected by the head H (only in the case of *vP*) and XP is an extra specifier licensed by C and *v* in addition to any selected external argument:

- (6) [XP [(EA) H YP]]

In Taiwanese *kong*-final sentences it has been suggested that the IP complement of C raises to a specifier associated with *kong* after the sequence *kong*-IP has been phonetically spelt-out. Such a specifier (SpecCP) is not semantically selected and so of the extra "outer" type (XP in (6)). This now leads to the initial conclusion that the input to CSO is the inner "core" of a phase consisting of its head H and its complement YP, but critically not the phase's outer phase-peripheral specifier XP. Such a specifier is perhaps only created after the inner core of the phrase has been sent to cyclic Spell-Out. The derivation assumed to underlie *kong*-final forms such as (18) is now represented in (24):

- (24) Syntactic creation of the inner core of a phase headed by C⁰ *kong*:



⁴ Chomsky notes that his proposals also relate to similar suggestions in Epstein et al (1998), Uriagereka (1999) and Bresnan (1971).

Syntactic raising of the output of mid-derivational Spell-Out → IP/TP raising to outer phase-peripheral Spec of the phase CP:

↓
[_{CP} [_{IP/TP} A*⁻-sin m• lai], kong• t_i]

↓
Final syntactic form is pronounced (as immediately above)

Having reached the conclusion that the sequence of events in (24) underlies the derivation of forms such as (18), we are now in a position to stand back a little and partially re-assess how CSO applies to a syntactic string. In Chomsky (1998/99), because the hypothesis of CSO arises from primarily theoretical and syntax-centred assumptions and reasoning rather than being led by phonological patterns/evidence, the specifics of CSO naturally remain somewhat tentative. Quite possibly there is a tacit assumption that whatever operations may have occurred *instantaneously* at Spell-Out in a single Spell-Out model could simply be assumed to occur *incrementally* in a multiple Spell-Out approach. However, logically it is not necessary that CSO should in fact mimic every property of single Spell-Out in an incremental way, and one might imagine certain differences between single Spell-Out and CSO in the way that they apply to syntactic strings as input. One clear effect of single Spell-Out is that this operation not only applies phonological processes to interpret words phonetically, it also establishes a linear order amongst words. This ordering of elements is also naturally and necessarily final in a single Spell-Out model as there is only one application of phonology/PF to a syntactic derivation. One might however wonder if the fixing of linear order is a necessary part of any and every operation of Spell-Out, or whether it is perhaps just a bi-product of a single Spell-Out model because phonology/PF in such an approach can access a syntactic string only once. Here the Taiwanese patterns are now extremely useful and informative as they clearly indicate that (cyclic) Spell-Out in fact does *not* necessarily fix the order of elements in an input in a fully final way and in the case of *kong*-final sentences, after the initial application of Spell-Out to [*kong* + IP] sequences it is seen that the IP constituent is subsequently still able to undergo repositioning to its final surface position preceding the element *kong*. Here it can be noted and stressed that the TS patterns found can only be correctly predicted if *both kong and* its IP complement are *together* sent to Spell-Out as a [*kong* IP] sequence, and the element *kong* has to be present in the input to CSO for its tone to be altered by the tone sandhi process. The phono-syntactic information available in Taiwanese therefore allows for the second important conclusion concerning CSO that while (cyclic) Spell-Out applies phonological processes to elements in a syntactic input to interpret them phonetically, it does *not* at the same time necessarily fix the final order of elements in a syntactic derivation.

These conclusions about CSO can now be noted to be further strengthened and confirmed by an independent pattern found in English, the interaction of *wh*-movement and sentential stress discussed in Bresnan (1971), which largely anticipates the idea of cyclic Spell-Out. Bresnan shows that *wh*-phrases which appear raised in surface forms in fact behave as if they were *in situ* for purposes of sentential stress assignment, receiving the sentential stress that would normally be assigned to an element in sentence-final position. Hence in (25) below the raised *wh*-phrase receives sentential stress and there is no sentential stress on the verb although it is linearly final in the sentence:

(25) John asked [what BOOKS] Helen had written.

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To explain this pattering, Bresnan suggests that sentential stress is actually assigned when the *wh*-element is *in situ* in sentence-final object position prior to raising to SpecCP. This therefore results in the conclusion that a *phonological/PF* rule (sentential stress assignment) is in fact followed by further *syntactic* movement – *wh*-raising to SpecCP, and Bresnan indeed concludes that phonology may apply mid-way in a syntactic derivation, i.e. there is cyclic Spell-Out. In addition to providing good positive evidence for CSO of the necessary phono-syntactic kind, the English *wh* data like the Taiwanese *kong* forms is usefully informative in various ways. First of all, it would seem that the application of the sentential stress rule applies to the CP phase *before* its outer specifier is created and raised to by the *wh*-phrase, i.e. the object *wh*-phrase in (25) has to be *in situ* following the verb in S-final position when the sentential stress rule applies. This would then seem to confirm the conclusion made on the basis of Taiwanese that the input to CSO is the inner core of a phase without its external specifier position. Both English and Taiwanese patterns furthermore converge on the assumption that CPs (lacking their external specifiers) are indeed constituents which occur as regular inputs to CSO.

Significantly, the English *wh* data also indicate very clearly once again that CSO does *not* result in fixing the linear order of elements submitted to Spell-Out in any final way. When the inner core of the CP phase is interpreted by CSO, the object *wh*-phrase in (25) must be *in situ* to receive the sentential stress, yet following this application of CSO it is clearly able to raise higher to the SpecCP position at the edge of the CP phase.⁵

A comparison of *wh* patterns in English with *object topicalisation* in Taiwanese can now be shown to lead on to a third important conclusion. In the latter construction, it can be noted that TS is *not* triggered in the verb which precedes the object in the underlying form of an object topicalization sentence (i.e. *kong* 'to say' in (26)). This contrasts with a non-topicalized equivalent where the positioning of the overt object following the verb will cause TS in the verb, as seen in (27):

- (26) [tai•oan•oe]_i [goan•lau•pe] be• hiao• kong t_i
 Taiwanese I old-father not know speak.
 'Taiwanese, my father can't speak.'
- (27) [goan•lau•pe] be• hiao• kong• tai•oan•oe
 I old-father not know speak Taiwanese
 'My father can't speak Taiwanese.'

This lack of TS in the verb in (26) might initially be unexpected if it is assumed that the object targets the same SpecCP position that IP-raising does in *kong* sentences. It might be expected that when the inner core of the CP phase is submitted to CSO the object would

⁵ Note that this conclusion holds whether the input to CSO for determination of sentential stress is the CP phase, as is natural to assume given the sentential nature of this stress assignment rule, or whether the input might alternatively be assumed to be a smaller vP phase. Supposing it might somehow be possible for Spell-Out of a vP phase to result in sentential stress (though it is far from clear how this could be so given the necessary global comparison of stress in a clause necessary for determination of sentential stress), in such a vP phase the object *wh*-phrase would again have to first be *in situ* at the point of CSO to receive the sentential stress, but would later still clearly undergo movement to a higher position. The conclusion that CSO does not fix the final order of elements in an input to CSO therefore seems to be unavoidable. Shortly arguments will also be presented that vPs are actually *not* potential inputs to CSO.

occur in situ prior to raising to SpecCP and so should trigger TS in the verb which precedes it at this point of Spell-Out. However, there is actually good evidence that object topicalization does not in fact target a SpecCP position but a position which is lower in the clause. In sentences where the element *kong* occurs as a simple embedding complementizer (as e.g. in (11)), it is found that object topicalization has to occur to a position which is below this C^0 as in (28), and is ungrammatical when it tries to target a SpecCP position preceding *kong* in C^0 , as shown in (29):

- (28) A^{*}-sin siong^{*} kong^{*} [hit^{*} pun^{*} chheh]_i A^{*}-hui m^{*} be t_i
 A-sin thinks C that CL book A-sin NEG buy
 'A-sin thinks that A-hui doesn't want to buy that book.'
- (29) *A^{*}-sin siong^{*} [hit^{*} pun^{*} chheh]_i kong^{*} A^{*}-hui m^{*} be t_i
 A-sin thinks that CL book C A-hui NEG buy

Given this observation, it can be suggested that the object raising in (26) and (28) actually targets a lower inner topic/focus-phrase position located inside the inner core of the CP phase. This being so, raising to this lower phase-internal position will take place before the CP phase is submitted to CSO and consequently objects raised and phonetically interpreted in such positions will not be able to cause TS in the verb as they will not occur following the verb at the point where TS applies.

This patterning in Taiwanese can now be compared with English *wh* to reach a potentially significant conclusion concerning *input forms* to CSO. Note that Bresnan's *wh*-sentential stress patterns could in fact possibly be given a slightly different explanation from the one initially offered. Supposing one were to assume that the input to CSO may be phases of either CP or ν P type, then it might be possible to suggest that sentential stress is assigned to an object *wh*-phrase when a ν P rather than a CP phase is submitted to CSO (though as footnote 5 observes, this is perhaps not very likely given the sentential nature of the stress rule which is relevant here). If so, the object *wh*-phrase would occur unraised in ν P-final position at such a point, and therefore in a final position where it might be assigned sentential stress.⁶ However, if ν P phases potentially could occur as the input to CSO, one would then expect incorrectly that Taiwanese topicalized objects should be able to trigger TS on the verbs which select them, as such objects would follow the verb when the ν P is hypothetically inputted to cyclic Spell-Out. As TS does not occur in such cases, this consequently suggests the broad conclusion that phonology/CSO has access to mid-derivational syntactic forms only at the clausal level after (the inner core of) CPs have been constructed, and does not apply directly to smaller syntactic cycles such as ν P phases.

Despite the initial tentative hypothesis in MP98 that both ν Ps and CPs may be phases and serve as inputs to cyclic Spell-Out, empirically there may now seem to be evidence and arguments based on the interaction of syntax and phonology that only CPs actually serve as phasal inputs to CSO and not smaller units such as ν Ps. Possibly ν Ps might have an importance from a purely syntactic point of view, and may be relevant as phases for syntax-internal phenomena, but the limited phono-syntactic evidence currently

⁶ This also requires assuming that it is the inner core of a phase which is the input to CSO and the *wh*-phrase would not be raised to Spec ν P, the outer specifier, at this point. If it was raised to Spec ν P during CSO, there would of course be no way that it should be able to get the sentential stress.

available and reviewed here now suggests that such units apparently do not participate in mid-derivational *phonological* interpretation, i.e. CSO.⁷

Finally, it can be pointed out and emphasized that the patterns presented here provide a strong argument for a derivational approach to syntax and phonology and arguably cannot be captured by any representational approach. In both Taiwanese and English it appears that certain phonological operations such as tone sandhi and sentential stress assignment have to be (assumed to be) effected *before* other syntactic operations of movement in order to account for the patterns observed, and while this is relatively simple to capture and describe in a derivational approach incorporating CSO, it is very difficult to model in any reasonably constrained representational approach. Considering the Taiwanese *kong*-final paradigm, a purely representational approach would have to attempt to explain the TS patterns in examples such as (18) by means of a single representation in which there is a trace or a phonetically null copy of movement following *kong* as in (30):

(30) [CP [IP/TP A*-sin m* lai]_i kong* t_i / [IP/TP A*-sin m*-lai]]

The simple problem with trying to allow for traces or copies to cause TS changes (such as that found in *kong* in (30)) is that elsewhere TS can *only* ever be triggered by *phonetically overt* elements (which furthermore must have non-neutral tone). For example, when the object of a verb is a phonetically null *pro* element, this does not trigger in TS in the verb, whereas a phonetically overt DP object would cause TS in the verb. It might therefore seem rather difficult to allow for phonetically null traces/copies to cause TS when other phonetically null or deficient elements (i.e. phonetically overt elements with neutral tone) cannot do this. A determined representational approach might nevertheless attempt to suggest that trace/copy structures such as (30) where TS is triggered before a trace/copy may perhaps still be distinguished from instances where a *pro* object fails to cause TS in a verb, as in the former case it could be suggested that the relevant traces/copies do in fact occur co-indexed with a higher phonetically overt element as part of the links of a chain, and possibly this association/linking with an (identical) overt higher element might allow for TS to be triggered in a lower position by some kind of 'inheritance' of the properties of the higher element. As *pro* elements will not occur in the same kind of movement-equivalent chains, it could perhaps be suggested that they would not be expected to allow for any similar 'inheritance' of phonetic properties and so should not be able to cause TS. However, such a potential chain-based inheritance approach is ultimately also not viable, as it predicts that copies/traces of movement should generally be able to cause TS effects, and this is actually not true. Reconsider for a moment the object topicalization cases in Taiwanese such as (26) and (28). Here movement will leave a trace/copy in the position following the verb, as indicated, and yet the occurrence of such a trace/copy consistently *fails* to trigger TS, whereas an overt object DP in such a position would cause TS in the verb, as seen in (27). This patterning indicates fairly clearly that traces/copies do not in fact

⁷ Note furthermore that the conclusions here actually do not depend on the *kong*-final patterns examined in the bulk of the paper, and would also hold without a consideration of *kong*-final forms. If vP units were to be possible inputs to CSO, then the input of [_{vP} V OB] to Spell-Out in Taiwanese should result in the application of phonology producing phonetic forms corresponding to such a sequence. As the occurrence of a phonetically interpreted object NP following its selecting verb should cause TS in the verb, it is expected that the verb should always show TS even when the object is later topicalized if vPs were to be genuine inputs to CSO. That TS does not occur in such cases then seems to clearly indicate that it is only CPs that are submitted to CSO.

allow for any inheritance of phonetic properties from other chain-internal elements. Consequently, to account for the TS patterns in *kong*-final examples such as (30) it seems that the only possibility is to assume that a phonetically overt element (the TP/IP) triggers TS in *kong* critically *before* the TP/IP raises leftwards, and that a sequenced derivational model incorporating CSO is therefore forced and necessary to capture the syntax-phonology interactions observed.⁸

5. Conclusions

We can now summarize the main conclusions of the paper, and close with a consideration of the potential impact they may have for the revised Minimalist system proposed in MP98/99. Essentially, the broad conclusions resulting from sections 2-4 are listed again in (31-33) below:

- (31) **Strong support for cyclic Spell-Out**
The Taiwanese *kong*-final paradigm provides strong positive empirical support for the idea of cyclic Spell-Out suggested in Chomsky (1998).
- (32) **CPs but not vPs are submitted to cyclic Spell-Out**
Patterns observed in both Taiwanese and English indicate that the input to cyclic Spell-Out is the inner core of a CP 'phase' composed of the C⁰ head and its TP/IP complement. Patterns observed in Taiwanese and English also clearly suggest that vP 'phase' constituents are NOT legitimate inputs to the cyclic Spell-Out process.
- (33) **Cyclic Spell-Out does not fix the final linear ordering of elements in a string**
Both Taiwanese and English data indicate that cyclic Spell-Out applies phonological processes to the elements present in a syntactic string to interpret them phonetically, but cyclic Spell-Out does NOT necessarily fix the linear order of the elements in such a string in any fully final way.

(31-33) above clearly provide important and useful clarification of what may be mechanically involved in the CSO process. As such conclusions do not fully coincide with certain of the initial hypotheses made about CSO in MP98/99, an important question is now what consequences (31-33) might have for the system outlined in these works?

⁸ The only possible way to salvage a representational approach here, it seems to us, is to attempt to suggest that only copies/traces linked to phonetically overt elements in *certain* higher positions are able to inherit phonetic-like properties from these higher elements. In order to distinguish cases like (30) from instances of object topicalization, one would have to say that a copy/trace linked to an element in SpecCP would allow for inheritance of the relevant PF properties, but a copy/trace linked to an element in some lower position would not. Here it is not at all clear what special properties of SpecCP could however be responsible for transmission of phonetic attributes to a lower trace/copy, given that similar transmission would have to be blocked from lower positions (e.g., in topicalization structures). Furthermore, elsewhere phonological processes (e.g., vowel harmony, liaison etc) are consistently noted to be very local in their application/computation and are not triggered by long-distance relations. It would therefore seem to be generally implausible that an element in a higher syntactic position could cause a phonological effect such as TS in a lower position, and TS would instead seem to be much more of a regular, local process.

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Considering (33) first, this conclusion might appear to be contrary to a working hypothesis adopted in Chomsky (1999), noted below, and so perhaps might be expected to be in conflict with the system resulting from such a hypothesis:

- (34) “The simplest assumption is that the phonological component spells out elements that undergo no further displacement – the heads of chains – with no need for further specification.” (Chomsky 1999, p.11)

However, here it can be suggested that (33), forced by the various patterns observed, may in fact have positive advantages for the revised Minimalist system outlined in Chomsky (1998/99). Specifically, there are two properties of the CSO system in MP99 which are to some extent unanticipated and which (33) may allow one to explain in other ways. The first of these is the conclusion/assumption that the size of the input to occurrences of CSO is actually not fixed and is subject to certain variability. Hence although it may perhaps be generally the case that: “...cyclic Spell-Out...takes place at the strong phase level.” (p.10), the hypothesis in (34) actually makes it necessary to assume that the input to CSO may consist in any of the combinations in (36) below (referring to the component parts of a phase as schematized in (35)):

- (35) [XP [(EA) H YP]]
 (36) Possible different inputs to CSO:
 a. only YP
 b. H and YP
 c. EA, H and YP
 d. XP, EA, H and YP

Supposing, for example, that an element from within YP raises to H and then undergoes further raising, as might be the case in finite clauses in French with a tensed verb first raising to H= v and then further to T, (34) requires one to assume that the finite verb in H will *not* be part of the constituent submitted to CSO as then (according to (34)) this would fix its surface position at v^0 whereas later on it actually surfaces higher in T^0 . For such cases it is therefore necessary to assume that a form such as (36a) can be the input to CSO at the vP level. Supposing, alternatively, that a tensed verb does not raise beyond v^0 but the external argument of v^0 , the subject, does raise to SpecTP, then (34) forces the assumption that (36b) should be a possible input form to CSO, fixing the position of the tensed verb at v^0 (if it is raised there), but allowing for the subject of the clause base-generated in the inner specifier EA position to escape CSO and raise to a higher position. (36c) might perhaps be the input form to CSO in surface [Aux S V O] sequences where these occur in languages such as Arabic or Welsh. Although on the one hand there is therefore an assumption that cross-linguistically the input to CSO will be uniformly submitted at a particular point (the vP/CP phase level), on the other hand (34) forces the assumption that there is also a potentially *non*-uniform input to CSO, which is possibly a little unanticipated.

A second point concerning the process of CSO outlined in MP99 is that (34) forces the assumption that CSO actually may often not apply when a constituent of the appropriate size for CSO has been constructed, but must instead wait until the syntax has built a larger structure. Consider the case of object *wh*-movement in examples such as: ‘Which book did you buy t?’. Here, according to (34) and MP99, it will be necessary to build a full vP with

an outer non-selected XP specifier position [XP EA H YP] and raise the object *wh*-phrase out of YP=VP to this position *before* CSO can then apply to the smaller syntactic constituent comprised of just [H YP] (i.e. if the object *wh*-phrase is not raised out of YP=VP, (34) suggests that it will be frozen in its VP-internal position). There is consequently a frequent 'over-construction' in the syntax before CSO can apply to a smaller part of the constructed derivation. This 'backtracking' side-effect of (34) is again a little unanticipated and one might expect that CSO would automatically and blindly apply as soon as an input form of appropriate size had been created by the syntax.

Both of the above complications can now be noted to potentially disappear if (33) rather than (34) is assumed. If the conclusion in (33) is correct, it becomes possible to assume that there is in fact a uniform input to CSO, quite possibly made up of the head of a phase and its YP complement given the patterns observed in Taiwanese and English. If there are cases where it is found that an element raised to a phase head H undergoes further movement to a higher position, (33) suggests that there is no need to assume that H is not a part of the constituent submitted to CSO. Rather, as with elements inside its complement YP, it can be assumed that H may indeed be spelt-out, but contra (34), the final linear positioning of H will not fixed by such a Spell-Out process, and will instead allow an element in H (potentially) to raise to some higher position following the occurrence of CSO. The assumption of (33) rather than (34) also has the effect that CSO can be assumed to apply automatically as soon as an appropriately-sized input form is constructed, and it is not necessary for the syntax to sometimes extend a structure before CSO is able to apply to a smaller sub-part of it - because elements interpreted by CSO may be able to undergo further movement following an occurrence of CSO, there will clearly be no need for them to have to escape from structures submitted to CSO by raising to positions constructed external to such structures. The assumption of (33), arguably forced independently by other considerations, might therefore seem to have positive advantages for a CSO and phase-based Minimalist approach and allow one to avoid otherwise necessary complications such as the non-uniformity of input forms to CSO and 'over-construction' of syntactic forms before the potential application of CSO.

Turning now to (32), the conclusion that *v*Ps are not legitimate inputs to CSO, such a conclusion would appear to be in conflict with the hypothesis in MP98/99 that both CPs and *v*Ps are phases and that phases are the regular input form to CSO. If (32) is correct, one can ask what further consequences it may have for the system of constraints and proposals made in MP98/99. Here there are two rather different ways of proceeding and two ways in which (32) could be interpreted as offering useful new insights into a phase-based Minimalist system. Arguably both routes forward will depend for their support on the strength of relevant empirical evidence that can be found.

One possibility is simply to conclude that (32) indicates that *v*Ps are actually *not* phases, and that only CPs are. If phases are indeed taken to be the input to CSO and *v*Ps do not appear to be regular legitimate inputs to CSO, then it may be suggested that *v*P constituents in fact have no special phasal status. Such a way forward would then require one to account for *v*P-level phase-type phenomena in a different way that does not make use of the notion of phase. As SCM phenomena may be the area of syntax where phases and the idea of phase impenetrability have been most useful in providing new accounts, a clear requirement of a Minimalist approach without *v*Ps as phases would be to reconsider the issue of SCM at the *v*P level. One obvious strategy here may perhaps be to attempt to deny the existence of SCM at the *v*P level, as SCM effects have in fact always been found more

frequently at the CP level, and much less clearly with ν Ps.⁹ If one is able to effectively challenge the existence of SCM at the ν P-level, there will clearly be much less support for the assumption that ν Ps are phases.

A second way forward from (32) is to explore the possibility that ν P constituents may be phases from a purely syntactic point of view, though NOT be inputs to the phonological operation of CSO. Here it can be noted again that there is no necessary logical connection between the syntactic notion of an opaque constituent (i.e. a phase) and the milder derivational *phonological* interpretation of a sub-part of structure (i.e. CSO). It is therefore quite possible that the portions of syntactic structure which serve as inputs to CSO might not necessarily be the same as those which are opaque to extraction. Supposing this were to be so, it is natural to ask how a derivation might proceed if ν Ps were to be phases but not inputs to CSO, and whether such an approach is generally plausible or not. A brief reconsideration of the case of object *wh*-movement in English is revealing here as it throws up a challenge to such a hypothesis. Recall that Bresnan's observations about sentential stress patterns indicate that an object *wh*-phrase must be assumed to be fully in situ at the point of CSO in order to receive sentential stress. If [C+IP] units are the only input forms to CSO, and if ν Ps are now taken to be opaque syntactic phases, this means that raising of a *wh*-object to the edge of the ν P will in fact critically have to take place *following* the input of C+IP to CSO.¹⁰ Such a sequencing might possibly seem to be counter-cyclic in flavor and therefore potentially problematic, with a higher constituent undergoing an operation (CSO) *before* syntactic operations syntactic operations (fully) confined to the lower parts of such a unit have been completed. This then might be taken as an argument against the possibility that ν Ps are syntactic phases but not inputs to CSO.¹¹ Whether an approach assuming ν Ps as syntactic phases but not inputs to CSO is to be preferred to the alternative assumption that ν Ps are simply not phases is therefore not immediately obvious, and not an easy matter to decide. Here we leave the issue open as an interesting question for further research and debate, and note that the question may perhaps ultimately be decided by empirical support

⁹ Positive evidence may even be provided that SCM seems to avoid the ν P level. McCloskey's (2000) West Ulster English data shows that quantifiers may be stranded by *wh*-movement in a variety of positions (indicating SCM) but apparently not in any Spec ν P position:

(i) What (all) do you think (all) that he'll say (all) that we should buy (all)?

Partial *wh*-Movement and *wh*-copying in languages such as German also clearly reveal the occurrence of SCM through SpecCP positions but not Spec ν P positions (see Simpson 1995 and references therein).

¹⁰ Specifically, the derivation should proceed as below:

(a) [C [IP ... [ν P *wh*]]] *wh*-object in situ in S-final position when C+IP are submitted to CSO and stress assignment

(b) [C [IP ... [ν P *wh*_k [... ... *t*_k]]]] following this, *wh*-object raises to the edge of ν P before it can extract to a higher position (due phase impenetrability)

(c) [C_P *wh*_k [IP ... [ν P *t*_k [... ... *t*_k]]]] finally, *wh* raises to SpecCP

¹¹ On the other hand, it might be suggested that the sequencing of the derivation in (37) is also actually not problematic. In Minimalism strict cyclicity has been sometimes seen to be the result of a requirement that a functional head with (strong) features must attract a relevant element to itself *as soon as* the head is introduced into a structure (Chomsky 1995). In the case of movement of an element to the edge of a phase to escape the opacity induced by a phase, such movement is however *indirectly-feature driven* and may not be immediately or directly caused by an attracting functional head (and in the approach in Chomsky (1998/99), when *wh*-objects raise to Spec ν P prior to CSO of the ν P, the C⁰ which will ultimately attract the *wh*-object will not be present in the syntactic structure at all). Movement to phase edges is therefore not expected to necessarily have the full appearance of strict cyclicity, and movement of an object *wh*-phrase to a lower Spec ν P following CSO of the containing C+IP may actually not be ruled out by anything.

and the degree to which evidence can (or cannot) be found both for successive cyclic movement at the νP -level and for similarities in patterning between CPs phases and νP units. Finally it can be added that what would also clearly seem to be needed for future research is substantially more cross-linguistic evidence linking phonology and syntax in a dynamic and mid-derivational way, just as presented in the current paper, and that such comparative evidence will be critically necessary for further progress in understanding the nature of cyclic Spell-Out.

References

- Bresnan, Joan. 1971. Sentence Stress and Syntactic Transformations. *Language* XLVII.2, 257-281.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, Mass.:MIT Press.
- Chomsky, Noam. 1998. Minimalist enquiries. Ms. MIT, subsequently published in *Step by step: Essays on minimalism in honor of Howard Lasnik*, (2000) eds R. Martin, D. Michaels & J.Uriagereka, Cambridge, Mass.: MIT Press.
- Chomsky, Noam. 1999. Derivation by phase. MIT Occasional Papers in Linguistics 18. Department of Linguistics, MIT.
- Epstein, Samuel, Eric Groat, Ruriko Kawashima & Hisatsugu Kawashima. 1998. *A Derivational Approach to Syntactic Relations*, Oxford University Press.
- McCloskey, James. 2000. Quantifier float and wh-movement in an Irish English. *Linguistic Inquiry* 31:57-84.
- McGinnis, Martha. 2001. Phases and the syntax of applicatives. *NELS* 31, edited by M. Kim & U. Strauss, GLSA, University of Massachusetts, Amherst, 333-349.
- Simpson, Andrew. 1995. *Wh-Licensing, Movement and the Locality of Feature-Checking*, PhD dissertation SOAS, subsequently published as: *Wh-movement and the Theory of Feature-checking*. (2000) John Benjamins, Amsterdam.
- Simpson, Andrew & Zoe Wu. 2002. IP-raising, tone sandhi and the creation of S-final particles: evidence for cyclic Spell-Out. *Journal of East Asian Linguistics* 11:1.
- Uriagereka, Juan. 1999. Multiple Spell-Out. In *Working Minimalism*, eds. S. Epstein & N. Hornstein, 251-282, Cambridge, Mass.:MIT Press.

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