On the Phi-Features of the Implicit Argument in the Passive
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Abstract: Using the distribution of reflexives and bound pronouns, this paper investigates the phi-features of the implicit argument of the short passive in English. I show that there are three cases: (a) null versions of generic *one* and *you,* (b) a null existential quantifier expression lacking phi-features, and (c) a null definite pro with any combination of phi-features.

Keywords: implicit argument, passive, reflexive, generic, existential, bound possessor pronouns

1.   Introduction

It has been claimed in the generative syntax literature that the implicit argument of a short passive can bind a reflexive pronoun. Some cases are listed below:

(1)   a.   Such privileges should be kept to oneself.
                  (Baker, Johnson and Roberts 1989: 228, Roberts 1987: 162))
         b.   Damaging testimony is always given about oneself in secret trials.
                  (Roberts 1987: 162)

Since reflexive pronouns are subject to Condition A of the Binding Theory, these examples suggest that the implicit argument of the short passive is a syntactically represented argumental DP.

Condition A is stated for convenience as follows:

(2)   Principle A: An anaphor must be bound in its domain.
         (Sportiche, Koopman and Stabler 2014: 168)

Such a conclusion about the sentences in (1) is contrary to recent claims by Bruening 2013, Legate 2014 and Alexiadou et. al. 2015 that there is no syntactically represented implicit argument in the short passive. Rather, on these theories, the implicit argument is not syntactically projected, but is semantically existentially closed.

Some quotes illustrating these claims are given below:

(3)   Bruening (2013: 22)
         "I propose that passive is a head (Pass) that selects a projection of Voice that has not yet projected its external argument."

(4)   Legate (2014: 141)
         "In chapter 2, I argued for a new analysis of the implicit initiator in passives: this is present on the Voice head, both as a T-role, introduced but not assigned to any DP, and as features restricting this T-position."

But the data in (1) is incompatible with such analyses. Since a reflexive pronoun requires a syntactic antecedent, the passive verbs in (1a,b) need syntactically present external arguments.

Alexiadou et. al. (2015: 131) suggest that: "…the English data might also find a quite

different explanation, as they could arguably involve a logophor instead of an ordinary reflexive pronoun." (see also Reed 2011)

However, no such approach will work for example (1a) for the simple reason that the reflexive in this example cannot be analysed as a logophoric or an exempt anaphor. One generalization about exempt anaphors is that they can always be replaced by pronouns with the same truth conditional meaning. So in each of the following standard examples (see for example Charnavel and Zlogar 2015 for a recent discussion of exempt anaphora in English), the exempt anaphor can be replaced by a pronoun, while maintaining the truth-conditions.

(5)   a. $Bill_1$ said that the rain had damaged pictures of $himself_1$/him_1.
        b.   In her_1 opinion, physicists like $herself_1$/her_1 are rare.
        c. Max_1 boasted that the Queen invited Lucie and $himself_1$/him_1 for a drink.

        But no such replacement works with *to keep privileges to*:

(6) $John_1$ kept those privileges to $himself_1$/*him_1

The reason for this is that *to keep privilges to* is a fixed expression requiring a reflexive pronoun that is bound by the external argument. Therefore, in example (1a) the reflexive must be a regular locally bound reflexive, not a logophoric or exempt anaphor. Therefore, example (1a) requires the existence of a syntactically present implicit argument.

But the presence of a syntactically present implicit argument in short passives raises the question of what the possible phi-features of that implicit argument are. In this paper, I sort through the various possibilities, and show that there are basically three cases: (a) null versions of generic *one/you,* (b) a null existential quantifier expression lacking phi-features, and (c) a null definite pro with any combination of phi-features.

In section 2, I give further examples like those above involving *oneself.* In section 3, I discuss existential implicit arguments. In Section 4, I discuss a new class of cases that has not to my knowledge been previously discussed, where the implicit argument is a definite pronoun. Section 5 addresses the issue of whether the implicit argument of the passive can be bound. Section 6 addresses the issue of whether there are any animacy restrictions on the implicit argument of the passive. Section 7 is the conclusion.

2.   Generic *one* and *you*
It is relatively easy to find examples involving *oneself* like (1) on the internet. A few such examples are given below:

(7)   Increased privacy and individuality result in more time spent on oneself.
        (https://www.sciencedirect.com/science/article/pii/S2452315116000035)

(8)   Anything done for another is done for oneself.
        (https://en.wikiquote.org/wiki/Talk:Pope_John_Paul_II)

(9)   Depression is anger turned against oneself.
        (http://www.parentingmatters-epc.org/wp-content/uploads/2017/10/18_suicide.pdf)

(10)   An email sent to oneself as a "memo to file" is considered a university record if it documents university business.
(http://ipo.info.yorku.ca/tool-and-tips/tip-sheet-5-email-management/)

(11)   We know that, in general, humor aimed at oneself is well received by others.
(https://www.aath.org/levity-defies-gravity-using-humor-in-crisis-situations)

(12)   Therefore, certain private matters must be kept to oneself and remain untouched.
(https://books.google.com/books?isbn=0857720147)

(13)   If feelings and emotions and fears and frustrations are to be kept inside oneself, those emotions are often also kept away from God.
(https://books.google.com/books?isbn=1929626177)

(14)   If there is one thing any artist knows, it is that art - whatever form it takes - cannot be kept inside oneself.
(https://janepenfield.com/blog/77021/i-have-had-singing)

These examples are all acceptable to the current author. And in each case, the antecedent of the reflexive is clearly the implicit argument of the short passive. What phi-features are involved in these kinds of examples?
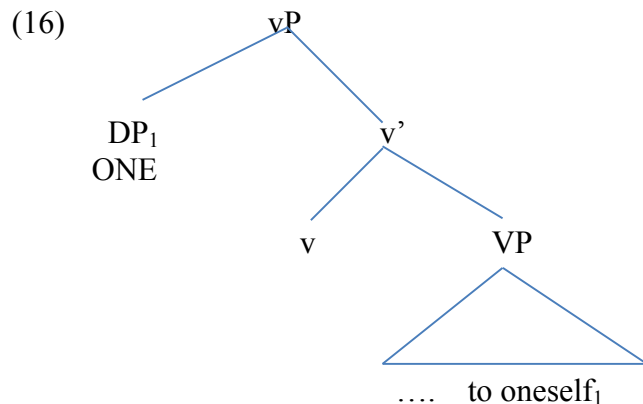
First, *oneself* is singular (as indicated by the use of the form *oneself*, rather than *oneselves*). Second, it is third person (with a semantic connection to the speaker, as described by Moltmann 2006). Third, it is human and animate. Fourth, it has a feature [+generic] (following Moltmann 2006: 262, see also Rizzi 1996: 512), which I will analyze as a kind of phi-feature (since it determines the form of the pronoun *one*). Moltmann claims that "Formally this means that generic *one* as well as arbitrary PRO should carry the feature [+gn] as a formal agreement feature which will require those pronominal elements to be bound by a generic operator carrying that feature as well (but as an interpretable feature)."

According to Moltmann (2006: 260): "Generic *one*, we can thus say, acts as a variable ranging over individuals, a variable bound not by a universal quantifier, but rather by a generic quantifier that allows for exceptions and has itself modal force. Without going into any further detail about the nature of that quantifier, let us simply say it is the generic quantifier Gn as commonly used in the linguistic semantic literature on generic sentences (cf. Krifka et. al., 1995)."

Putting these ideas together, I assume that the implicit argument in the short passive in these cases is a null version of the pronoun *one*, which I will call ONE (on null generic pronouns see Rizzi 1996):

(15)   Generic Implict Argument ONE:
   a.   ONE is a DP
   b.   Phi-features: third person, singular, human, animate, generic
   c.   Intepretation: ONE is of type <e> and is bound by a generic operator

A partial tree diagram for examples like those in (1a) is the following:

(16)

```
                    vP
           ╱          ╲
        DP₁            v'
        ONE         ╱     ╲
                   v       VP
                         ╱    ╲
                      ….   to oneself₁
```

Crucially, the reflexive and the implicit argument agree in phi-features. I assume that this agreement is governed by the Pronominal Agreement Condition:

(17)   The Pronominal Agreement Condition (PAC)
        An anaphor agrees in phi-features with its antecedent.
        (see Collins and Postal 2012: 92, Sportiche, Koopman and Stabler 2014: 160)

The reflexive *oneself* in (16) is locally bound and agrees in phi-features with its antecedent. And that is why (1a) is grammatical.

The second person singular pronoun *you* occurs in generic contexts as a substitute for *one*. There are examples that correspond to those in (7-14) using second person reflexives:

(18)   Time spent on yourself is time well spent.
        (https://carsontate.com/work-life-balance-how-to-balance-your-life-like-the-four-seasons/)

(19)   Some things are better kept to yourself.
        (https://www.facebook.com/GriffinsNZ/...kept-to-yourself.../1253558661331547/)

(20)   In the case of an e-mail sent to yourself, it decides to show it in Inbox, even if its true location is in Sent Mail.
        (https://github.com/nylas/nylas-mail/issues/2456)

Like earlier *one* examples, these reflexives cannot be analyzed as exempt anaphors. First, example (19) involves the fixed expression *keep x to self* which does not allow a logophoric or exempt anaphor (see the discussion of (6) above).

Second, replacing the reflexive with a pronoun yields a different interpretation, which would not be predicted if the reflexives were exempt anaphors. Consider the result of replacing *yourself* by *you* in example (20):

(21)   In the case of an e-mail sent to you,…

In (21) the sender of the e-mail is unspecified, exactly as if the implicit argument is an existential quantifier as discussed in section 3 below. This clearly contrasts with the interpretation of (20), where the sender is the same person that *yourself* refers to.

Because of these examples, we can adjust (15) to also include second person singular generic pronouns.

I have not discussed how the Case Filter is satisified by null pronouns such as ONE in diagrams like (16) (on this issue see Epstein 1984: 503, fn. 8). Certainly, Spec vP is not associated with any structural Case, such as nominative, accusative or genitive. One possibility is that there is a null preposition *by*, so that the Spec vP would be [BY ONE]. Another possibility is that null elements like ONE are exempt from the Case Filter. I do not pursue this issue here.

Another issue is whether ONE is pro or PRO. Collins (2005: 104) claims that the implicit argument is PRO: "…the empty category in the passive…is simply arbitrary PRO." This issue is not easy to decide. On the one hand, both null ONE and PRO cannot occur in Case marked positions (such as the subject of a finite clause). On the other hand, prototypical cases of PRO are licensed in Spec TP[-FIN]. Furthermore, as far as I know, the implicit argument of the passive never enters into a relation of obligatory control (see section 5 below). Therefore, I will analyze ONE as pro.

3. Existential UN

Consider now the following non-generic examples of passives:

(22) a. The proposal was criticized at the meeting.
      b. The package was sent this morning.
      c. John was killed this morning.

(22a) can be be true if either a man or a woman criticized the proposal. Furthermore, it can also be true if either one person or more than one person criticized the proposal. Similarly, I can say (22b) to my boss if I myself have sent the package (with my boss understanding that nobody but me could have sent the package). So (22b) does not exclude the speaker from being the sender (see also Bianchi 2015: 6). Sentence (22c) is consistent either with a report of a murder (animate agent), or death by a natural force (inanimate causer). These sentences show that the implicit argument is either ambiguous in its feature specifications for the phi-features person, number, gender and animacy, or unspecified for those feature values.

These observations are consistent with McCalwley's (1988: 82) remarks about implicit arguments in passives:

(23) "If reduced passives are to be analyzed as having underlying subjects, the underlying subject must be something more indefinite than any expression of English is: it must be neutral with regard to whether it refers to human or non-human entities, and with regard to whether its referent is the same as or different from other individuals mentioned in the discourse. I will invoke a deux ex machina at this point and simply assume that such an element, hereby christened UNSPEC, is available, and will set up deep structures having UNSPEC as subject in the case of reduced passives…" (McCawley 1988: 82)

I will, call the existential implicit argument in short passives UN (for unspecified) (following Johnson and Postal (1980)).

As Grinder (1971: 186) has pointed out, there is a striking difference between the implicit argument of a passive and an overt indefinite. The following sentences are based on his examples:

(24) a.   Someone$_1$ stole the painting, and he$_1$ left his fingerprints on the wall.
      b.   The painting was stolen by someone$_1$, and he$_1$ left his fingerprints on the-wall.
      c.   The painting was stolen and he left his fingerprints on the wall.

Although *someone* can be the antecedent of *he* in (24a,b) it is much more difficult for the implicit argument in the passive to be the antecedent of *he* in (24c). Grinder (1971) explains this in terms of his Chaining Constraint which informally says that if an indefinite is the antecedent of a pronoun, then the indefinite cannot undergo deletion (where implicit arguments are assumed to be indefinites that undergo deletion).
      The contrast can be replicated with intra-sentential anaphora:

(25) a.   If somebody$_1$ sends an e-mail to his$_1$ mother, how long does it take to arrive?
      b.   If an e-mail is sent to his mother, how long does it take to arrive?

Example (25b) cannot have the same interpretation as (25a), suggesting that the implicit argument of the passive cannot bind the possessive pronoun *his* in (25b). What accounts for that this constraint?
      I suggest that the facts in (24) and (25) can be explained in terms of the PAC in (17) on the assumption that UN, the implicit existential argument in the short passive, does not have any phi-features (cf. Bianchi 2015: 8 who reaches the conclusion that the implicit argument of the passive is not specified for participant features). The relevant part of the structure of (25b) will be the following (I assume UN linearly follows participle, just as an overt *by*-phrase would):

(26)   *If an e-mail is sent UN$_1$ to his$_1$ mother….

But since UN does not have phi-features, (26) violates (17) requiring phi-feature agreement between the possessive pronoun *his* and its antecedent UN.
      I assume that UN's lack of phi-features is the reason that it can be used in such a wide variety of situations, as described in (22). Essentially UN is an unrestricted existential quantifier. The assumptions about UN are summarized below:

(27)   Existential Implicit Argument UN:
        a.   UN is a DP
        b.   Phi-features: none
        c.   Interpretation: existential quantifier of type <<e,t>,e>.

English has a variety of contexts permitting null existential quantifiers. For example, Collins and Postal 2014 analyse negative existentials such as *no boy* as having the structure [[NEG SOME] boy], where SOME is a covert existential quantifier. The claim of (27) is that the implicit argument of the passive can also be a null existential quantifier.
      A closely related proposal would be to assume that UN has no phi-features, but it is existentially bound by some quantificational element in the tree. In other words, UN would not

be an existential quantifier phrase, but rather a null pronoun. On existential closure, see Legate (2014: 2): "The semantic interpretation of this external argument position as existential (e.g., 'Something bit me' approximates 'I was bitten') is accomplished through existential closure (Landau 2009, Bruening 2013, pace Collins 2005)." One way to implement existential closure in the framework of Collins 2005 is to assume that Voice can existentially bind the null implicit argument. I will not pursue the issue here.

A third theory is that on the existential interpretation of the passive, there is no syntactically realized implicit argument at all. I will call this the non-projection theory. In this case, Spec vP is empty. Such a theory would automatically account for Grinder's generalization. Since Spec vP is empty, there is no antecedent for a reflexive. I reject this analysis since it is not uniform with the other cases discussed in sections 2 and 4, which involve DP pronouns. In my analysis, in all cases there is a DP as the implicit argument.

Another reason to reject the non-projection theory is that UN plays a role in obligatory control:

(28)   Once it had been decided to build a walled enclosure, new possibilities opened
        up.
        (www.paulgough.org/places_of_peace/sites.htm)

In this example, the implicit external argument of *decided* controls PRO of the infinitival complement of *decided*. Furthermore, the implicit argument seems to be existential (as opposed to generic or definite). If obligatory control is a syntactic phenomenon, then these examples argue against the non-projection theory of implicit arguments.

4.   Null pro

Helke 1973 investigated a class of possessor pronouns that have the requirement of being bound locally. Consider the following example of the idiomatic expression *to lose one's mind* (see Helke 1973: 11):

(29)   a.   *The lady hopes that the gentleman won't lose her mind.
        b.   *The man who found the girl lost her mind.
        c.   *The girl's father lost her mind.
        d.   *The girl and the boy lost her mind.

Example (29a) shows that there is a locality constraint on the relation between *her* and its antecedent *the lady*. (29b,c,d) show that there is a c-command condition. I will call such pronouns bound possessor pronouns.

From this point of view, consider the expression *on my own* in the following examples:

(30)   a.   I did the homework on my own.
        b.   *I did the homework on John's own.
        c.   *Mary said I did the homework on her own.
        d.   *John's mother did the homework on his own.
        e.   *Somebody did the homework on my own.
        f.   *It rained on my own.

(30a) shows the use of *on my own*. (30b) shows that the possessor must be a pronoun bound by the subject. (30c) shows a locality effect: (30c) is only acceptable if *on her own* modifies the matrix VP, not the embedded VP. (30d) illustrates a c-command effect: *his* is not c-commanded by *John*, and so the sentence is unacceptable. In (30e,f), there is no possible local antecedent for the possessor.

So the following generalization appears to hold:

(31)   In the expression *on X's own*, X is a locally bound prononominal possessor.

Given this condition, consider the following example:

(32)   A: Did you get help on this assignment?
        B: No, it was done on my own.

While B's response might be a bit awkward, it is grammatical. It may improve if certain modifiers like *completely* or *all* are added before *on my own*. In an informal Facebook survey, out of eight native speakers of English, four said it was fine, and four others rejected it to varying degrees (ranging from ? to *). So there is definitely some variation that would be worth investigating.

Assuming that (32B) is acceptable, given condition (31), there must be an implicit argument binding the possessor *my*. Therefore, by condition (17), that implicit argument must be a first person singular pronoun.

Such examples do not seem any worse with other person number combinations:

(33)   a.   It was done on your own, right?
        b.   It was done on his own, right?
        c.   Homework done on one's own is never easy.

Related examples appear on the internet:

(34)   I'm not even going to lie, but the solo has been the hardest to create and perform as everything was done on my own.
        (https://www.mandy.com/news/dancer-yukiko-masui-interview-hip-hop-contemporary)

(35)   This was done on my own time and with no reimbursement for my gasoline.
        (https://books.google.com/books?isbn=311097391X)

(36)   Occasionally, he was able to study formally with an accomplished artist, but much of his training was done on his own.
        (https://helpinghandhomeschool.com/vincent-van-gogh-artist-study-activities/)

(37)   This work was written on my own during the summer and fall of 1963,...
        (www.smcq.qc.ca/smcq/en/oeuvres/216/87.php)

(38)   First, the research framework was created on my own.
        (epub.lib.aalto.fi/en/ethesis/pdf/12502/hse_ethesis_12502.pdf)

The distribution of bound possessor pronouns in the short passive shows that there is another kind of implicit argument, described as in (39). I use the term *definite* to distinguish these cases from the generic and existential implicit arguments discussed in sections 2 and 3.

(39)   Definite Pronominal Implicit Argument (Null pro):
       a.   Null pro is a DP
       b.   Phi-features: any combination of phi-features
       c.   Interpretation: Null pro is of type <e>.

But if such definite pronominal implicit arguments are possible, can they bind reflexive pronouns? Consider first the following examples involving first and second person reflexives:

(40)   I cannot receive emails sent to myself from Outlook though they appear in Webmail
(https://crowdsupport.telstra.com.au/t5/Telstra-Mail/I-cannot-receive-emails-sent-to-myself-from-Outlook-though-they/td-p/770123)

(41)   The time spent on myself daily was like giving myself a big hug.
*(*https://nsmh.org/images/docs/nsmh-program-guide-2018-ver2.pdf)

(42)   Most of this blog is self-deprecating humor aimed at myself as much as others.
(http://eveoganda.blogspot.com/2016/01/rixx-in-local.html)

(43)   Please understand that my family does not excuse her mistakes. She knows she made them, and she knows that she should not have gotten pregnant so young. I would really appreciate it if any negative feelings you have toward teen mothers were kept to yourselves.
(https://www.disboards.com/threads/the-multi-reason-special-family-wdw-trip.1800085/)

It is also possible to find third person reflexives bound by the implicit argument of the passive:

(44)   In a blistering farewell e-mail sent to himself, Jones defended his stance against further cuts.
(http://www.notthelatimes.com/fired.html)

(45)   He is so self involved he could not even think of a title for a song dedicated to himself other than his own name.
(https://www.thequiz.com/finish-the-lyrics-disney-edition/)

(46)   Gore delivered the message with a mix of seriousness, humor aimed at himself and measured alarm.
(https://newspaperarchive.com/santa-ana-evening-blade-aug-28-1996-p-13/)

(47)   Rumor has it that Mike Tyson bought over 200 cars throughout his career, totaling at $4,5 million. Many were bought for himself and others as gifts for his friends and family.
*(*https://gazettereview.com/2016/06/mike-tyson-net-worth/)

(48)   His interest in hockey, soccer and chess was never displayed and was kept to himself.
       (www.biography.co.in/justin-bieber-biohraphy.html)

       I did an informal survey of seven people on these sentences. I asked them to rate the sentences from 1 (acceptable) to 5 (unacceptable). Every sentence had an average less than 2: (40: 1.7), (41: 1.7), (42: 1), (43: 1), (44: 1.4), (45: 1), (46: 1.1), (47: 1) and (48:1.1). Furthermore, for almost every sentence and every speaker, the most natural interpretation was that the implicit argument binds the reflexive.
       Note that in these cases it is not possible to describe the implicit argument as logophoric. For example, in (47) the implicit argument is not describing the thoughts of Mike Tyson, but rather the thoughts of the narrator discussing Mike Tyson.
   In fact, there are examples where the implicit argument has a quantificational antecedent, and so the implicit argument is interpreted as a bound variable (and in turn binds the reflexive).

(49)   Every corporate manager has been advised
       that emails sent to himself can be used as incriminating evidence.

       Many (but not all) of the examples are reduced relatives modifying nouns. For example, in (40) the reduced relative *sent to myself* modifies *e-mails*. I leave it to further work to find out why it is easier to find examples of this type.
       Once again, one can ask if some or all of the reflexives in these sentences can be analyzed as logophoric or exempt anaphora. Consider example (48) once again using the fixed expression *keep x to self*. This expression does not allow a logophoric or exempt use (see the discussion of (6) above). Furthermore, the expression *on my own* does not seem to allow any long distance binding at all (unlike reflexives).
       Putting together the results from the Helke expressions and from reflexive pronouns, I conclude that the implicit argument can be a null pro with any combination of phi-features. A partial syntactic tree for an example like (44) would be:

(50)   vP

          DP$_1$ v'
        pro[3SG]
                         v   VP

                                    ….   to himself$_1$
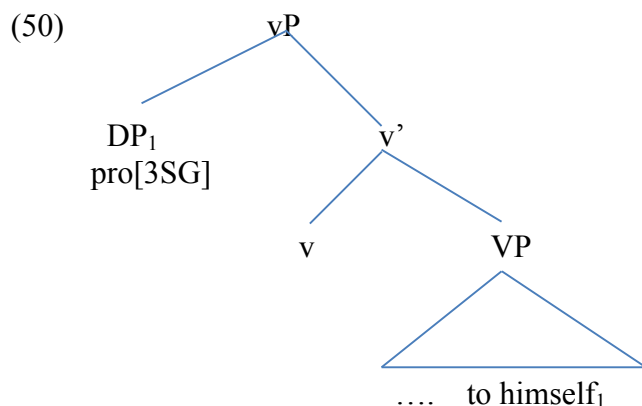
       Putting together the results of section 3 and the current section, the prediction about the interpretation of these reflexive pronouns is the following:

(51)   a.   An existential implicit argument cannot bind a reflexive, or equivalently:

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b. If a reflexive is bound by an implicit argument, the implicit argument is not understood existentially.

It is clear in all of the above cases that the implicit argument is not understood existentially. For example, in (47) *himself* refers to the buyer, who is Mike Tyson.

5. Binding the Implicit Argument

In the preceding sections, I investigated the kinds of pronouns that an implicit argument can bind. A parallel question is whether the implicit argument can be bound. Consider the following example:

(52) John was killed.
     a. John was killed by somebody.
     b. *John killed himself.

Since (52) is not a generic sentence, the implicit argument could only be UN or null pro. But UN would yield the interpretation in (52a), not (52b).

Now consider the possibility of null pro (once again, the implicit argument is placed linearly in the same position as a *by*-phrase would be):

(53) John$_1$ was killed pro$_1$.

While this representation yields the interpretation in (52b), it violates Condition B of the binding theory. So it follows that (52a) and not (52b) is the right interpretion of (52).

Williams (1987: 155) claims that the implicit argument in the passive is never bound (see also Bruening 2013: 19). Consider the following sentence:

(54) John wants Mary to be seen.

About (54), Williams says:

(55) "When an implicit argument is existentially quantified, it acts like an R expression, in that it is disjoint from c-commanding NPs…The unassigned Agent is understood as disjoint from John, or at least is vague on that point in the same way that John wants Mary to be seen by somebody is; neither means John wants to see Mary."

This result is perplexing from the point of view of the present analysis. The following should be a possible representation of (54):

(56) John$_1$ wants Mary to be seen pro$_1$.

But (54) does not seem to have the interpretation in (56), rather (54) seems to have the same interpretation as:

(57) John wants Mary to be seen by somebody.

But there are other cases where sentences similar to (54) have an interpretation where the implicit argument is identical to the matrix subject. Consider:

(58) a. I set myself some health related goals and I want those goals to
          be met by the new year.
      b. I plan on going on vacation to Jamaica this summer, so I want all revisions to be
          made on my thesis before then.

In these cases, the implicit argument is taken to be identical with the matrix subject. No other interepretation makes sense. How could I want someobody else to meet my health goals? However, (58) could still be consistent with William's claim in that what is expressed is that the doctor wants somebody to meet those goals, and the only person who could possibly meet them is the speaker.

More importantly, there are embedded passive sentences involving reflexives and bound possessor pronouns that do allow the matrix subject to bind the implicit argument of the passive:

(59) He reveals to Skyler in the end that everything was done for himself, as it made him feel
      alive.
      (villains.wikia.com/wiki/Walter_White)

(60) He is so self involved he could not even think of a title for a song dedicated to himself
      other than his own name.
      (https://www.thequiz.com/finish-the-lyrics-disney-edition/)

(61) John$_1$ thought that a friendly e-mail sent to himself$_1$ would cheer him$_1$ up.

How then can we account for William's observations about the interpretation of (54)? I suggest that the definite pro interpretation of the implicit argument is only possible when the implicit argument binds a reflexive or a pronoun. So in (61), the implicit argument is pro[3SG] and it binds the reflexive pronoun *himself*. In William's example (54), the implicit argument does not bind a reflexive or a pronoun, so only the existential interpretation is possible.

Now consider again the contrast in (25) repeated below as (62):

(62) a. If somebody$_1$ sends an e-mail to his$_1$ mother, how long does it take to arrive?
      b. If an e-mail is sent to his mother, how long does it take to arrive?

Recall that (62b) lacks the interpretation of (62a). I accounted for this by claiming that the implicit argument in (62b) is UN. But now there is an alternative representation:

(63) If an e-mail is sent pro$_1$ to his$_1$ mother….

Nothing rules out representation (63). The possessor *his* could agree in phi-features with its null pro antecedent. And I believe that in the right context (62b) has this interpretation. But for (62b) presented out of the blue (with no linguistic context) and especially in comparison with (62a), the most natural interpretation is the one where the implicit argument is existential UN. And in that case, (62b) is unacceptable (because it violates the PAC in (17)).

6.   The Inanimacy Gap

Can the null definite pro be an inanimate pronoun? It is difficult to find relevant examples. One way to try would be to first look for examples with an inanimate *by*-phrase binding a reflexive, and then drop the *by*-phrase. Consider the following internet examples (from Angelopoulos, Collins and Terzi 2018):

(64)   You find yourself rising and being pulled by the sun toward itself.
         (https://www.do-meditation.com/power-chakra-guided-meditation.html)

(65)   The most direct way to determine it is to examine the far distant behavior of the magnetic field generated by the black hole around itself.
         (https://slideheaven.com/black-holes-in-our-universe.html)

(66)   More recently oxytocin has been found to be released by the brain into itself …
         (https://books.google.com/books?isbn=9814488372)

(67)   But soon also this will be sucked up by the earth into itself.
         (https://gottfriedbennpoems.com/the-poems/)

(68)   For that which is decidedly thick and earthy in nature, and has entirely escaped alteration in the liver, is drawn by the spleen into itself;
         (https://faculty.humanities.uci.edu/bjbecker/PlaguesandPeople/week2j.html)

Dropping the *by*-phrase in these examples yields unacceptable results. And it is perhaps impossible to find the relevant acceptable examples on the internet.

(69)   *You find yourself rising and being pulled toward itself.

(70)   *The most direct way to determine it is to examine the far distant behavior of the magnetic field generated around itself.

(71)   *More recently oxytocin has been found to be released into itself …

(72)   *But soon also this will be sucked up into itself.

(73)   *For that which is decidedly thick and earthy in nature, and has entirely escaped alteration in the liver, is drawn into itself;

The question is how to explain the unacceptability of (69)-(73). There are three cases to consider: (a) null generic ONE or YOU, (b) null existential UN, (c) null definite pro. Only the last case is relevant. The null generic must be human, and the null existential has no phi-features. So the question is what rules out the following representation where pro is [3SG, inanimate]:

(74)   *The magnetic field generated pro_1 around $itself_1$

I am not entirely convinced that this representation is ungrammatical. It may just be hard to interpret for a confluence of reasons. First, the UN interpretations are more accessible than the null definite pro interpretations (see the discussion of (54)). Second, it is more usual for an animate to be interpreted as a topic (anteceding a null definite pronoun) than an inanimate. Third, the inanimate *itself* also has the inanimate subject as a possible antecedent, making the choice of the implicit argument as the antecedent difficult. For example, in (72) a possible antecedent of *itself* is the subject *this*.

But if it turns out that (74) is really ungrammatical, the following constraint could be posited:

(75)   Anti-Inanimacy
        Implict argument of passive: *[pro, inanimate]

This anti-inanimacy constraint is violated in (74). It is not violated by UN in general, because UN does not have any phi-features at all (animate or inanimate). So we can still obtain inanimate interpretations of sentences like (22c) above, repeated below in (76):

(76)   John was killed this morning.

As noted above, (76) is consistent with John having been killed by an inanimate force. That interpretation is consistent with (75), since UN in that case has no phi-features.

7.   Conclusion
In this paper, I have shown that there are three possibilities for the phi-features of the implicit argument of the short passive. I summarize the results here:

(77)   a.   Generic ONE/YOU:
                Phi-features: third/second person, singular, human, animate, generic
        b.   Existential UN:
                Phi-features: none
        c.   Null pro:
                Phi-features: any combination of phi-features

Some unification of these three cases is possible. For example, (77a) is just a particular combination of phi-features, so it may fall under (77c). (77b) would also fall under (77c) if UN were not an existential quantifier expression, but rather a null pronoun whose variable denotation is existentially closed. I will leave attempts at unification to further work.

A consequence of this work is that English has null pro. English is not a null subject language, in the sense of Italian, Spanish and other well known languages, but there are certain contexts where pro can appear (e.g., the implicit argument of the passive). Another such case is the implicit dative argument described by Epstein 1984, Landau 2010 and Rizzi 1996: 550.

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