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STRESS SHIFT AS A DIAGNOSTICS FOR IDENTIFYING EMPTY CATEGORIES IN BRAZILIAN PORTUGUESE

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In this paper we discuss several constructions with null objects in Brazilian Portuguese (BP), based on Santos's (2002, 2003) arguments that stress shift in BP is blocked by *pro*, but not by traces. In particular, we show that stress shift provides evidence for an analysis of PP-chopping relatives in terms of *pro* (Kato & Nunes, this volume) and that it can also distinguish true null objects from parasitic gaps in BP.

1. INTRODUCTION*

The fact that Brazilian Portuguese allows null objects quite freely (see e.g. Galves, 1989; Farrell, 1990; Kato, 1993b; Cyrino, 1997; and Ferreira, 2000) ends up yielding structures that at first sight are very surprising. Parasitic gap constructions constitute a clear example. One of the standard properties of these constructions is that parasitic gaps can only be licensed by traces of A'-movement, but not by traces of A-movement (see e.g. Chomsky, 1982), as illustrated in (1) below in English. In Brazilian Portuguese, on the other hand, sentences comparable to (1a) and (1b) are both

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acceptable, as shown in (2) (see e.g. Galves, 1989; and Ferreira, 2000 for relevant discussion).

- (1) a. Which paper did you file without reading?
b. *The paper was filed without my reading first
- (2) a. Que artigo você arquivou sem ler?
which article you filed without read
'Which article did you file without reading?'
b. Este artigo foi arquivado sem eu ler.
this article was filed without I read
'This article was filed without my reading it.'

Unusual constructions involving empty categories are also found in the domain of relative clauses. Along with the standard relative clause with *wh*-movement and pied-piping shown in (3a) and the nonstandard version with no *wh*-movement and an overt resumptive pronoun shown in (3b), Brazilian Portuguese also allows “chopping” relative clauses like (3c), where the whole PP seems to have been deleted (see e.g. Tarallo, 1983; Kato, 1993a; and Kato & Nunes, this volume).

- (3) a. o professor com quem eu falei
the teacher with who I talked
b. o professor que eu falei com ele
the teacher that I talked with him
c. o professor que eu falei
the teacher that I talked
'the teacher who I talked to'

This paper discusses the nature of empty categories involved in constructions such as (2b) and (3c) based on the syntax-phonology interface. More specifically, we will use stress shift as a diagnostics to identify empty categories in relative clauses and parasitic gap constructions in Brazilian Portuguese, based on Santos's (2002, 2003) proposal that in Brazilian Portuguese *pro* blocks stress shift, but traces do not.

The paper is organized as follows. Section 2 reviews Santos's (2002, 2003) arguments for the proposal that *pro* and traces in Brazilian Portuguese have different behavior in the phonological component, as far as stress shift is concerned. Section 3 deals with parasitic gap and null object constructions in Brazilian Portuguese and discusses how they can be teased apart based on stress shift. Section 4 shows that stress shift can also be used as a diagnostic for identifying the empty category used in nonstandard relative clauses such as (3c). Section 5 speculates on why *pro* and traces should behave differently. Finally, section 6 presents some concluding remarks.

2. STRESS SHIFT AND EMPTY CATEGORIES IN OBJECT POSITION IN BRAZILIAN PORTUGUESE

In Brazilian Portuguese, stress shift optionally applies within a phonological phrase ϕ to resolve stress clashes between two adjacent primary stresses.¹ In (4), for instance, the stress clash represented in (5a)² can be resolved by stress shift after the second and third ϕ restructured into a single ϕ ,³ as shown in (5b-c).

(4) O Davi comeu bolo.
the Davi ate cake
 ‘Davi ate cakes.’

(5) a. [o Davi] $_{\phi}$ [coMEU] $_{\phi}$ [BOlo] $_{\phi}$ → restructuring
 b. [o Davi] $_{\phi}$ [coMEU BOlo] $_{\phi}$ → stress shift
 c. [o Davi] $_{\phi}$ [COmeu BOlo] $_{\phi}$

Santos (2002, 2003) shows that stress shift is also syntactically conditioned in Brazilian Portuguese. The sentences in (6) below, for instance, both meet the phonological requirements for stress shift to apply and are minimally different from a phonological perspective. However, only (6a) allows stress shift.

(6) a. O José Maria canTOU HOje → o José Maria CANTou HOje
the José Maria sang today
 ‘José Maria sang today.’

b. O José Maria conTOU HOje → #o José Maria CONtou HOje
the José Maria told today
 ‘José Maria told it today.’

Santos associates the contrast in (6) with a possible intransitive reading of *cantar* ‘sing’ in (6a), which is not possible with *contar* ‘tell’ in (6b). More precisely, Santos argues that the empty category in the object position of *contar* in (6b) breaks the adjacency between the two stresses, thus blocking stress shift.

The question then is what kind of empty category (6b) involves. Raposo (1986) argues that null objects in European Portuguese are traces left by a null operator, based on the fact that they are subject to island effects. Thus, sentences such as (7a) are acceptable in European Portuguese, but sentences such as (7b), which involves an island, are not.

(7) a. O João disse que a Maria comprou. (EP: OK; BP: OK)
the João said that the Maria bought
 ‘João said that Maria bought it.’

¹ For relevant discussion on stress shift in Brazilian Portuguese, see e.g. Abousalh (1997), Guimarães (1998), Santos (2003), and Sândalo & Truckenbrodt (2002).

² Capital letters indicate stressed syllables and the relevant phonological context is in bold. Since asterisks will be used for syntactic ungrammaticality, we will employ # to mark prosodic ungrammaticality.

³ See Selkirk (1984) and Nespor & Vogel (1986) for the conditions on the restructuring of phonological phrases and related discussion.

b. O João conversou com a pessoa que comprou (EP: *; BP: OK)
the João talked with the person who bought
 ‘João talked with the person who bought it.’

In Brazilian Portuguese, on the other hand, the types of sentences in (7) are both acceptable, indicating that the null object of Brazilian Portuguese is *pro* (see e.g. Galves, 1989). Assuming this to be the case, Santos then concludes based on the impossibility of stress shift in (6b) that *pro* in Brazilian Portuguese is computed for adjacency purposes despite being phonologically null. In other words, for the purposes of stress shift, the two stressed syllables in (6a) count as adjacent, but the ones in (6b) don’t, due to the intervention of *pro*.

Santos further argues that it is not the case that any type of empty category can obstruct stress shift. Take the paradigm in (8)-(11), for instance.

(8) [esse casaco]_i o João disse que ele ves**TIU** ___i **HOje** →
 [esse casaco]_i o João disse que ele **VESTiu** ___i **HOje**
this coat the João said that he dressed today
 ‘This coat, João said that he put on today.’

(9) [esse casaco]_i, a Maria ficou elegante [depois que ela ves**TIU** ___i **HOje**.] →
 #[esse casaco]_i, a Maria ficou elegante [depois que ela **VESTiu** ___i **HOje**.]
this coat the Maria became elegant after that she dressed today
 ‘This coat, Mary became elegant after she put it on today.’

(10) [essas árvores]_i a Maria disse que ela po**DOU** ___i **ONtem** →
 [essas árvores]_i a Maria disse que ela **POdou** ___i **ONtem**
these trees, the Maria said that she pruned yesterday
 ‘These trees, Maria said that she pruned yesterday.’

(11) [essas árvores]_i a Maria pagou o jardineiro [que po**DOU** ___i **Ontem**] →
 #[essas árvores]_i a Maria pagou o jardineiro [que **POdou** ___i **Ontem**]
these trees, the Maria paid the gardener who pruned yesterday
 ‘These trees, Maria paid the gardener who pruned them yesterday.’

All of these sentences have a gap in the embedded object position and an antecedent in the left periphery of the sentence. Since there are no islands involved in (8) and (10), the gap can in principle be a trace or *pro*. In (9) and (11), on the other hand, the empty category must be *pro*, given that it is separated from its antecedent by an island. Thus, the fact that (9) and (11) do not allow stress shift confirms what was already observed with respect to (6b): *pro* in Brazilian Portuguese blocks stress shift. If so, Santos reasons, the acceptability of (8) and (10) must then be due to its potential derivation employing a trace, rather than *pro*. In other words, traces in Brazilian Portuguese do not block stress shift.

Assuming Santos’s (2002, 2003) conclusion regarding the different behavior of traces and *pro* in Brazilian Portuguese as far as stress shift is concerned, let us now examine the empty categories that appear in the apparent parasitic gap constructions and the “chopping” relative clauses mentioned in section 1.

3. DISTINGUISHING TRUE AND APPARENT PARASITIC GAPS WITH STRESS SHIFT

As mentioned in section 1, parasitic gaps in Brazilian Portuguese are hard to pin down, for sentences that at surface correspond to ungrammatical parasitic gap constructions in other languages are acceptable thanks to the general availability of null objects in the language. Take the standard paradigm of parasitic gap constructions in English given in (12) below, for instance. (12b) shows that parasitic gaps cannot be licensed by an *in-situ* constituent (see e.g. Chomsky, 1982); (12c) that parasitic gaps cannot be licensed by A-movement (see e.g. Chomsky, 1982); (12d) that no more than one island can intervene between the parasitic gap and its antecedent (see e.g. Kayne, 1983); and (12e) that parasitic gaps cannot be c-commanded by the “real” gap (see e.g. Taraldsen, 1981).

(12) a. [[which paper]_i did you file _{t_i} [without reading **pg_i**]]
 b. *[who filed [which paper]_i [without reading **pg_i**]]
 c. *[[[this paper]_i was filed _{t_i} [without my reading **pg_i** first]]]
 d. *[[[which paper]_i did you file _{t_i} [after consulting the student who read **pg_i**]]]
 e. *[[[which paper]_i _{t_i} impressed you [after you read **pg_i**]]]

In Brazilian Portuguese, on the other hand, sentences analogous to the sentences in (12) are all acceptable, as illustrated in (13).

(13) a. [[que artigo]_i você arquivou _{t_i} [sem ler **ec_i**]]
 which article you filed without read
 ‘Which article did you file without reading?’
 b. [você arquivou [que artigo]_i [sem ler **ec_i**]]
 you filed which article without read
 ‘Which article did you file without reading?’
 c. [[este artigo]_i foi arquivado _{t_i} [sem eu ler **ec_i**]]
 this article was filed without I read
 ‘This article was filed without my reading it.’
 d. [[que artigo]_i você arquivou _{t_i} [depois de consultar o estudante [que leu **ec_i**]]]
 which article you filed after of consult the student who read
 ‘Which article did you file after consulting the student who read it?’
 e. [[que artigo]_i [t_i te impressionou [depois que você leu **ec_i**]]]
 which article you impressed after that you read
 ‘Which article impressed you after you read it?’

Given the existence of pronominal null objects in Brazilian Portuguese, sentences such as (13b)-(13e) can receive a straightforward account. They can have a convergent derivation if the empty category inside the adjunct clause is *pro*. Questions then arise regarding (13a), which is ambiguous between a true parasitic gap construction like (12a) and a null object construction along the lines (13b-e). The nature of the empty category in (13a) thus depends in part on what kind of category one takes a standard parasitic gap like (12a) to be.

The large literature on parasitic gap constructions can be roughly divided into general approaches: (i) the parasitic gap is a trace of A'-movement (see e.g. Chomsky, 1986) and (ii) the parasitic gap is a pronoun with special properties (see e.g. Cinque, 1990). Here we won’t attempt to review the substantial differences between these two

approaches. We will rather focus on their predictions on how the empty category of (13a) in Brazilian Portuguese should behave as far as stress shift is concerned.

If a parasitic gap is a pronoun of sorts, it should in principle behave like other null objects, which block stress shift, as we saw in section 2. Thus, under this approach, sentences like (13) should all inhibit stress shift. On the other hand, if parasitic gaps are traces, ambiguous constructions similar to (13a) should allow stress shift thanks to the parasitic gap (i.e. trace) analysis and contrast with unambiguous null object constructions analogous to (13b-e). Bearing these predictions in mind, let us consider the data in (14)-(17), which add stress clashes to the picture.

(14) a. [[que livro]_i você recomendou t_i [depois que comPROU PG_i ONtem]] →
 [[que livro]_i você recomendou t_i [depois que COMprou PG_i ONtem]]
 which book you recommended after that bought yesterday

 b. [você recomendou [que livro]_i [depois que comPROU pro_i ONtem]] →
 #[[você recomendou [que livro]_i [depois que COMprou pro_i ONtem]]
 you recommended which book after that bought yesterday
 ‘Which book did you recommend after buying yesterday?’

(15) a. [[que livro]_i você encomendou t_i [depois que ela perDEU PG_i ONtem]] →
 [[que livro]_i você encomendou t_i [depois que ela PERdeu PG_i ONtem]]
 which book you ordered after that she lost yesterday
 ‘Which book did you order after she lost yesterday?’

 b. [[esse livro]_i foi encomendado t_i [depois que ela perDEU pro_i ONtem]] →
 #[[esse livro]_i foi encomendado t_i [depois que ela PERdeu pro_i ONtem]]
 this book was ordered after that she lost yesterday
 ‘This book was ordered after she had lost it yesterday.’

(16) a. [[que carro]_i você decidiu comprar t_i [depois que o mecânico
 which car you decided buy after that the mechanic
 cheCOU PG_i ONtem]] →
 checked yesterday
 [[que carro]_i você decidiu comprar t_i [depois que o mecânico
 CHEcou PG_i ONtem]]
 ‘Which car did you decide to buy after the mechanic having checked
 yesterday?’

 b. [[que carro]_i você decidiu comprar t_i [depois de conversar com o
 which car you decided buy after of talk with the
 mecânico que cheCOU pro_i ONtem]] →
 mechanic that checked yesterday
 #[[que carro]_i você decidiu comprar t_i [depois de conversar com o mecânico
 que CHEcou pro_i ONtem]]
 ‘Which car did you decide to buy after talking with the mechanic that
 checked it yesterday?’

(17) a. [[que remédio]_i você jogou t_i fora [depois que ela toMOU PG_i HOje] →
 [[que remédio]_i você jogou t_i fora [depois que ela TOmou PG_i HOje]]
 which medicine you threw away after that she took today

b. [[que remédio]_i [t_i te fez bem [depois que você toMOU pro_i HOje]]] →
 #[[que remédio]_i [t_i te fez bem [depois que você T_Omou pro_i HOje]]]
 which medicine you made well after that you took today
 'Which medicine made you fell well after you took it today?'

In all the sentences above, the sentences that can be analyzed as parasitic gap constructions (the *a*-sentences of (14)-(17)) allow stress shift, as opposed to the unambiguous null object constructions in the *b*-sentences of (14)-(17).⁴ This result allows us to choose between the two general approaches mentioned above, based on stress shift. That is, the data indicate that parasitic gaps are indeed traces and not *pro*, for they are compatible with stress shift.

To put this conclusion in a broader setting, the existence of true parasitic gap constructions side by side with null object constructions in Brazilian Portuguese shows that even in a language with a wide spread use of null objects, the derivational mechanisms that are involved in the generation of parasitic gaps can be employed and are not blocked by the availability of null pronouns. If parasitic gaps are traces, this in turn suggests that pronominalization may indeed be a general last resort strategy when movement is precluded, as proposed by Hornstein (2001, 2007) in the context of the Minimalist Program.⁵

4. CHOPPING RELATIVE CLAUSES AND STRESS SHIFT IN BRAZILIAN PORTUGUESE

As mentioned in section 1, Brazilian Portuguese allows “chopping” relative clauses like (18a) and (19a), which seem to employ deletion of the PP that surfaces in the corresponding pied-piping and resumptive counterparts, respectively shown in (18b-c) and (19b-c) (see Tarallo, 1983).

(18) a. a pessoa que eu falei hoje
the person that I talked today
 b. a pessoa com que eu falei hoje
the person with that I talked today
 c. a pessoa que eu falei com ela hoje
the person that I talked with her today
 'the person who I talked to today'

(19) a. a sala que eu fiquei ontem
the room that I stayed yesterday
 b. a sala em que eu fiquei ontem
the room in which I stayed yesterday

⁴ Although the contrast may not be strongly sharp in some cases due to the complexity of the structures involved, the directionality of the judgment is clear. Although some speakers may not get a clear contrast for some cases, when a contrast is identified, it is always the case that stress shift in parasitic gap constructions is more acceptable than unambiguous null object constructions, rather than the opposite.

⁵ Assuming that parasitic gaps are traces, there remains the question of what a parasitic gap is a trace of. Unfortunately, one cannot tell based on stress shift in Brazilian Portuguese whether it is a trace of, say, a null operator (see Chomsky, 1986) or an element undergoing sideward movement (see Nunes, 2001, 2004), for all kinds of traces appear to be transparent for purposes of stress shift (see section 5 for further discussion).

c. a sala que eu fiquei nela ontem
the room that I stayed in-it yesterday
 ‘the room where I stayed yesterday.’

Kato (1993a) proposes that the source for chopping and resumptive relative clauses in Brazilian Portuguese is to be found in analogous left dislocation structures, as illustrated in (20) and (21). More precisely, Kato proposes that in the three kinds of relative clauses illustrated in (18) and (19), *que* is a relative pronoun. In the specific case of the chopping and resumptive relatives as in (18a)/(19a) and (18c)/(19c), *que* is generated in the left dislocation position before moving to [Spec, CP] and, as such, it can be resumed by an empty category or a resumptive pronoun, as seen in (20) and (21).

(20) a. Essa pessoa, eu falei hoje.
this person I talked today
 b. Essa pessoa, eu falei com ela hoje.
this person I talked with her today
 ‘This person, I talked with her today.’

(21) a. Essa sala, eu fiquei ontem
this room I stayed yesterday
 b. Essa sala, eu fiquei nela ontem
this room I stayed in-it yesterday
 ‘This room, I stayed there yesterday.’

Kato & Nunes (this volume) maintain the essence of Kato’s (1993a) proposal, reinterpreting it in terms of Kayne’s (1994) analysis of relative clauses. Relevant for our current concerns is Kato & Nunes’s related proposal that chopping relatives and left dislocation constructions like (18a)/(19a) and (20a)/(21a) involve a null pronoun and that the preposition of (20b) and (21b), for instance, is a realization of inherent Case (in the sense of Chomsky 1986), which will surface only if the argument of the verb is phonetically realized. Thus, according to them, left dislocation and chopping pairs like (20a)/(18a) and (21a)/(19a) are to be associated with structures along the lines of (22) and (23), with *pro* in the object position.⁶

(22) a. [LD [essa pessoa]_i [IP eu falei *pro_i* hoje]]
this person I talked today
 ‘This person, I talked with her today.’

b. [[a pessoa]_i [CP que_i [LD *t_i* [IP eu falei *pro_i* hoje]]]]]
the person that I talked today
 ‘the person that I talked to today’

(23) a. [LD [essa sala]_i [IP eu fiquei *pro_i* ontem]]
this room I stayed yesterday
 ‘This room, I stayed in there yesterday.’

⁶ Kato & Nunes (this volume) actually argue that *que* in sentences such as (18) and (19) in Brazilian Portuguese is a relative determiner whose complement has raised. Since this point is orthogonal to our discussion, we will represent *que* as a relative pronoun for the sake of simplicity in the presentation.

b. [[a sala]_i [CP que_i [LD t_i [IP eu fiquei pro_i ontem]]]]]
the room that I stayed yesterday
‘the room where I stayed yesterday’

By relying on stress shift as a diagnostic for types of empty categories in Brazilian Portuguese, we can now test Kato’s (1993a) proposed correlation between left dislocation and non-standard relative clauses in Brazilian Portuguese and Kato & Nunes’s (this volume) proposal that the apparent null PP is actually a null pronominal. Santos (2002) has independently shown that movement structures and left dislocation yield different results as far as stress shift is concerned, as illustrated in (24) and (25).

(24) a. [[do bebê]_i a babá cuiDOU t_i ONtem] →
[[do bebê]_i a babá CUI dou t_i ONtem]
of-the baby the babysitter took-care yesterday
‘The nanny took care of the baby yesterday.’

b. [[o bebê]_i a babá cuiDOU pro_i ONtem] →
#[[o bebê]_i a babá CUI dou pro_i ONtem]
the baby the babysitter took-care yesterday
‘The baby, the babysitter took care of him yesterday.’

(25) a. [[pro João]_i eu liGUEI t_i HOje] →
[[pro João]_i eu LIguei t_i HOje]
to-the João I called today

b. [[o João]_i eu liGUEI pro_i HOje] →
#[[o João]_i eu LIguei pro_i HOje]
the João I called today
‘I called João today.’

Given that the verbs in (24) and (25) require a preposition if their arguments remain *in situ*, the sentences in (24b) and (25b) arguably involve base-generation of the DP in the left dislocated position and a *pro* in the object position (see Ferreira, 2000). The contrasts between (24a) and (25a), on the one hand, and (24b) and (25b), on the other, are thus another instantiation of the generalization that traces in Brazilian Portuguese are transparent for stress shift, but *pro* is not.

If Kato & Nunes’s proposal that chopping relatives involve *pro* is correct, we predict that pied-piping and chopping relatives should replicate the contrast observed in (24) and (25). That this is indeed the case is illustrated in (26)-(29) (see fn. 4).

(26) a. [[o bebê]_i [CP [de quem]_i_k [IP a babá cuiDOU t_k ONtem]]] →
[[o bebê]_i [CP [de quem]_i_k [IP a babá CUI dou t_k ONtem]]]
the baby of who the babysitter took-care yesterday

b. [[o bebê]_i [CP que_i [LD t_i [IP a babá cuiDOU pro_i ONtem]]]]] →
#[[o bebê]_i [CP que_i [LD t_i [IP a babá CUI dou pro_i ONtem]]]]]
the baby which the babysitter took-care yesterday
‘the baby that the babysitter took care of yesterday’

(27) a. [[o rapaz]_i [CP [pra quem]_i [IP eu liGUEI t_i HOje]]] →
[[o rapaz]_i [CP [pra quem]_i eu LIguei t_i HOje]]]
the guy to whom I called today

b. [[o rapaz]_i [CP que_i [LD t_i [IP eu li**GUEI** pro_i **HOje**]]]] →
 #[[o rapaz]_i [CP que_i [LD t_i [IP eu **Liguei** pro_i **HOje**]]]]
 the guy that I called today
 ‘the guy that I called today’

(28) a. [[a pessoa]_i [CP [de quem]_k [IP eu fa**LEI** t_k **ONtem**]]] →
 [[a pessoa]_i [CP [de quem]_k [IP eu **FAlei** t_k **ONtem**]]]]
 the person of who I talked yesterday
 b. [[a pessoa]_i [CP que_i [LD t_i [IP eu fa**LEI** pro_i **ONtem**]]]] →
 #[[a pessoa]_i [CP que_i [LD t_i [IP eu **FAlei** pro_i **ONtem**]]]]]
 the person that I talked yesterday
 ‘the person that I talked about yesterday’

(29) a. [[a sala]_i [CP [em que]_k [IP eu fi**QUEI** t_k **ONtem**]]] →
 [[a sala]_i [CP [em que]_k [IP eu **FIquei** t_k **ONtem**]]]]
 the room in which I stayed yesterday
 b. [[a sala]_i [CP que_i [LD t_i [IP eu fi**QUEI** pro_i **ONtem**]]]] →
 #[[a sala]_i [CP que_i [LD t_i [IP eu **FIquei** pro_i **ONtem**]]]]]
 the room that I stayed yesterday
 ‘the room in which I stayed yesterday’

Let us finally consider (30) below. Given that PP complements are not at stake and there are no islands intervening between the relative pronoun and the object position, *que* could in principle be generated in the object position, leaving a trace behind after moving to [Spec, CP], or be generated in the left dislocated position in association with *pro* in the object position.

(30) o livro que a Maria comprou *ec* ontem
the book which the Maria bought yesterday
 ‘the book that Maria bought yesterday’

The fact that (30) allows stress shift, as shown in (31), reveals that the structure with a trace must be not only theoretically possible, but actually available to the computational system. In turn, this again indicates that the general availability of resumption in a given language does not preclude movement.

(31) [[o livro]_i [CP que_i a Maria com**PROU** t_i **ONtem**]] →
 [[o livro]_i [CP que_i a Maria **COMprou** t_i **ONtem**]]]

5. A NOTE ON THE DIFFERENCE BETWEEN TRACES AND *pro*

The different behavior of traces and *pro* with respect to stress shift discussed in the previous sections is reminiscent of the well-known *wanna*-contraction phenomenon in English (see e.g. Lightfoot, 1976; and Jaeggli, 1980), where traces but not PRO block contraction, as illustrated in (32):

(32) a. [who_i do you **want PRO to** kiss t_i] → [who_i do you **wanna** kiss t_i]
 b. [who_i do you **want** t_i **to** kiss you] → #[who_i do you **wanna** kiss you]

The classic analysis of contrasts such as the one in (32) resorts to the Case properties of the empty category intervening between *want* and *to* (see Jaeggli, 1980, for instance). Assuming that the *wh*-trace in (32b) must be Case-marked and that PRO in (32a) cannot, the contrast in (32) is attributed to the Case-feature of the empty category, that is, only a Case-marked empty category is able to disrupt the adjacency between *want* and *to* and block contraction. That being so, one wonders if the contrast between traces and *pro* in Brazilian Portuguese could be subject to a similar explanation.

Two sorts of facts show that Case is not what is at stake as far as stress shift in Brazilian Portuguese is concerned. First, Case-marked and Caseless traces behave alike in allowing stress shift, as shown in (33a) with a transitive verb, and in (33b), with an unaccusative verb.

(33) a. [[o vaso novo]_i o bebê queBROU _i ONtem] →
 [[o vaso novo]_i o bebê QUEbrou _i ONtem]
 the vase new the baby broke yesterday
 ‘The new vase, the baby broke yesterday.’

b. [[o vaso novo]_i queBROU _i ONtem] →
 [[o vaso novo]_i QUEbrou _i ONtem]
 the vase new broke yesterday
 ‘The new vase broke yesterday.’

Second, we have seen that *pro* in Brazilian Portuguese can appear in standard structural Case positions such as (34a) below, as well as positions which are arguably associated with inherent rather than structural Case, as illustrated in (34b). As discussed in section 4, in both instances *pro* blocks stress shift.

(34) a. [[esse carro]_i eu conversei com o mecânico que cheCOU _i pro_i HOje] →
 #[[[esse carro]_i eu conversei com o mecânico que CHEcou _i pro_i HOje]
 this car I talked with the mechanic that checked today
 ‘This car, I talked with the mechanic that checked it today.’

b. [[essa pessoa]_i o João faLOU _i ONtem] →
 #[[[essa pessoa]_i o João FAlou _i ONtem]
 this person the João talked yesterday
 ‘This person, João talked to her yesterday.’

We would like to suggest instead that the different behavior exhibited by traces and *pro* is not due to some intrinsic property associated with them; rather, it is a by-product of the syntactic computation itself, after syntactic structures are shipped to the phonological component by Spell-Out. If traces are copies that are deleted in the phonological component, as proposed by Chomsky (1993), what we are informally describing as trace invisibility may be a misinterpretation of the facts. It may be the case that when stress shift is computed there are no longer traces/copies around to begin with.

For concreteness, consider Nunes’s (1999, 2004) proposal that deletion of copies is triggered by linearization considerations. Nunes proposes that given that traces are nondistinct in virtue of replicating material presented in the numeration that feeds the derivation, they should count as “the same” for purposes of linearization. If so, linearization of the structure in (35a) below, for instance, creates contradictory requirements, as *was* is required to follow and precede *John*. Deletion of the lower

copy, which Nunes refers to as Chain Reduction, then allows (35a) to be linearized and surface as (35b).⁷

(35) a. [Johnⁱ [was [arrested Johnⁱ]]]
 b. John was arrested.

Now, if prosodic parsing in the phonological component follows applications of Chain Reduction, traces won't have any impact on stress shift as they have been eliminated from the structure.⁸ By contrast, an *in situ pro* is unaffected by Chain Reduction and can therefore block stress shift if it intervenes between two primary stresses.

5. CONCLUDING REMARKS

This paper has dealt with the syntax-phonology interface, using stress shift as a diagnostic to identify null syntactic categories. Based on the fact that *pro* blocks stress shift while traces do not, we were able to show that Brazilian Portuguese does indeed have parasitic gap constructions, despite apparent counter-examples due to the general availability of null objects in the language. Stress shift was also shown to provide evidence for Kato's (1993a) correlation between left dislocated and nonstandard relatives in Brazilian Portuguese, as well as for Kato & Nunes's (this volume) proposal that chopping relatives involve *pro* in the object position.

If our analysis is correct, it not only shows that syntax-phonology mapping may be very helpful in choosing among competing syntactic analyses, but also makes some predictions about the organization of the mapping itself. We have suggested, for instance, that prosodic mapping follows Chain Reduction (i.e. deletion of traces/copies) and this is why traces seem to be invisible to stress shift. Testing the accuracy of this suggestion however requires the investigation of traces and *pro* with respect to other phonological processes in Brazilian Portuguese, something that we leave to future research.

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⁷ Nunes (1999, 2004) actually argues that the choice of the copy to be deleted is determined by economy considerations and there are actually cases where the head of the chain is deleted instead of lower copies and even cases where more than one link can be phonetically realized under special circumstances (see Bošković & Nunes, 2007 for several case studies). For our current purposes, it suffices to assume that Chain Reduction deletes lower copies in the phonological component. For further discussion, see the collection of papers in Corver & Nunes (2007).

⁸ See An (2007) for relevant discussion.

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