

# Tough Nuts to Crack

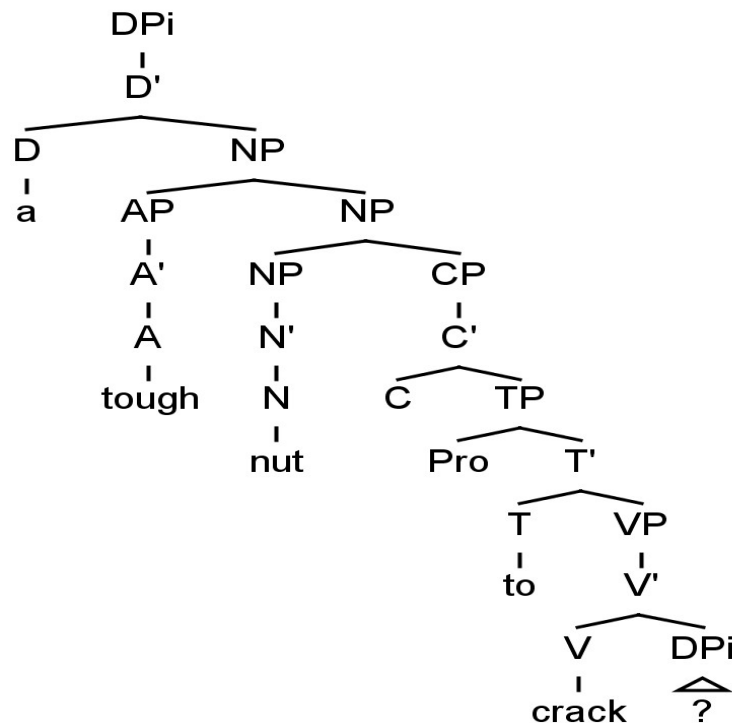
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1 March 2008

Berman (1974) noticed that the same adjectives that allow Tough Movement can also occur in constructions like the following:

- (1) Harvey is [a difficult person to deal with].
- (2) My gorilla is [an easy pet to clean up after].
- (3) This problem looks like [a tough nut to crack].

I will call these bracketed DPs Tough Nuts. Berman pointed out many interesting properties of Tough Nuts, which will be discussed below, but in the theoretical framework of the time it was impossible for her to address the question that will concern me here, namely, what is their internal structure? Initially, the structure might appear fairly clear. It looks like the A is just a modifier of NP, and an infinitival relative clause follows the N, either as complement or as an adjunct of NP:

(4)



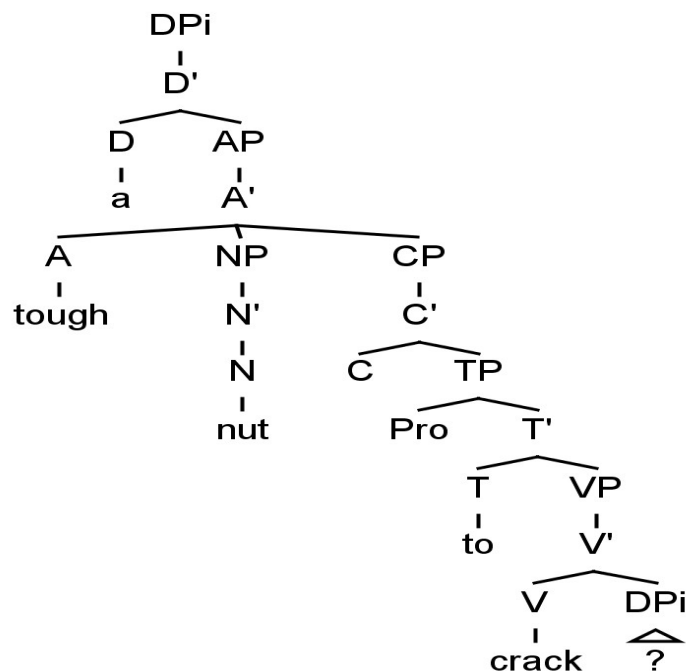
However, if this were the correct structure we would expect that the AP should be optional and that any semantically appropriate A could occur there, but this is not the case. We see in (5) that the AP is mandatory, and (6) and (7) show that not just any A can occur in this construction.

- (5) \*My gorilla is a pet to clean up after.
- (6) \* a ready turkey to take out of the oven
- (7) \* an eager student to please

This implies that the particular A is necessary to license the construction, and that there must therefore be a clear syntactic relationship between the A and the CP. However, the structure above allows for no such relationship.

What is needed instead is a structure where the A controls the CP. There are two possible alternative structures that would both achieve this and produce the proper constituent ordering within the Tough Nut. The first of these, which I will ultimately reject, would involve making both the NP and the CP complements of A. That is, a structure something like the following:

(8)

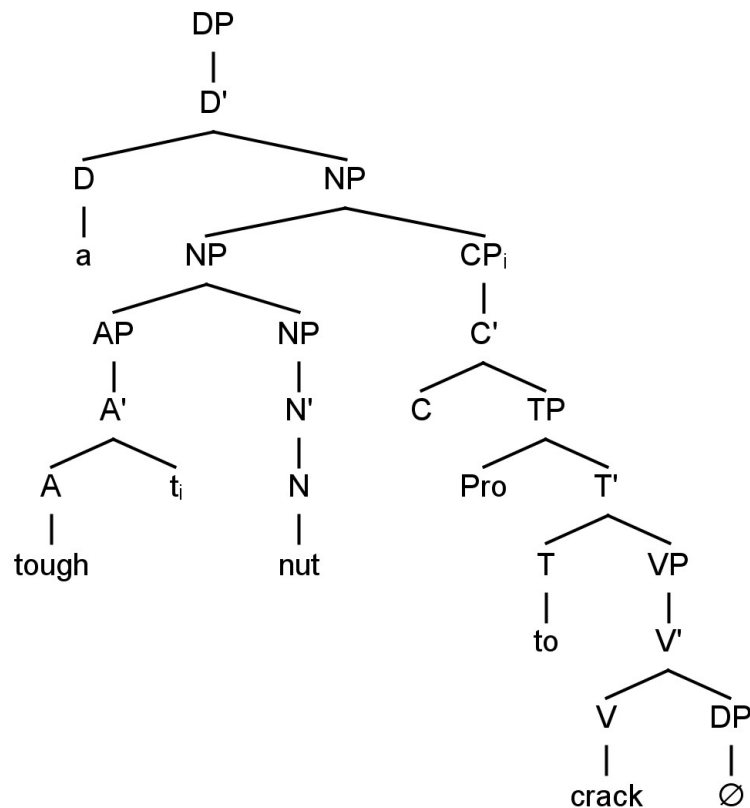


It is somewhat questionable to have an AP complement of D, but it is not unprecedented. It has in fact been proposed by Abney (1987) that AP complement of D is the usual structure for prenominal

As. One of Abney's arguments for this structure was the claim that prenominal As in English never take any other complement, and so in that position they must be taking the NP as complement. Hankamer & Mikkelsen (2005), takes issue with this claim, pointing out that it does not apply cross-linguistically, and one thing I hope to show in this paper is that there is some reason to believe that it is not strictly true in English either. Indeed, the very problem here is that the prenominal A in Tough Nuts does seem to take another complement.

I propose instead that the CP starts out as a complement of A and later moves to adjoin to either NP or DP. Which of these it actually adjoins to is not clear. I've drawn it adjoined to NP below just for the sake of simplicity:

(9)



This structure is the core of my analysis. In the rest of this paper I will first try to narrow the scope of the investigation to a single phenomenon by distinguishing between true Tough Nuts and other superficially similar constructions, and I will argue that only the Tough Nuts have the structure above. I will also point out and respond to several possible challenges to the proposal.

First, it is important to note that some As that are not in the *tough* class - i.e. those that do not permit Tough Movement - can also appear in sequences of *D A NP to VP*:

- (10) A gorilla is an unlikely pet to own.
- (11) Santa Cruz is a strange town to live in.

Berman (1974) points out a contrast between constructions with As like *unlikely* and *strange*, and those with As like *tough*. In either case, it is possible to have an overt *for DP* sequence at the beginning of the embedded clause:

- (12) A gorilla is an unlikely pet *for me* to own.
- (13) The gorilla is a difficult pet *for me* to clean up after.

However, various dummy DPs can follow the *for* in sentences with the *unlikely* class of As, but not with the *tough* class:

- (14) The front porch is a strange place for there to be a unicorn.
- (15) \*The front porch is a hard place for there to be a unicorn.

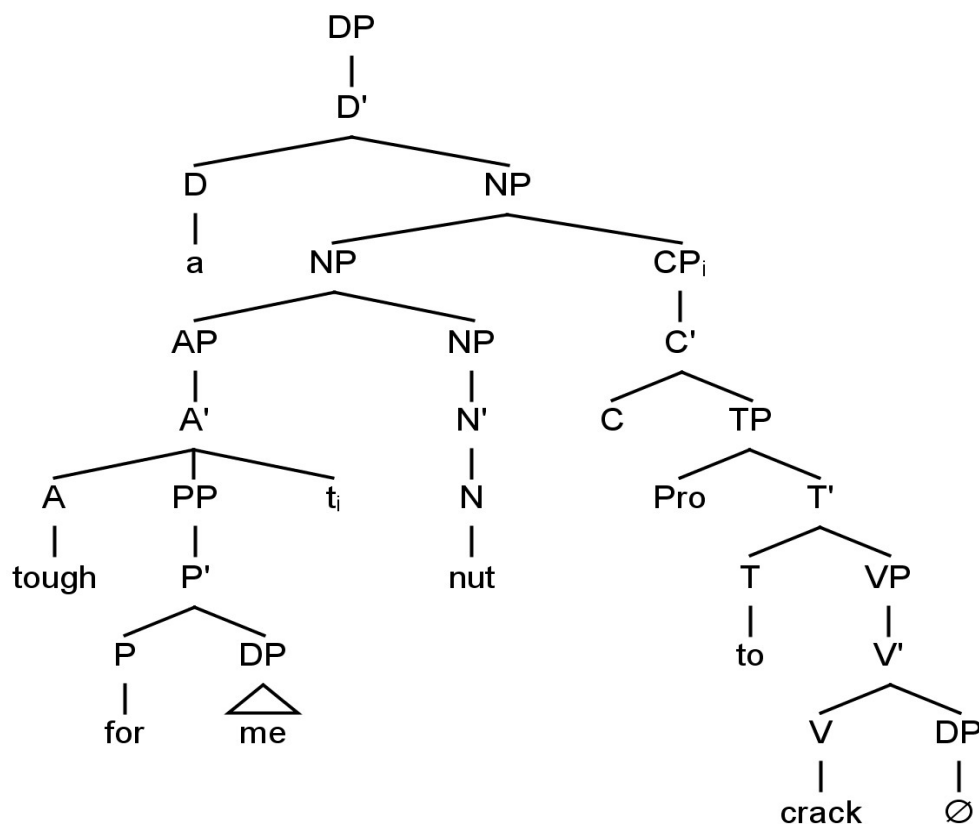
Berman argues that the *tough* class actually takes a *for*-PP followed by a CP, whereas the *unlikely* class just takes a CP, since it is possible to have an expletive in subject position within a CP, but not as an object of P. This accounts neatly for (14-15), and lines up nicely with other facts about how the *tough* class behaves:

- (16) a. It would be unlikely for Martha to leave Bob.
  - b. \*For Martha, it would be unlikely to leave Bob.
  - c. \*It would be unlikely for Bob for Martha to leave him.
- (17) a. It would be difficult for Martha to leave Bob.
  - b. For Martha, it would be difficult to leave Bob.
  - c. It would be difficult for Bob for Martha to leave him.

The (a) and (b) examples show that the *for*-DP is moveable with *tough* predicates, but not with *unlikely* predicates. This makes sense if we assume that it is a PP in (17) and a C - subject, that is, a non-constituent, in (16). The (c) examples show that indeed, *tough* predicates can sometimes take both a PP and a CP with an overt subject, while *unlikely* class predicates cannot. However, there are many cases, as in Tough Movement contexts and Tough Nuts, where the subject of the CP cannot be overt, but must be coindexed with the DP object of P, as in (15).

If Berman's argument is correct, that would complicate the structure offered for Tough Nuts above in (9). A *for*-PP complement of *tough* would be required, and there would have to be some separate operation to move the PP to the end of the phrase as well. The new structure, something like (18) below, would apply only to *tough* class As when there was a *for*-PP present. *Unlikely* class As presumably only occur in structures like (9), and if there is an overt *for DP* sequence, that will be made up of an overt complementizer and subject of the embedded clause.

(18)



This is problematic for my proposal because if the *for*-PP and the Tough Nut CP do not form a constituent, then the movement of the CP to adjunct position, as in (18), will leave the PP behind. This would seem to predict that *\*a difficult for me pet to clean up after* should be grammatical. However, it is possible that the PP moves independently to another adjunct position to produce *a difficult pet for me to clean up after*. There is some support for this idea in that the alternate ordering of PP and CP is also acceptable, as in *The gorilla is a difficult pet to clean up after for me*. This is not entirely conclusive, since such constructions may also be possible with the *unlikely* class predicates, as in *The gorilla is a strange pet to own for me*, which is not as good to my ears, but still acceptable. This phenomenon

remains somewhat mysterious, and a fuller discussion would take us far afield. Thus, for the sake of simplicity, I intend to ignore cases with overt *for DP* from here on, and assume that the cases without *for DP* have the structure originally proposed in (9).

I should note here that, beyond this, I am not going to concern myself much with the internal structure of the CP, which I will refer to as the Tough Nut CP. The important point here is that the Tough Nut construction is distinct from other, similar ones, and that the difference is dependent on the choice of A. I also reserve judgment on whether the Tough Nut CP is an infinitival relative. It contains a gap that might hold either a PRO controlled by the top DP or a trace of some silent wh-element that has moved to Spec CP, as in finite relative clauses, but for my purposes it hardly matters which analysis is correct.

It is, however, notable that for true Tough Nuts, the gap must be in a non-subject position, just as Tough Movement only moves things out of non-subject positions. This non-subject gap is part of what distinguishes these constructions from others. The *unlikely* class, for instance, doesn't need one -- they can have a gap in subject position:

(19) Harvey is an unlikely person to be living in Santa Cruz.

(20) \*Harvey is a difficult person to deal with you.

By contrast, the lack of a non-subject gap with *difficult* renders (20) ungrammatical.

There is a third class of As that can also occur in the sequence *D A NP to VP*:

(21) That's a big meal to eat (if you don't want indigestion).

This differs from the others in that it seems to imply that the meal is *too big*, and therefore you shouldn't eat the whole thing. This is not a meaning that arises in the other examples -- we do not interpret (2) as meaning that the gorilla is *too easy* of a pet, and so you shouldn't clean up after it. In fact, while it appears that in (21) the meal must be *big*, in (2) the *pet* is not *easy* so much as the *cleaning up after it* is. It might be *an easy pet to clean up after* and still be *a bitch of a pet to toilet-train* with no contradiction. Thus it appears that *easy* is modifying the CP and not the N, whereas this is not really clear in (21). This implies different structures for (2) and (21): in (2) the CP must be a complement of A, and not the complement of N, while something else happens in (21).

Although I do not intend to fully investigate the structures for all classes of As that can occur in this sequence, it should be clear at this point that there are structural differences between them, and that the As are the determining factor in this structure. It is not clear how an A could idiosyncratically control everything else in the DP if it is merely a modifier adjoined to NP, as in (4). In that position, it cannot command anything else in the tree. The clearest way I see to make sure that the A can c-command what it needs to is to adopt an analysis where the A subcategorizes for a CP complement

with a gap (or something moveable) in the appropriate place. This would in fact be exactly the same subcategorization as we have already proposed for these As in Tough Movement sentences like (22):

(22) My gorilla is easy to clean up after.

This analysis also captures my intuition that the Tough Nut CP is more closely semantically related to the A than the N.

Beyond these considerations, there is some empirical evidence for an underlying structure with a CP complement of A in that sometimes the Tough Nut CP can appear directly after the A in surface structure:

(23) ? Harvey is a difficult-to-deal-with person.

(24) ? My gorilla is an easy-to-clean-up-after pet.

(25) The macadamia is a tough-to-crack nut.

I find (23) and (24) grammatical but slightly awkward, and (25) is perfect, though perhaps no longer idiomatic. It is relevant here that the CPs in (23-24) are somewhat longer or heavier than the one in (25). It suggests that the motivation for the movement that I propose to produce Tough Nuts might be the same as for Heavy Shift. It is also notable that the landing site for this movement is the same as the one that I would assume for Heavy Shift: a rightward adjoined position.

However, there is still some reason to be suspicious of my analysis. First, if these non-finite CPs indeed move to adjunct position, we would expect them to be able to come after other adjuncts. It is difficult, but not impossible to find examples where this occurs. First, some places where it does not occur:

(26) a. This is a difficult problem to tackle, which I need to solve soon.

b. \*This is a difficult problem, which I need to solve soon, to tackle.

In (26) we see that finite relative clauses, which I take to be adjuncts, cannot precede the Tough Nut CP. But it is not quite clear what is going on here. There are two different types of finite relative clauses: nonrestrictive ones, as in (26), and restrictive ones, which we will see below in (27).

Nonrestrictive relatives are presumably adjoined higher than restrictive ones, perhaps to DP rather than NP. Thus (26) might merely show that the Tough Nut CP is adjoined at NP and so cannot appear after the nonrestrictive relative adjoined higher up at DP.

It is more difficult to test whether the Tough Nut CP can co-occur with restrictive relatives because we run into interference with an indefiniteness constraint. Tough Nuts generally do not allow a definite D, and restrictive relatives usually require one. Still, a few examples may be constructed:

- (27) a. This is the one hard problem to solve that I noticed on the quiz.  
b. \*This is the one hard problem that I noticed (on the quiz) to solve.

In this case, although the Tough Nut CP and the relative clause co-occur in (27a), (27b) shows that they are not freely ordered, as we would expect them to be if they were both adjuncts at the same level.

However, there is one construction where the Tough Nut CP can alternate with other adjuncts, whether PPs or relative clauses. This is in superlatives:

- (28) a. the hardest problem in the world to solve  
b. the hardest problem to solve in the world  
(29) a. the hardest problem to solve that I've ever encountered.  
b. the hardest problem I know of to try to solve in a timely fashion

We might wonder whether these facts have more to do with the superlative construction than with Tough Nuts, and whether what looks like a Tough Nut CP may actually be something else, licensed by the superlative rather than by the choice of A. But in fact, As in the superlative degree still seem to pattern differently based on whether they are members of the *tough* class or not:

- (30) a. the toughest nut in the world to crack  
b. the toughest nut to crack in the world.  
(31) a. \*the eagerest/most eager student in the class to please  
b. \*the eagerest/most eager student to please in the class  
(32) a. \*the biggest meal in the world to eat  
b. \*the biggest meal to eat in the world  
(33) a. ?the strangest town in the world to live in  
b. ?the strangest town to live in in the world

I don't want to go into great depth on the intricacies of the superlative construction here. From the examples above, it appears clear that whatever superlatives do to save Tough Nuts with multiple adjuncts, they do not similarly allow multiple adjuncts, including something that looks like a Tough Nut CP, after an A that would not otherwise allow them, like *eager* or *big*. Thus it seems safe to take (28-29) as good evidence of the placement of the Tough Nut CP as adjunct at surface structure.

Another possible problem with my proposed analysis of Tough Nuts is demonstrated in (34-35):

- (34) a. a difficult fear to assuage  
b. a difficult-to-assuage fear of cats



- c. \*a difficult fear to assuage of cats
  - d. \*a difficult fear of cats to assuage
- (35) a. a tough rumor to squelch
- b. A tough-to-squelch rumor that Harvey snores is going around.
  - c. \*A tough rumor to squelch that Harvey snores is going around.
  - d. \*A tough rumor that Harvey snores to squelch is going around.

It appears that the Tough Nut CP cannot occur after the N if that N already has a complement, although again, this does not hold for superlatives:

- (36) a. the easiest symptom of the disease to deal with
- b. ?the easiest-to-deal-with symptom of the disease
- (37) a. the most difficult habit of Charley's to tolerate
- b. ?the most difficult-to-tolerate habit of Charley's

(36) and (37) are thus counterexamples to the claim made for (34-35), that the N cannot already have a complement. I'm not sure whether the fact that the (b) examples are less good is significant, since there may be some interference from the relative heaviness of the complement PP and the Tough Nut CP. I think the judgments for (37a-b) would be reversed if, for instance, *Charley* were replaced with something heavier, like *my uncle's tap-dancing gorilla*.

In any case, the existence of counterexamples does not make the facts in (34-35) seem much less curious. I see two possible explanations for them. The one that fits with my current analysis would require a constraint against moving the Tough Nut CP past some kinds of complex NPs. I am not sure how this could be formalized because it is not clear how the CP or its A head could know what was in the NP, since neither c-commands the NP. The other possibility is that there are in fact different structures when the CP precedes the N, as in (34-35b), versus when it follows, as in (34-35a). In (b), it could be a complement of A, as previously assumed, but (a) would not be produced from (b) by a movement like Heavy Shift. Rather, in (a), the CP might be a complement of the N, which would explain why it conflicts with other complements of N in (c-d). We would merely have to say that the N does not subcategorize for both complements at once, but then this solution loses the original insight that it is the A that licenses the Tough Nut CP.

However, even this insight can be called into question. Another difficulty with the proposed analysis is the fact that some As that do not permit the Tough Nut construction do allow the construction demonstrated in (38-39):

- (38) a. a ready-to-eat meal
- b. \*a ready meal to eat

- c. ? a ready-to-carve turkey
- (39) a. an eager-to-please student
- b. \*an eager student to please
- c. ? an eager-to-sleep student

The (a) examples are somewhat idiomatic, especially (38a), since *ready-to-eat* is not entirely compositional in meaning - a *ready-to-eat meal* is not just any meal that happens to be ready, but one that is packaged and purchased in a *ready-to-eat* state. The less idiomatic (c) examples are not quite as good to my ear. They are certainly better than the (b) examples, but that may be because of some analogy to the idiomatic examples, rather than because such forms are intrinsically acceptable. If they are in fact acceptable and have deep structures similar to those of Tough Nuts, then the question is why these CPs cannot similarly move to adjunct position, as Tough Nut CPs do. Interestingly, the opposite case also exists, where As that allow surface structures similar to those of Tough Nuts do not allow the CP to precede the NP:

- (40) a. an unlikely pet to own
- b. \* an unlikely-to-own pet
- (41) a. a strange place to live in
- b. \* a strange-to-live-in place
- (42) a. a big meal to eat
- b. \* a big-to-eat meal

These facts do not necessarily require throwing out the proposal. All we would need to say for (40-42) is that *unlikely*, *strange*, and *big* are not in the *tough* class of predicates and thus these [A NP to VP] constructions actually have a different internal structure from Tough Nuts, which we already suspected based on (10-18). We have not thoroughly investigated that structure, but if we did we might well find some difference that would account for this contrast.

There is a larger problem with (38-42), which will require another condition being placed on the proposed movement to adjunct. That is, we will have to say that the A not only selects for a CP complement, but also selects the movements that its CP complement can undergo. That is, *ready* and *eager* do not allow their complements to move to adjunct, but *tough*-like As do. This is a suspicious claim, but not too much more suspicious than the claim that these same As can select for complements with the proper structure to allow Tough Movement.

Thus there are various possible objections to my analysis of Tough Nuts, but none of them individually seem to be damning to the proposal. At this point I take it as established that different adjectives pattern differently with respect to the Tough Nut construction, implying that the Tough Nut CP must be a complement of A. The only alternative way I can think of to allow the A to control the

CP is to use Abney's (1987) proposal that AP is a complement of D, and to place both NP and CP as complements of A. We saw earlier that that analysis had some flaws of its own, and at this point it is possible to point out yet another problem with it: it would require a different operation entirely to produce sequences like *a tough to crack nut*, which are neatly accounted for under the proposal I have developed above. Therefore, despite its problems, I prefer my hypothesis, where the CP starts as complement of a modifier A and later moves to right adjoin to NP. However, some questions remain for the future. A more careful study of the similar looking constructions involving other adjectives will be required to fully account for all the contrasts seen above.

## References

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