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Why Ellipsis Needs TOO*

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ABSTRACT The inclusion of TOO improves the acceptability of many ellipsis sentences, including rendering ungrammatical VPE grammatical. Thus far, there is no appropriate explanation for this effect that accounts for all aspects of interaction between TOO and ellipsis. The mechanism for ellipsis followed by most generative work is PF-deletion (Merchant 2001), a syntactic operation. In contrast, theories concerning the obligatory nature of TOO are almost exclusively semantic, creating a gap in the literature concerning the interaction of both. There is similarity between TOO and ellipsis, as both require a focus alternative antecedent, as defined by TOO's presupposition and the Contrast Condition on ellipsis (Stockwell 2020). Although other factors, such as discourse similarity and Obligatory Implicatures (Bade 2014) affect the general need for TOO, underlying similarity can explain its specific relationship with ellipsis. The necessary antecedent can be reduced to a single constraint for both TOO and ellipsis, deriving from general principles of focus and alternation, meaning their interdependent relationship may merely be an outcome of this similarity, rather than a specific phenomenon in need of explanation.

1 INTRODUCTION

This paper investigates an aspect of ellipsis that has generally been largely overlooked; its susceptibility to and interaction with the additive particle TOO.

(1) [$_A$ I duck when I get onto that helicopter,] [$_E$ and you should ε too].

The above sentence is an example of Verb Phrase Ellipsis (VPE), spoken by President Bartlett in 'Gone Quiet' (S3, E6 of The West Wing). The ellipsis site (ε) is understood to mean 'duck when you get onto that helicopter', despite this predicate not being pronounced. The inference is recoverable based on the antecedent clause (A), and its similarity to the ellipsis clause (E). The pertinent observation is that the sentence becomes less acceptable if 'too' is omitted.

(2) ?I duck when I get onto that helicopter, and you should.

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These examples have been considered ungrammatical, but with specific intonation (heavy stress on 'should' or 'and'), they can be grammatical. Hence, the difference may not necessarily be one of grammaticality, but instead of acceptability. This is similar to the pragmatic notion of felicity; grammatical sentences can be infelicitous in improper context, due to pragmatic factors. Acceptability is a broader term than either grammaticality or felicity; a sentence must be both grammatical (well-formed in terms of morpho-syntactic rules concerning competence) and felicitous (acceptable in context) to be acceptable.

The general necessity of too in specific contexts is well-attested (Green 1968, Kaplan 1984, Krifka 1998, Stockwell 2020: amongst others), with explanations including *Maximise Presupposition* (Heim 1992) and *Obligatory Implicatures* (Bade 2016). Research on too is largely semantic, creating a gap in the literature concerning its interaction with ellipsis, often assumed to be a syntactic phenomenon. The obligatory nature of too varies depending on context, including across varieties of ellipsis. Despite many scholars considering the necessity of too a binary stipulation, there are also examples where it appears to be optional, and its obligatory nature may be a gradient measure.

Regarding ellipsis, traditional theories are predicated on similarity between A and E, which allows ε in the latter to have recoverable meaning. However, recent research on ellipsis has defined the existence of a *Contrast Condition* on ellipsis (Stockwell 2020), based on applying Rooth's theory of Alternative Semantics for focus to ellipsis (Rooth 1992, 1997); the antecedent for ellipsis must be a proper alternative to the ellipsis clause. This is very similar to the conventional meaning of too, which can be summarised as presupposing a proper alternative to its host sentence.

This paper comprises 7 sections. Section 2 reviews ellipsis literature, including mechanisms, varieties, and tension between similarity and contrast, and section 3 gives an overview of the literature surrounding too, including its (presuppositional) meaning and obligatory nature. This information is used to inform new, empirical research into the interaction of ellipsis and too; the formulation and analysis of this research is discussed in section 4. The results from this investigation are presented in section 5, and discussed in section 6. Finally, section 7 presents overall conclusions and areas for future research.

2 Ellipsis

2.1 Mechanisms

In linguistics, ellipsis refers to phenomena in which there is meaning without corresponding form, creating a mismatch between Logical Form (LF) and Phonological Form (PF). Such constructions abound in both linguistic literature and general language, and have been the focus of decades of linguistic research from a variety of theoretical frameworks. Both semantic and syntactic theories have been proposed, and the contentious debate between the two is far from resolved.

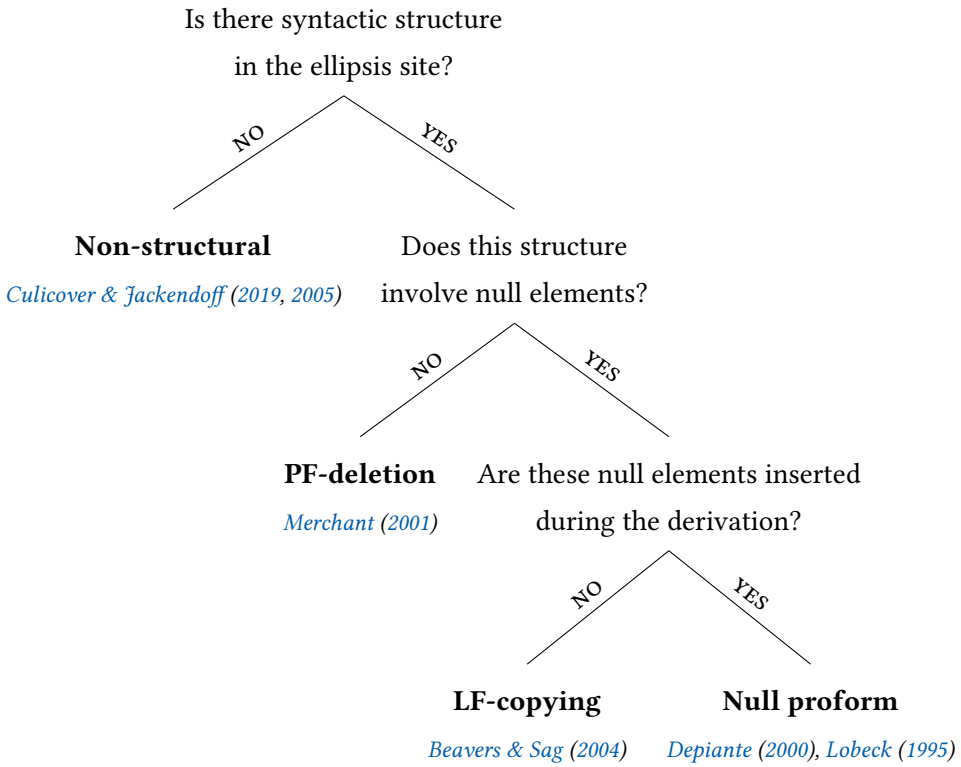


Figure 1 Approaches to ellipsis.

Generally, ellipsis requires specific (syntactic) context, and a salient antecedent in the discourse which allows the meaning of ε to be recovered; without such an antecedent, ellipsis is meaningless, as exemplified by Fiengo & Lasnik (1972). Non-structural approaches propose a semantic mechanism, whereas syntactic approaches, such as PF-deletion, propose isomorphic syntactic structure. Other proposals include LF-copying and null proforms, which have both semantic and syntactic elements, such as adhering to Binding Theory in the ellipsis site but allowing a semantic inferencing system for recoverability. A broad overview of such approaches, the ways they differ, and key scholarship is given in Figure 1 (from Banerjee 2021).

The variation in theoretical assumptions reflects a variation in data. The main tension is between connectivity effects, where surviving structure is connected in some way to elided structure, and non-connectivity, where such a relationship is impossible (Merchant 2019). Non-connectivity includes phenomena such as case mismatching; in (3), a PF-deletion account of ellipsis would render the utterance ungrammatical.

(3) Who wants a slice of pizza?

a. Me!

b. *Me ~~wants a slice of pizza~~! (Merchant 2019: 34)

However, as first noted by Ross (1969) concerning German, ellipsis can also necessitate case-matching, a connectivity effect supporting implicit structure. Another connectivity effect concerns voicing mismatches, which are grammatical for VPE; (4a) has an active antecedent but the elided verb is passive.[1] Such mismatches are disallowed under sluicing and other clausal ellipsis, as in (4b) and (4c). For VPE, the Voice projection is not elided, allowing a mismatch, whereas it is is contained within TP and hence deleted under sluicing, disallowing mismatches; implicit structure affects grammaticality.

(4) a. The janitor must remove the trash whenever it is apparent that it should be ~~removed~~.

b. *Joe was murdered, but we don't know who.

c. *Someone murdered Joe, but we don't know who by.

(Merchant 2013: 78-81)

Further connectivity effects include lower origin effects, locality effects, P-stranding effects, agreement effects, the distribution of complementizers, of infinitivals, and of predicate answers (Merchant 2019 provides an overview of these).

I adhere to the account proposed in Merchant (2001), and adhered to by most generative work since. The head licensing ellipsis has a formal E feature, which triggers the phonological deletion of its complement at the PF interface,[2] meaning the structure fed to the LF interface is the same as if the ellipsis site was pronounced.

Licensing of ellipsis is also syntactic. Little attention has been paid to explaining this licensing system, with notable exceptions from Aelbrecht (2009) and Lobeck (1995). Licensing relates to the type of ellipsis. For example, VPE is licensed by a T-type element (modals, *do*-support, etc.), sluicing (TP-deletion) is licensed by a wh-element in SpecCP, and Noun Phrase Ellipsis (NPE) is licensed by another element within DP (e.g. number): these items are bolded below.

(5) a. Marcus plays guitar and Christian **does** ~~play guitar~~ too. *VPE*

b. Marcus plays something, but I don't know **what**$_i$ ~~he plays t_i~~. *Sluicing*

c. Marcus plays two instruments, and Christian plays **four** ~~instruments~~. *NPE*

Data concerning the licensing of ellipsis supports a syntactic mechanism. Omission of licensors may render sentences unacceptable, but does not affect their meaning, merely shifting the syntactic boundaries of the ellipsis site. In some cases, this new boundary can give rise to a different type of ellipsis, as with VPE, where ε becomes T'.

[1] Elided material shown via strikeout text.

[2] More recent work suggests the ellipsis site and its licensing head are not necessarily always in a head-comp relationship, see Aelbrecht (2009).

(6) a. Marcus plays guitar, and Christian ~~plays guitar~~ too.

b. *Marcus plays something, but I don't know ~~what he plays~~.

c. *Marcus plays two instruments, and Christian plays ~~four instruments~~.

Appropriate licensing is necessary for acceptable ellipsis, but the specific context varies between varieties of ellipsis. Too is relevant to this licensing: both (5a) and (6a) would be unacceptable if it were omitted. The reason for the necessity of TOO for such specific ellipsis constructions is currently an open question, and is the motivation for this thesis.

2.2 Varieties

Ellipsis is a type of 'shallow' anaphora, which requires a salient linguistic antecedent, (compared to 'deep' anaphora, for which unpronounced meanings can be recovered via pragmatic/extralinguistic antecedents, terms introduced by Hankamer & Sag 1976). Types of ellipsis tend to cluster at the predicate, clausal, and nominal levels (Temmerman & van Craenenbroeck 2019: 5), and hence can be broadly classified as clausal, predicate, or nominal ellipsis. Examples are given below.[3]

(7) a. Emma took a syntax course, but I don't know which ~~syntax course Emma took~~. *Sluicing*

b. Emma likes linguistics, and her course-mate ~~likes linguistics~~ too. *T' ellipsis*

c. Emma studies linguistics, and Susan does ~~study linguistics~~ too. *VPE*

d. Emma likes syntax, and Susan ~~likes~~ psycholinguistics. *Gapping*

e. Emma likes syntax, and Susan does ~~like~~ psycholinguistics. *Pseudogapping*

f. Emma likes linguistics a lot, and ~~she likes~~ psychology ~~a lot~~ too. *Stripping*

g. Emma takes three modules, and Susan takes four ~~modules~~. *NPE*

Not all types of ellipsis can or must use TOO. When both the object and subject differ in gapping/pseudogapping, TOO cannot be included. In contrast, TOO is often necessary for VPE,[4], and for T' ellipsis and stripping. NPE is more complex; in the example above, TOO is unnecessary, but if A and E agree in number (or more generally, in non-elided nominal modifiers), TOO is preferred.

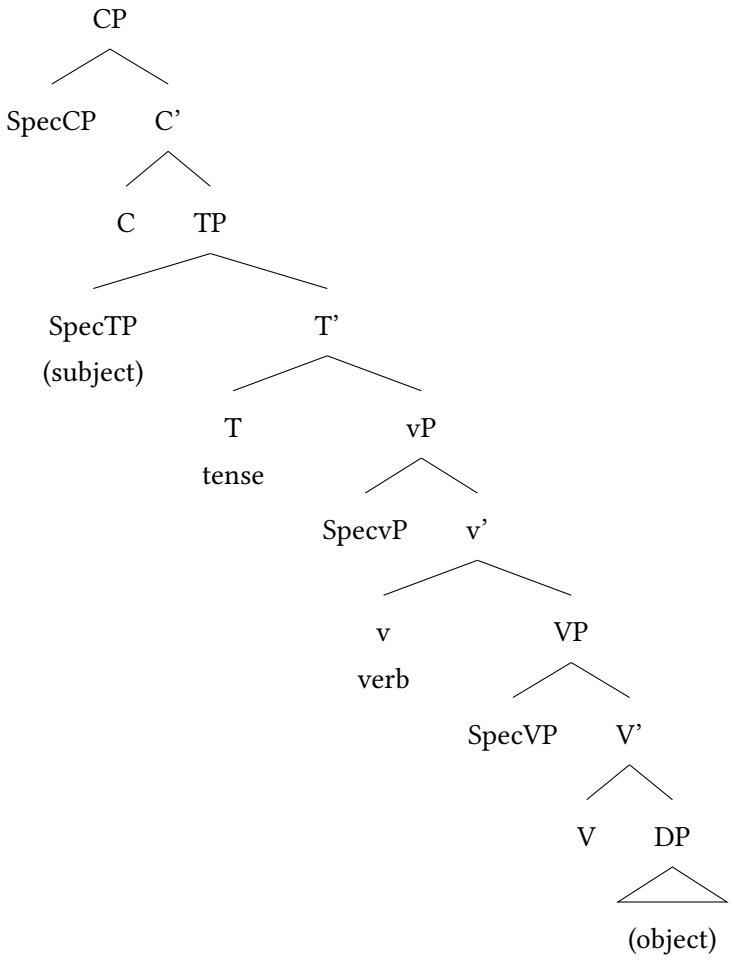
(8) a. ?Emma takes three modules, and Susan takes three.

b. Emma takes three modules, and Susan takes three, too.

[3] These are simplified representations, ignoring movement, and hence contrast to explanations in section 6.

[4] An exception to this is if there is heavy stress on AND, focusing the conjunction of the propositions rather than the subjects, but this conveys a different meaning in terms of an obligatory exhaustive implicature, an idea introduced in section 3.2 and discussed in section 6.1.1.

(9)



Variation largely concerns the size and placement of the ellipsis site, which can be shown given the generic syntax tree in (9). VPE refers to ellipsis of vP (Merchant 2001, Aelbrecht 2009, Johnson 2014, Sailor 2014: amongst others) licensed by an element in T, and hence fits the head-comp relationship proposed in Merchant (2001). Similarly, T' ellipsis elides T', leaving the subject in SpecTP. Sluicing is TP deletion, licensed by a wh-feature in C (Ross 1969), which is realised in SpecCP. Gapping and pseudo-gapping both elide v, with the difference lying in whether tense features remain in T (necessitating *do*-support if there is no morphological host), or lower (and are elided). NPE elides the NP, licensed by another element within the DP (e.g. number). Stripping, like sluicing, is TP-deletion, but involves focus movement of the object out of TP. Variation in ellipsis sites is relevant to the interaction of ellipsis and too, particularly considering the place of too in a clause, which is discussed in section 3.3.

2.3 Contrast vs. Similarity

In reference to the relationship of similarity between ε and its antecedent, the terms 'recoverability', 'identity' and 'parallelism' are often used interchangeably, but distinctions should be drawn. 'Recoverability' refers to the general ability to retrieve meaning from ε, and is theory-neutral in terms of mechanism. In contrast, 'identity' is a syntactic term, referring to underlying syntactic equivalence between A and E (assuming PF-deletion), while 'parallelism' is a semantic term, referring to overall sameness in meaning between A and E.[5]

Under a PF-deletion account, there is perfect identity between A and E, which only differ in phonology. (1) has the underlying structure in (10), where 'should' takes the E feature, triggering the phonological deletion of its complement (vP).

(10) I_i duck when I_i get onto that helicopter, and [$_{TP}$ you_j $should_E$ [$_{vP}$ ~~duck when you_j get on that helicopter~~ too]].

The elided 'you' differs from its antecedent ('I'). Intuitively, such a mismatch should be disallowed under identity. This appears to be a strength of semantic accounts; semantic parallelism is forgiving towards ε-internal mismatches as overall sameness in meaning is maintained. The difference is superficial; there can still be syntactic identity between A and E. If the embedded pronoun derives morphological form when it is bound by the overt subject, identity can be maintained between vPs.

(11) I_i [$_{vP}$ λx. x ducks when x gets on that helicopter] and you_j should [$_{vP}$ λx. x ducks when x gets on that helicopter].

Abstracting away from morphological form to deeper underlying structure, syntactic identity can also be maintained in more extreme cases, including mismatches in syntactic category.

(12) David Begelman is [$_{DP}$ a great laugher], and when he does [$_{vP}$ ~~laugh~~], his eyes crinkle… (Hardt 1993: 34)

In (12), the elided vP has a nominal (DP) antecedent, which is counterintuitive to identity. However, nominals can underlying contain event arguments, which hold syntactic identity with other event arguments (Larson 1998). In this example, 'laugher' can be considered a 'deverbal' noun, as it derives from the verb 'laugh'; Fu, Roeper & Borer (2001) argue that such 'process nominals' underlyingly contain vPs. If there was no such relationship between DP and vP, (13) should be as acceptable as (12), but since 'person' cannot contain an event argument, the ellipsis is ungrammatical, supporting Fu et al.'s (2001) argument.

(13) *David Begelman is a great person, and when he does, his eyes crinkle…

[5] These definitions broadly encompass those in previous literature but do not claim to be universal.

Despite the emphasis on similarity, ellipsis constructions abound in contrastive elements between E and A. There is evidence that contrast is not merely permissible in ellipsis, but necessary, as argued by Stockwell (2020). Specific contrasts which have perfect identity between A and E are ungrammatical, despite their non-elided counterparts being acceptable.

(14) a. *If John is wrong, then he is.

b. If John is wrong, then he is wrong.

c. *John eats what he does.

d. John eats what he eats.

This evidence motivates Stockwell (2020) to propose a necessary Contrast Condition on ellipsis, based on applying Rooth's theory of focus interpretation to ellipsis (Rooth 1992). In summary, this theory suggests that if a constituent is focused, then there must be a proper focus alternative salient in the preceding discourse.

Stockwell states that E must be a 'proper alternative' to A, in that the two are in the same focus group, but not the same member. Focus groups (denoted by Stockwell as F(X) where X is a syntactic item) comprise all possible alternatives for a given focused value. For example, in the sentence 'Mary likes cake', in which Mary has focus features, the focus group would be 'x likes cake' for any x (including Mary).

(15) Contrast Condition: For ε to be elided, ε must be inside a phrase E that has an antecedent A such that either:

a. $[\![A]\!] \in F(E)$ and $[\![A]\!] \neq [\![E]\!]$; or

b. $[\![A]\!] \subseteq F(E)$ (Stockwell 2020: 5)

Ellipsis in which A and E are not proper alternatives is only grammatical if A denotes a set, which is a subset of F(E). In (16), A and E are not proper alternatives, as both can refer to the same predicate (e.g. 'Emma studies linguistics'). However, A denotes a set ('something'), which is a subset of the focus alternatives of E, hence sluicing is grammatical according to the second conjunct of the Contrast Condition.

(16) [$_{A}$ Emma studies something], but I don't know [$_{E}$ what [$_{\varepsilon}$ ~~Emma studies~~]].

Stockwell terms the structural size of A and E the 'Parallelism Domain' (PD). Semantic parallelism is maintained as A and E must belong to the same focus group. Previous approaches in this vein, such as Takahashi & Fox (2005) and Heim (1997), have emphasised focus group membership, but discounted the concept of necessary contrast. Stockwell uses the concept of a PD to explain the grammaticality differences in ellipsis sentences which minimally differ in their inclusion of too.

(17) a. John bought five books, and Mary bought five books.
b. *John bought five books, and Mary bought five.
c. John bought five books, and Mary bought five, too.
d. John bought five books, and Mary bought three.
e. *John bought five books, and Mary bought three, too.

His argument is that the inclusion of TOO moves the boundaries of the PD. In (17b), the PD is 'bought five (books)' for both clauses, eliciting no contrast between A and E. In (17c), it is broadened to include the subject, so there is contrast at the clausal level. This also explains the difference between (17d) and (17e); when the boundaries are widened in (17e) there are two contrastive elements (number and subject), so the inclusion of TOO renders the sentence ungrammatical. As a native speaker, I judge (17b) to be less acceptable than (17c), but not ungrammatical (a viewpoint Stockwell has more recently acquiesced to, p.c.).

Where Stockwell's explanation falls short is in determining *why* TOO has this effect on the PD, beyond observing that it does. In terms of factors influencing the size of the PD, it appears unconstrained (p.c.); whatever is observed as the PD is the PD. Despite being one of very few formal approaches that explores the relationship between TOO and ellipsis, Stockwell's approach falls short in terms of explanatory adequacy.

3 'Too'

3.1 Meaning

Too is acquired early and easily understood by native speakers, and yet its meaning is complex and contentious. There is generally a consensus that TOO does not contribute propositional content to a sentence, first noted by Horn (1972). However, TOO is not meaningless, nor is its presence or absence redundant; its meaning is considered to be presuppositional rather than propositional (as in Horn 1972). Its use emphasises a relationship of similarity between its host sentence and some antecedent. Its necessity may be a pragmatic consideration; TOO may be semantically inert at the sentence level of meaning, but in context, its use effects felicity and acceptability.[6]

(18) (Anita was a teacher.) Emmy taught for a while, too.

The meaning of TOO is multifaceted, but can be summarised by the following conditions for its felicitous use, exemplified using (18), and explained further in the following subsections.

i. Presuppositional: The use of TOO presupposes the truth of some alternative proposition. For (18), the presupposition is that someone other than Emmy

[6] Whether this is a semantic or pragmatic consideration relates to the ongoing debate between minimalist and contextualist accounts of meaning, which is beyond the scope of this thesis.

'taught for a while'. The proposition is focus-sensitive; if 'taught' was focused, the presupposition would be that Emmy did something other than teach (for a while).

ii. Anaphoric: The necessary presupposition must be satisfied by a salient antecedent in the discourse; in (18), this is '(Anita) was a teacher'.

iii. Focus-sensitive: TOO associates with a specific constituent in its host sentence. This associate contrasts to the antecedent, and is assumed to have focus features. In (18), the associate is 'Emmy', which contrasts to 'Anita'.

There are other features of TOO that do not directly relate to its meaning, but rather governance of its usage. Specifically, TOO is sometimes obligatory for a felicitous utterance, including for VPE. This obligatoriness, and theories concerning it, are discussed in section 3.2. The syntax of TOO, in terms of its sensitivity to polarity and its position in syntactic structures, is discussed in section 3.3, and it is compared to other additive particles in section 3.4.

3.1.1 Presupposition and Focus

Additive particles express that their host predication holds for at least one focus alternative (Krifka 1998: 111). This can be considered a conventional implicature embedded in the semantics of TOO at the lexical level.

(19) TOO conventionally implicates: What I say about the contrasting (or focused) constituent in the second clause, I also say about the contrasting (or focused) constituent in the first clause. (Kaplan 1984: 511)

Focus and presupposition are interdependent; the focused constituent is obligatorily the one that alternates to form a presupposition. This concept has been termed the Contrastive Topic Hypothesis (CTH).

(20) Contrastive Topic Hypothesis: The associated constituent of stressed postposed additive particles is the contrastive topic of the clause in which they occur. (Krifka 1998: 113)

The CTH explains the difference in felicity between the following ellipsis examples. Where the focused constituent in A is not an alternative to the (focused) associate of TOO in E, the sentence is infelicitous.[7]

(21) a. AMELIA likes dancing, and LAURA does ~~like dancing~~ too.

b. #Amelia likes DANCING, and LAURA does ~~like dancing~~ too.

c. Amelia likes DANCING, and she does ~~like~~ RUNNING too.

d. #AMELIA likes dancing, and she does ~~like~~ RUNNING too.

[7] Small caps indicate focus.

Hence, similarly to the Contrast Condition on ellipsis, the presupposition of TOO can be understood as a focus alternative to its host sentence, where the focused constituent is the associate of TOO. Also similarly to ellipsis, there must be exactly one focused/contrastive element, or else the sentence is unacceptable.

3.1.2 Anaphoricity

TOO emphasises similarity, effectively meaning something like 'one more the same', which is the single basic meaning attributed to it by Goddard (1986). This emphasis on similarity may be a fundamental contribution of TOO; Kaplan (1984) argues that the necessity of TOO is a direct result of the contrast between its host and antecedent sentences; where the contrastive elements have prominence (such as being focused), TOO is obligatory.

(22) Barb is seventeen, and Wendy is old enough to have a driver's license, too. (Green 1968: 24)

In (22), the use of TOO indicates that 'seventeen' is broadly synonymous with 'old enough to have a driver's license', hence this sentence would be infelicitous in countries such as Spain, where the legal driving age is 18. If TOO is omitted, no such implication is retrieved. Two conjuncts may not mean the same thing superficially, but the (felicitous) use of TOO indicates that they do.

Similarity can be more general than this kind of synonymy. For example, (23) is grammatical if both 'is a pacifist' and 'paints well' connote positive attributes in the mind of the speaker. If the speaker were an art fan, but also a violent terrorist, the sentence would be rendered infelicitous as the clauses would have opposite value judgements attached.

(23) He's a pacifist, and he paints well, too. (Green 1968: 28)

If no similarity can be found between clauses, the use of TOO is infelicitous.

(24) #I wrote my mother a letter yesterday, and six men can fit in the back seat of a Ford, too. (Green 1968: 28)

Without TOO, (24) is 'grammatical but pointless', with it, it is 'inconceivable, except perhaps…by a mentally disturbed person' (Green 1968: 28-29). Some kind of semantic similarity between the host and antecedent is necessary for the felicitous use of TOO.

Green's formulation of this necessary similarity considers it ambiguous, essentially an indefinitely long list of similar things between propositions, so long as those things match in affective polarity. In contrast, Wierzbicka (1981) has a specific formulation of the similarity, in that both must have the same truth value. A third approach comes from Goddard (1986), who criticises Green for being too vague, Wierzbicka for being too limited, and both for ignoring the additive, cumulative element of TOO. Goddard's approach considers the semantics of TOO to be 'one

more…the same', but this formulation is meaningless without a definition of 'the same', which he does not proffer.

More recent work improves upon these proposals, particularly Winterstein (2009), who argues that a fulfilled presupposition is not sufficient for licensing TOO, it is subject to a second necessary condition of *discourse similarity* between its host and antecedent. The argument is that this a gradable variable based on the *argumentation* (the orientation of an expression in relation to a goal, see Anscombre & Ducrot 1983, Merin 1999) of TOO's host and antecedent. In the example below, the truth conditions of each predicate are the same, apart from the contrastive subjects: both Lemmy and Ritchie solved some (but presumably not all, given the standard implicature of the scalar particle SOME) of the problems. However, the sentence is infelicitous if TOO is included.

(25) a. Did Lemmy and Ritchie do well at the maths exam?

b. Lemmy did not solve all problems, Ritchie solved some of them (# too).
(Winterstein 2009: 324)

Winterstein argues that this infelicity is due to a lack of discourse similarity between antecedent and host, as they mismatch in argumentation. Intuitively, the sentence makes a negative appreciation of Lemmy's performance, whereas it is positive towards Ritchie; the clauses differ in terms of their polarity regarding exam performance.

As well as being orientated, argumentation is gradable. Winterstein (2009) supports this claim with experimental evidence regarding the naturalness (i.e. acceptability) of minimally variant sentences in French, concerning the additive particle *aussi* ('too'). Participants were given the context that Marseille and Bordeaux were each playing a football match, and presented with the question 'Do they have a chance of winning?'. Three answers were used across experimental conditions. The first clause of each stated that Marseille would certainly win, and the second stated the possibility of Bordeaux winning too, with varying strengths. An infelicitous condition, which differed in polarity, was used as a control (26d). The English translations are provided below.

(26) The victory of Marseille is certain, and…

a. Bordeaux's is assured too.

b. %Bordeaux's is very likely too.

c. ??Bordeaux's is likely too.

d. #Bordeaux doesn't have a big chance to win either.
(Winterstein 2009: 328-9)

There was a significant positive correlation between the strength of the possibility that Bordeaux would win and the acceptability of the sentence, and the judgements for possible win sentences were higher than the infelicitous (26d). Interestingly, the most acceptable sentence (26a) had a lower average acceptability judgement than

other 'perfect' sentences in the survey. The 'perfect' version for this context would be (27): a version with anaphoric reduction, which Winterstein does not address but is certainly relevant to a thesis investigating ellipsis.

(27) The victory of Marseille is certain, and that of Bordeaux too.

Too is anaphoric in that it requires an antecedent, which can be considered a focus alternative to its host sentence. However, there is an added level of similarity necessary for its felicitous use, namely discourse similarity or argumentation.

3.2 Obligatoriness

It has been established that too is obligatory in specific contexts. The traditional theory regarding the obligatory nature of too considers it a binary condition, then it must. Its ability to appear is conditioned by its presupposition; if the presupposition is met, then too must be used.

(28) a. *Jo had fish and Mo did.
b. Jo had fish and Mo did too. (Kaplan 1984: 510)

In reality, there is more variance than a binary condition, as mentioned in section 3.1.2. The factors governing its necessity are more complex than merely whether its presupposition is met. Optional uses of too are not rare exceptions; a small study of corpora by Amsili, Ellsiepen & Winterstein (2012) found that 33% of additive particle usage was optional, compared to 66% being compulsory, where omission either rendered a sentence ungrammatical or created a different inference.

The obligatoriness of too is related to ellipsis. If there is no anaphoric reduction, too seems to be optional, although its use is preferred.

(29) a. Jo sent Helen a note and Mo sent Helen a note ?(too).
b. Jo sent Helen a note and Mo sent her one *(too).
c. Reagan frightens Jo and Reagan frightens Mo ?(too).
d. Reagan frightens Jo and he does Mo *(too). (Kaplan 1984: 512)

If the contrastive element is an adjunct, too is also optional, with no clear preference (according to Kaplan).

(30) a. Jo has lived in Philadelphia, and she has lived in San Diego (too). *Locative*
b. Jo wrote an article in 1980 and she wrote one in 1981 (too). *Temporal adverbial*
c. Jo danced wildly and she danced romantically (too). *Manner adverbial*
(Kaplan 1984: 512-3)

There are two competing semantic accounts to explain the obligatory nature of TOO: *Maximise Presupposition* and *Obligatory Implicatures*.

Maximise Presupposition (MP) was proposed by Heim (1992), in response to the fact that Grice's Maxim of Quality cannot capture the preference for a definite article over an indefinite article in sentences like (31). MP refers to a new maxim governing felicitous utterances; that they should 'presuppose as much as possible'.

(31) The/#A sun is shining.

The use of THE presupposes that there is a single unique referent for 'sun', whereas A would suggest multiple possible referents; THE has a stronger presupposition than A. This approach has since been widened; in more recent proposals, syntactic items are in competition, the winner being whichever alternative has a stronger presupposition.

One set of these alternative terms is {TOO, ∅}. Since TOO is presuppositionally stronger than its omission, detailed in section 3.1.1, its omission antipresupposes (a term coined by Percus 2006) a focus alternative to the host sentence. If someone states 'MARY came', rather than 'MARY came too', the hearer infers that no one other than Mary came. Hence, if someone other than Mary did in fact come, the sentence is infelicitous.

There are issues with considering these inferences presuppositions. Presuppositions show projection behaviour; they are maintained when embedded, for example under negation. Therefore, if the stronger triggers discussed under MP were presuppositional in the traditional sense, they should still be obligatory under negation, but instead are optional. This is true of TOO, AGAIN and KNOW.

(32) a. Jenna went ice-skating yesterday. Today she didn't go (again).

b. Mary came to the party. It is not the case that Peter came to the party (too).

c. Mary is pregnant. Joe does not know/believe she is. (Bade 2014: 45)

This observation motivates Bade (2014) to propose a different account: *Obligatory Implicatures* (OI). The theory is based on similar work concerning scalar implicatures which make use of a covert exhaustivity operator to explain conventional implicatures such as 'some' implying 'not all', which functions similarly to the overt inclusion of ONLY.

The application of this theory to TOO is based on observations by Krifka (1998) and Saebø (2004). Considering TOO's relationship with focus, they both note that if focus is present, but TOO is not, an implicature arises that states that there is no proposition that is a focus alternative that is true, other than the one uttered.

(33) $\neg\exists p[p \in C \wedge p = 1 \wedge p \neq [\![q]\!]^0]$ (Bade 2014: 46)

For the sentence in (34a), where 'Mary' is focused, the implicature (34b) arises, which amounts to there being no true proposition of the form 'x came to the party', other than 'Mary came to the party' in context.

(34) a. [$_F$ MARY] came to the party.

b. $\neg\exists p[p \in \{p : \exists x.person(w)(x) \wedge p = \lambda w.x$ came to the party in $w\} \wedge p = 1 \wedge p \neq [\![$ Mary came to the party $]\!]^0]$ (Bade 2014: 46)

Under OI, the obligatory nature of TOO is triggered when this implicature contradicts context. For (34), if someone other than Mary did come to the party, the implicature is false, hence TOO must be used. This implication is related to the Question Under Discussion, a pragmatic term coined by Roberts (2012), referring to the question interlocutors are attempting to answer in given discourse; in these examples, the QUD would be 'Who came to the party?'. Bade terms the implicature 'exhaustive' in that it implies there are no other correct answers to the (implicit or explicit) QUD.

Both MP and OI have their strengths. Regarding TOO, OI is more fitting, as is argued for in Bade (2014) and supported by empirical data (Bade 2016), whereas something like obligatory definiteness (as in 31) is better explained by MP.

3.3 Syntactic Position

The position of TOO in a clause is complex and contradictory, with no clear or obvious answer (Jason Merchant, p.c.). It generally seems to be a right-branching adjunct in the v domain, but it can also appear in other places, such as when it survives T' ellipsis (and hence, must be higher than T').

Evidence for TOO as a vP-adjunct comes from McCawley (1998), who uses vP-conjunction to show the scope of TOO is (or at least, can be) over just vP. Specifically, for vP-conjuncts, additive particles such as TOO can modify the entire conjunction, or one of the conjuncts.

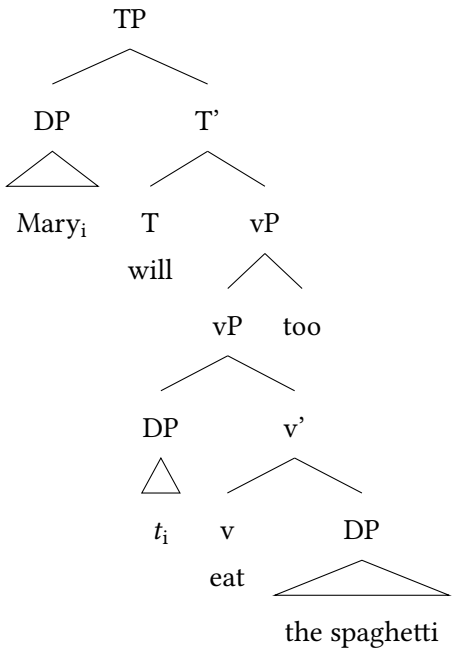
(35) a. Hugh moved out and bought a house, and Belle [moved out and bought a house] too.

b. Hugh moved out and bought a house, and Belle [moved out] too.

c. Hugh moved out and bought a house, and Belle [bought a house] too.

Rullmann (2003) gives the following structure to 'Mary will eat the spaghetti too'. Note that this analysis adheres to VISH, as semantically TOO has scope over the subject, hence must c-command its trace.

(36)



(Rullmann 2003: 368)

Ellipsis can also inform an analysis of too's place in the syntactic derivation. Recall the ellipsis examples using too given in section 2.2, and repeated below with labelled bracketing.

(37) a. Emma likes linguistics, and [$_{TP}$ her course-mate [$_{T'}$ ~~likes linguistics~~] too]. *T' ellipsis*

b. Emma studies linguistics, and Susan [$_{TP}$ does [$_{vP}$ ~~study linguistics~~] too]. *VPE*

c. Emma likes linguistics a lot, and [$_{TP}$ ~~she likes~~ psychology too]. *Stripping*

d. Emma takes three modules, and [$_{TP}$ Susan takes [$_{DP}$ three [$_{NP}$ ~~modules~~]] too]. *NPE*

Since too survives VPE (and smaller ellipsis), it must be structurally higher than the ellipsis site, e.g. a high vP adjunct. This analysis is undermined by T' ellipsis, however. T' can be elided, with too surviving, which would suggest too is higher than T', although T' ellipsis is less acceptable (and less common) than VPE. Stripping confuses the analysis even more, as its mechanism is more complex. The subject and verb are elided, but the object and too survive. There is focus-driven movement of the object from CompvP to a Focus head c-commanding TP, followed by TP deletion (Hunter & Yoshida 2016, Depiante 2000, Merchant 2005, Nakao 2009). Hence, too must be higher than TP in these examples, but whether it is motivated to move from a lower position, or is base-generated higher than TP is an issue beyond the scope of this analysis.

Although the place of TOO generally seems to be between v and T, this may not be a standard vP shell. The analysis in Belletti (2004) identifies clause-internal Focus and Topic positions, similar to the complex structure of the left periphery proposed by Rizzi (1997), and generally in line with a cartographic approach to syntax (Cinque & Rizzi 2012). This proposal ties into overall arguments concerning the inherent similarity between CP and vP, for example, that they are considered 'strong' phases by Chomsky (2001). Considering the evident relationship between TOO and focus, its existence in this 'low periphery' as a Focus projection is reasonable, and a more illuminating analysis than the vP-adjunct approach from Rullmann (2003).

3.4 Comparison to other additive particles

Literature rarely dissociates TOO from other additive particles, treating all additive particles as a homogeneous class, of which TOO is prototypical. For example, Goddard (1986) considers ALSO, AS WELL and TOO to all have the same 'relevant illocutionary comment', in meaning 'one more…the same' (Goddard 1986: 638). Similarly, Rullmann's (2003) definition of TOO explicitly states that it 'is meant to apply to other 'positive' additive particles as well, including ALSO, AS WELL…independent of linear order'.

This conflation is inaccurate; the very existence of multiple additive particles suggests they are different in some way. It is uncontroversial to state that (stressed) additive particles all have presuppositions of the type described in section 3.1.1, but specific aspects of their use and syntax vary. For example, ALSO is perfectly acceptable with standard negation, where TOO is impossible and AS WELL may be permitted, but is certainly less natural.

(38) Kate doesn't study engineering and

a. Ellie also doesn't.

b. *Ellie doesn't too.

c. ?Ellie doesn't as well.

There is also variation in word order. TOO and AS WELL seem to be obligatorily clause-final, whereas ALSO is more free, likely due to an underlying difference in structure. Rullmann (2003) considers the difference between TOO and ALSO to be purely syntactic; TOO is a right-branching vP adjunct, whereas ALSO is a left-branching vP adjunct, though he offers no explanation as to why.

(39) Dawn takes out the rubbish.

a. She does the dusting also/too/as well.

b. Also/*Too/*As well, she does the dusting.

c. She also/*too/*as well does the dusting.

ALSO does not obligatorily need a focus alternative antecedent, its presupposition is more flexible, and allows multiple contrastive elements.

(40) a. Amelia likes dancing, and also, Laura likes running.

b. #Amelia likes dancing, and Laura also likes running.

In (40a), ALSO has scope over the entire proposition, and hence is underlyingly likely a T or C level adjunct. In contrast, for (40b) ALSO is likely a vP-adjunct, similarly to TOO, but left rather than right-branching. The difference in felicity suggests that the scope of an additive interacts with the conditions for its felicitous use, particularly in presupposing a focus alternative (necessary for 40b but not for 40a).

Kaplan (1984) (citing Ellen F. Prince, p.c.) notes that another difference between TOO and ALSO is that 'only the latter can be used to say that what is predicated about the focused constituent of the first clause is also predicated about that of second clause' (Kaplan 1984: 511). (41a) is acceptable, meaning that Thomas had both salad and steak; this reading is not possible with TOO. Kaplan only notes this difference for TOO and ALSO, but AS WELL permits the same reading. Hence, the presuppositions of ALSO and AS WELL seem to differ from that of TOO in that they can be purely cumulative, without necessary contrast.

(41) a. Abbie had salad, and Thomas had steak also.

b. Abbie had salad, and Thomas had steak as well.

c. #Abbie had salad, and Thomas had steak too.

The default interpretation of the above sentences are not necessarily the cumulative versions; I would not infer that Thomas ate salad if I read (41a), but I find the reading more natural in (41b). The position (and hence underlying scope) of ALSO also appears to be a confounding factor. The cumulative reading is more natural for (42b) than (42a).

(42) a. Abbie had salad, and also, Thomas had steak.

b. Abbie had salad, and Thomas also had steak.

Another difference regards the focus-sensitive nature of TOO, which AS WELL and ALSO do not seem to need in the same way. Recall the Contrastive Topic Hypothesis from section 3.1.1:

(20) Contrastive Topic Hypothesis: The associated constituent of **stressed postposed** additive particles is the contrastive topic of the clause in which they occur. (Krifka 1998: 113)

The CTH applies to stressed, postposed additive particles, as emphasised by bold text. Hence, if the particle is not stressed (perhaps in the case of AS WELL) or preposed compared to the verb (as is often true of ALSO), the CTH does not hold. This could mean that these particles associate with a different element in the sentence, or that they do not associate. The lack of CTH could also explain the

felicity differences in (41); a lack of focus features would remove the necessity for a contrastive antecedent.

Note that theories concerning the obligatory nature of TOO do not (overtly) apply to other additive particles, despite their clear similarity. It is both possible and likely that the necessity of TOO in ellipsis contexts is actually a necessity for additive particles in general, with TOO simply being the most frequent and common option.

4 Methodology

4.1 Questionnaire Formulation

The previous sections have shown a range of factors conditioning the acceptability and necessity of TOO, particularly for ellipsis. A survey was formulated probing these factors and their impact on acceptability. There were multiple main factors; ellipsis type/presence, additive type/presence, and contrast. Within contrast, there was variation in both type and number of contrastive elements. Several factors are interactive; for example, contrastive objects are only possible for stripping, gapping, and pseudogapping, which do not elide objects.

The hypothesis that ellipsis needs TOO is only proposed for ellipsis constructions with 1 contrastive element, adhering to the Contrast Condition (15 in section 2.3). This is characteristic of VPE, T' ellipsis, stripping, and some NPE. Sluicing lacks contrast or focus and doesn't use TOO, so was omitted from experimental work. Gapping and psuedogapping usually have two contrastive elements and do not tend to use TOO. They can be modified to have a single contrastive element (with TOO), as in (43), but this is only grammatical for pseudogapping. Therefore, gapping was only used for the experimental condition with 2 contrastive elements.

(43) a. Emma likes syntax, and she does ~~like~~ psycholinguistics too.

b. *Emma likes syntax, and she ~~does like~~ psycholinguistics too.

c. *Emma likes syntax, and Susan ~~does like~~ syntax too.

The final survey had 56 test items. The main comparison was between ellipsis with/without TOO, hence these conditions had two items. All items adhered to the conditions for felicitous use of TOO, apart from when that condition was experimental. Broadly, the survey had four parts, to allow the four comparisons explained and exemplified below. These groupings are guidelines; the interaction between factors meant that many items informed more than one comparison.

i. The presence/absence of TOO in elliptical contexts ([±TOO]), investigating its obligatory nature.

ii. Non-elliptical sentences to compare with elliptical sentences ([±ELLIPSIS]), with and without TOO.

Code	Ellipsis type	Additive	Sentence
VTS(1)	VPE	[+TOO]	Mia studies psychology, and her best friend does too.
V0S(1)	VPE	[−TOO]	Anna goes running most days, and Steve does.
PTO(1)	Pseudogapping	[+TOO]	Monica wears blazers often, and she does pencil skirts, too.
P0O(1)	Pseudogapping	[−TOO]	Joe wears a lot of scarves, and he does hats.

Table 1 Sample sentences from the ellipsis ±TOO condition.

Code	Additive	Contrast	Sentence
OTS	[+TOO]	[+1]	Millie wants to be a teacher, and Anita wants to be a teacher too.
00S	[−TOO]	[+1]	Oliver enjoys doing jigsaw puzzles, and Liam enjoys doing jigsaw puzzles.
0TVO	[+TOO]	[+2]	Eddie cycles to the pub, and he drives to work, too.
00VO	[−TOO]	[+2]	Diane wears Louboutins to work, and she dislikes Doc Martens.

Table 2 Sample sentences from the ellipsis absence condition.

iii. Additive variation, ellipsis constructions using ALSO or AS WELL, to be compared with sentences using TOO, including both possible word orders for ALSO.

Code	Additive	Sentence
VAS(1)	ALSO (left)	Lily prefers tea to coffee, and her mother also does.
VAS(2)	ALSO (right)	Emily handwrites her notes, and her sister does also.
VWS	AS WELL	Isaac uses a Bluetooth mouse, and his brother does as well.

Table 3 VPE sentences from the additive variation condition.

iv. Contrastive elements ([±TOO]), sentences that varied in what the contrastive element was, and in the number of contrastive elements ([+1CONTRAST] or [+2CONTRAST]).

Code	Ellipsis	Additive	Contrast	Sentence
NTSo	NPE	[+TOO]	[+1]	Kyle read three books last month, and Maggie read four, too.
N0So	NPE	[−TOO]	[+1]	Tasha ate five doughnuts, and Callum ate three.
GTSO	Gapping	[+TOO]	[+2]	Shauna has a dog, and Polly, a cat, too.
G0SO	Gapping	[−TOO]	[+2]	Hugh plays the saxophone, and Giles, the cello.

Table 4 Sample sentences from the contrast variation condition.

Filler items were also included to obscure the purpose of the study, reducing participant bias. Fillers were taken from Sprouse & Almeida's (2017) paper *Design sensitivity and statistical power in acceptability judgment experiments*. The z-scores for each experimental item were averaged and ranked. Four classes of acceptability were then identified, with equal intervals between each; Strong Acceptable (highest average z-scores), Weak Acceptable, Weak Unacceptable, and Strong Unacceptable (lowest average z-scores). 10 items were included from each condition.

Code	Condition	Sentence
SU4	Strong Unacceptable	Who did that Mary was going out with bother you?
WU3	Weak Unacceptable	The dinosaur with terrible teeth's roar was monstrous.
WA5	Weak Acceptable	The glass fell just a short fall to the floor, but it broke anyway.
SA3	Strong Acceptable	John believes without a doubt that his team will win.

Table 5 Example filler sentences in each condition.

The first part of the survey collected demographic data, including age, gender, and linguistic background. There were also optional sections to collect general feedback and email addresses; the latter entered a participant into a lottery to win one of 3 £10 Amazon vouchers, funded by the Faculty of Modern and Medieval Languages and Linguistics at the University of Cambridge.

The survey was live from the 1st of May 2021 till the 14th of May. Participants were recruited through social media; WhatsApp, Facebook, Instagram, Twitter, and Reddit.[8] 267 responses were collected, of which 202 were complete and usable.

[8] https://www.reddit.com/r/SampleSize/, a subreddit dedicated to surveys in all forms.

4.2 Data Analysis

Judgements were normalised using z-scores, which correct for scale biases such as skew, expansion and compression. Z-scores for each item were calculated using the equation in (44), where x is the item judgement, μ is the participant's average judgement, and σ is the participant's standard deviation.

(44) $Z = \frac{x-\mu}{\sigma}$

The anonymous and widespread nature of participant recruitment had several impacts on the data. It allowed a large number of responses to be recorded in a comparatively small time, but it left the survey vulnerable to spam or bots, exacerbated by the possibility of financial gain. Multiple responses gave nonsensical answers to the text based questions or took the survey, estimated to take 10.7 minutes by Qualtrics, in under 3.5 minutes. Some answers also indicated people may not be native speakers, despite a compulsory disclaimer ensuring otherwise.

Outliers are often simply omitted. A fence of 2SD applied to my experimental items rendered 233 of them as outliers (2%). However, the fence approach does not account for the fact that certain *participants* should be discounted. The use of filler items with pre-established judgements allowed me to judge how trustworthy participants were, based on whether they judged these sentences as expected.

I applied a 'gold standard' approach, based on relative rankings of filler items. For each participant, I averaged[9] their z-scores for the ten items in each filler class. I then tested whether relative judgements mapped to expectations (45).

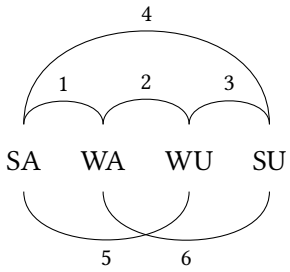
(45) $(\mu_{\text{SA}} > \mu_{\text{WA}}) \wedge (\mu_{\text{WA}} > \mu_{\text{WU}}) \wedge (\mu_{\text{WU}} > \mu_{\text{SU}})$

Of 202 participants, only 90 'gold standard' (GS) participants passed this test. There is an imbalance between the amount of data discounted under the GS approach (55%), and the amount discounted using fences (2-5%). Intuitively, this suggests that fences are too forgiving and GS too strict.

The binary nature of the test in (45) is too simplistic, and hence too strict. A more nuanced judgement of the relationship between expected and observed judgements can be obtained using correlation coefficients, which produce a variable score ($1 > x > -1$), rather than Boolean value, such as *Kendall's tau* (τ) (Kendall 1938), recommended for this data by Jon Sprouse (p.c.).

Kendall's τ is applied to ranked data, and produces a value showing how concordant/discordant a person's judgements are compared to expected rankings, with 1 showing perfect concordance (i.e. the GS participants). The ranking in (45) gives rise to 6 binary comparisons.

[9] Population mean, denoted by μ.



1 $\mu_{SA} > \mu_{WA}$
2 $\mu_{WA} > \mu_{WU}$
3 $\mu_{WU} > \mu_{SU}$
4 $\mu_{SA} > \mu_{SU}$
5 $\mu_{SA} > \mu_{WU}$
6 $\mu_{WA} > \mu_{SU}$

Figure 2 Kendall's τ comparisons.

The input for Kendall's τ is whether a participant's average scores met the criteria given on the right in Figure 2. Each participant was assigned a value for C (concordant comparisons) and D (discordant comparisons). Their τ value was then computed using (46) (Howell 2012).

(46) $\tau = \frac{C-D}{C+D} = \frac{C-D}{6}$

Participants for whom $\tau \leq 0$ were omitted, leaving 144 trustworthy participants and discounting 29% of the data. The amount of data lost is approximately halfway between the GS approach and the fence approach, suggesting a good compromise. Z-score averages were calculated using only participants who had a positive τ value; these are the scores referred to in section 5.

T-tests were run using these z-scores, to determine whether comparisons were statistically significant. These were two-tailed (a relationship in either direction may be significant) and based on unknown variance. T-tests produce a p-value; the standard in psychological research is a p-value of $\leq$0.05 to indicate significance, as this means there is a 95% likelihood that the results are not due to chance. Throughout the following sections, p-values $\leq$0.0001 (99.9%) are referenced as 'strongly significant', with values < 0.05 referred to as 'significant'.

5 Results

5.1 Ellipsis and 'too'

The major comparison to be made from the results of the study was between ellipsis structures with TOO, compared to those without any additive particle. There were 22 items that were [+1CONTRAST] and differed minimally between [±TOO]. T-tests comparing constructions within ellipsis types returned strongly significant p-values for all types except stripping, which had a p-value of 0.1; a non-significant improvement. For every kind of ellipsis except stripping, [+TOO] sentences were judged as significantly more acceptable than [−TOO] sentences, supporting the theory that the presence of TOO makes ellipsis constructions more acceptable.

There was variance in how strongly TOO improved acceptability. The largest difference was observed for VPE, an expected outcome given that work which considers TOO necessary for ellipsis tends to focus on VPE as a prototypical example of ellipsis.

Ellipsis type	Example sentence	[+TOO]	[−TOO]
VPE	Mia studies psychology, and her best friend does (too).	-0.023	-1.039
NPE	Molly plays four sports, and Jacob plays four (too).	-0.279	-0.602
Stripping	Jamie likes whiskey a lot, and red wine (too).	-0.163	-0.284
T'	Mary likes baking, and her sister (too).	-0.633	-1.246
Pseudogapping	Nellie watches a lot of sitcoms, and she does thrillers (too).	-1.000	-1.349
Object	Seth watches tennis every week, and he plays (too).	-0.083	-0.439

Table 6 Average z-score judgements and example sentences comparing ellipsis [±TOO].

TOO also strongly improved the acceptability of T' ellipsis (a difference of 0.61), but T' ellipsis was considered less acceptable than other ellipsis types, except pseudogapping. T' ellipsis and pseudogapping are less common types of ellipsis, so this likely reflects that they were perceived as marked, infrequent structures. The inclusion of TOO made a noticeable difference in improving the acceptability of both NPE and object ellipsis, though the [−TOO] items were far more acceptable than for VPE, T' ellipsis or pseudogapping. The relative acceptability of stripping, especially without TOO, is surprising. It may, however, be due to syntactic ambiguity, a possibility explored in section 6.1.4. Pseudogapping was judged as strongly unacceptable both with and without TOO, but TOO still improved acceptability (for [+1CONTRAST] items).

5.2 Ellipsis presence

The results in the previous section could be explained by TOO improving the acceptability of [+1CONTRAST] sentences, independently of ellipsis. Hence, one relevant comparison is between ellipsis sentences and fully pronounced counterparts. Comparisons were run for [+1CONTRAST] sentences separately to [+2CONTRAST] sentences; results are shown in Figures 4 and 5, respectively.

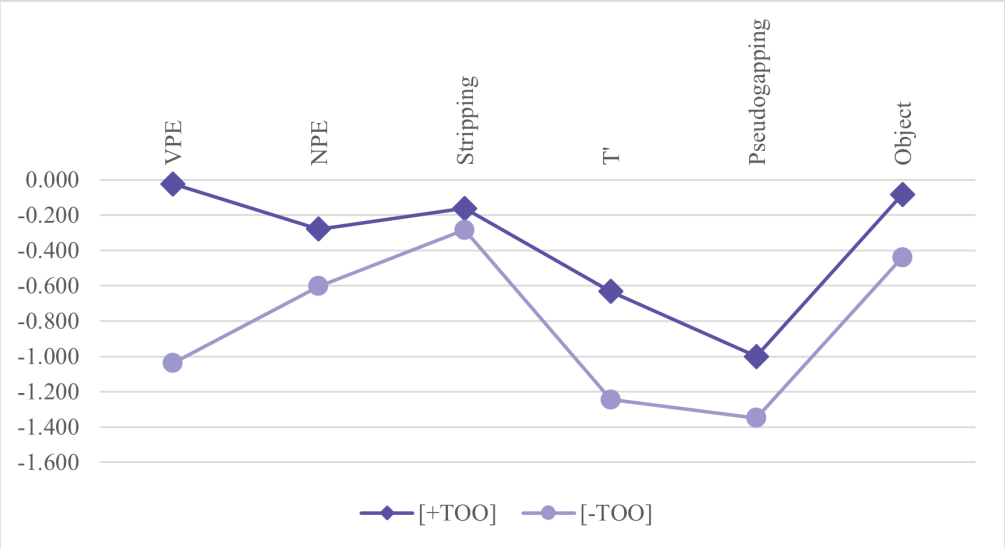


Figure 3 Average z-score judgements of ellipsis sentences [±TOO]

Ellipsis	Additive	Example sentence	Avg.
[+ELLIPSIS]	[+TOO]	Emma reads mostly non-fiction, and Anne does too.	-0.364
[+ELLIPSIS]	[−TOO]	Susan prefers noodles to rice, and her friends do.	-0.826
[−ELLIPSIS]	[+TOO]	Millie wants to be a teacher, and Anita wants to be a teacher too.	-0.081
[−ELLIPSIS]	[−TOO]	Oliver enjoys doing jigsaw puzzles, and Liam enjoys doing jigsaw puzzles.	-0.383

Table 7 Example sentences and average z-scores for [+ELLIPSIS] [+1CONTRAST] items.

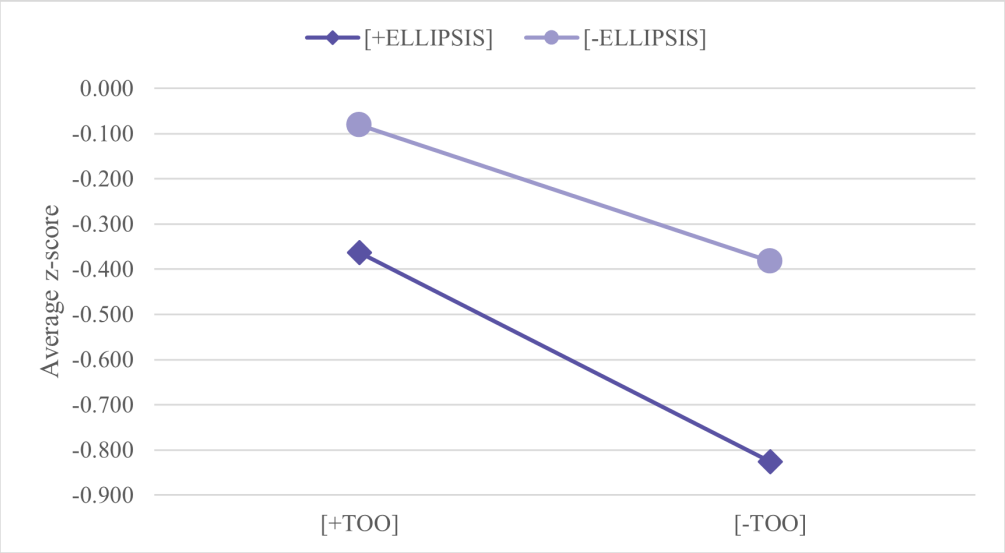


Figure 4 Comparisons for [+ellipsis] [+1contrast.] items.

When there is only one contrastive element, the inclusion of too improves acceptability, regardless of ellipsis. There were strongly significant p-values comparing [+ellipsis] items to [−ellipsis] items, in both conditions. Importantly, the data suggests that ellipsis is a relevant factor as the inclusion of too improves acceptability of [+ellipsis] constructions more than [−ellipsis] constructions, as can be seen by the slope of the lines in Figure 4.

Too was expected to decrease acceptability for [+2contrast] items. This result was true of both conditions.

Ellipsis	Additive	Example sentence	Avg.
[+ellipsis]	[+too]	Kyle read three books last month, and Maggie read four, too.	-0.779
[+ellipsis]	[−too]	Tasha ate five doughnuts, and Callum ate three.	-0.303
[−ellipsis]	[+too]	Eddie cycles to the pub, and he drives to work, too.	-0.818
[−ellipsis]	[−too]	Diane wears Louboutins to work, and she dislikes Doc Martens.	-0.027

Table 8 Example sentences and average z-scores for [+ellipsis] [+2contrast] items.

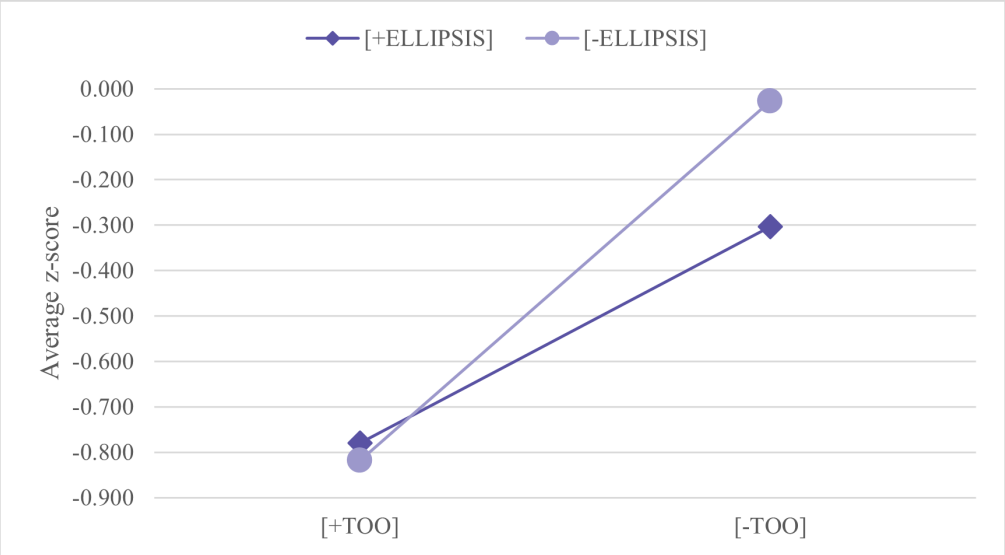


Figure 5 Comparisons for [+ELLIPSIS] [+2CONTRAST].

For both conditions, using TOO was judged as strongly unacceptable and omitting TOO improved acceptability. The slope of the no ellipsis condition is 0.79, whereas it is only 0.48 for ellipsis constructions. Both improvements were strongly significant, but the effect was stronger without ellipsis. These results suggest that the obligatory nature of TOO is not independent of ellipsis.

5.3 Additive type

Section 3.4 showed that TOO exhibits distinct behaviour from other additive particles. For each type of ellipsis, experimental items were included using TOO, AS WELL, and both preverbal and postverbal ALSO.

Code	Additive	Sentence
VTS(1)	TOO	Emma reads mostly non-fiction, and Anne does too.
VAS(L)	ALSO (left)	Lily prefers tea to coffee, and her mother also does.
VAS(R)	ALSO (right)	Emily handwrites her notes, and her sister does also.
VWS	AS WELL	Isaac uses a Bluetooth mouse, and his brother does as well.

Table 9 Example sentences (VPE) from the additive variation condition.

Ellipsis type	TOO	ALSO (L)	ALSO (R)	AS WELL
VPE	-0.023	-0.450	-0.434	-0.129
NPE	-0.279	-0.103	-0.331	-0.041
Stripping	-0.163	-0.140	-0.506	0.000
T'	-0.633	-1.096	-0.951	-0.853
Pseudogapping	-1.000	-0.977	-1.008	-1.075

Table 10 Average z-score judgements for the additive variation condition.

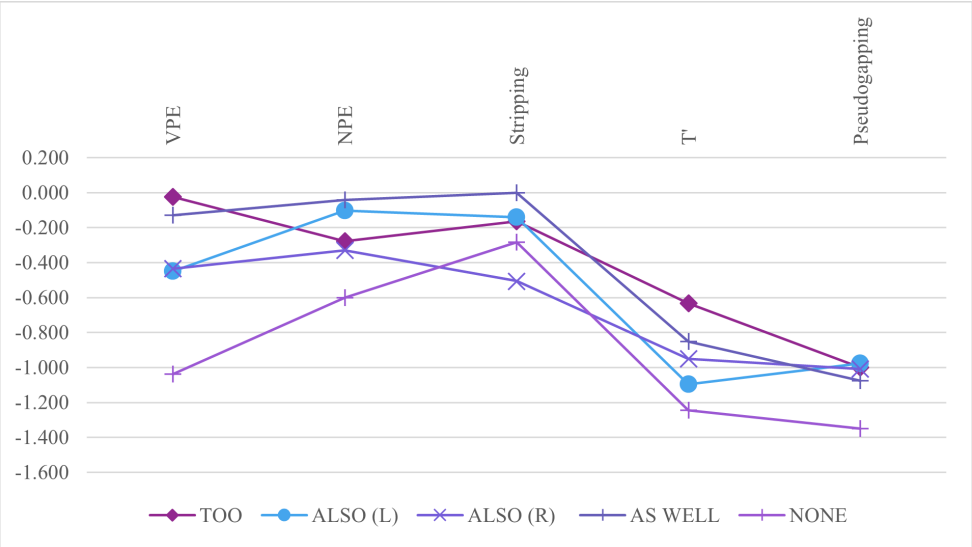


Figure 6 Additive type variation comparisons across ellipsis types.

Although there is variation in average judgements and in relative preference, the differences are less significant than other comparisons. Pseudogapping was judged as strongly unacceptable regardless of additive type, which is predictable considering it rarely naturally co-occurs with additives. The difference in order of preference for the other types of ellipsis is interesting, and somewhat unexpected. There are two distinct orders, one applying to NPE and stripping, one to VPE and T' ellipsis. This could suggest that there are two different underlying mechanisms concerning the necessity of additive particles, varying depending on the type of ellipsis.

(47) a. AS WELL > ALSO (L) > TOO > ALSO (R) *NPE, stripping*

b. TOO > AS WELL > ALSO (R) > ALSO (L) *VPE, T' ellipsis*

This may be due to a difference in scope; NPE and stripping target elements within vP, whereas VPE and T' ellipsis target higher constituents, an idea which

would require further research to be substantiated. ALSO can have wider scope, as it often applies to an entire clause (though this is unlikely when it is verb-adjacent), and doesn't necessarily have the same strict presupposition (see section 3.4). Given their scope, other additives are likely in a similar place to TOO; a high (focused) vP-adjunct. Their similarity in function and syntax provides little motivation for different places in the underlying structure.

For every additive, average judgements were higher than for the same ellipsis type with no additive at all, apart from right-branching ALSO for stripping. Other than T' ellipsis, left-branching ALSO was preferred to its right-branching counterpart, suggesting this is the more natural position for it. This was not a significant difference, however (p-value = 0.076). As argued by Rullmann (2003), the difference between TOO and ALSO may be as simple as whether they are a left or right-branching adjunct.

While TOO may be preferred, other additives clearly also improve acceptability. Perhaps ellipsis does not need TOO, but rather requires some kind of additive particle, with a preference for TOO for some ellipsis types. This does not undermine the necessity of TOO for ellipsis, but does suggest that other additive particles have similar effects.

6 Discussion

6.1 Types of ellipsis

6.1.1 VPE

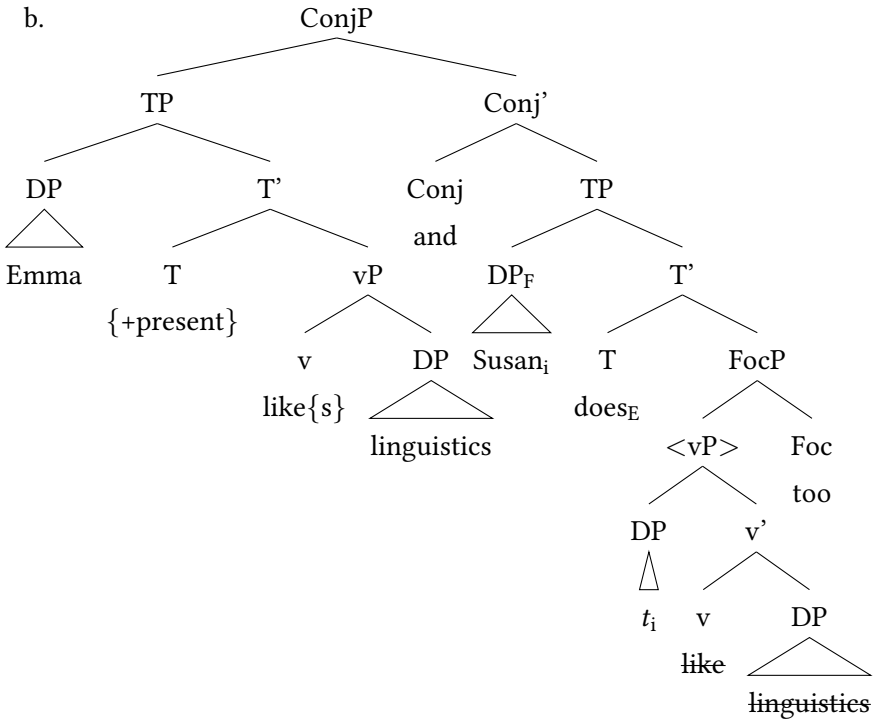
Including TOO in specific ellipsis contexts renders ungrammatical constructions grammatical. For VPE, the picture is simple. Given contrastive subjects, TOO significantly improves acceptability. No other form of ellipsis had such a significant difference. There was a noticeable preference for TOO over other additive particles, though AS WELL was only slightly less acceptable.

Assuming TOO is in a Focus projection analogous to a vP adjunct (motivated in section 3.3), the elided vP is the sister of the Focus head containing TOO. Including this projection, as well as adhering to VISH, the VPE example from section 2.2 (repeated below) would have the structure in (48b),[10] with focus features on the contrasted subject.

[10] Angle brackets denote the elided constituent.

(48) a. Emma likes linguistics, and Susan does too.

b.



The question still remains as to why TOO has this effect on VPE. In (48b), the focused subject DP 'Susan' c-commands the Focus head 'too'. One viable explanation for the necessity of TOO for VPE may be due to an Agree relationship between focus features in the Focus head (Probe) and the focused constituent, here DP in SpecTP (Goal). This is known as 'Upward' or 'Reverse' Agree, in contrast to the traditional Chomskyan account (Chomsky 2000) of downward Agree, where Probes c-command Goals. Upwards Agree is well attested and theoretically motivated, and is even preferred by some scholars (Zeijlstra 2012, Bjorkman & Zeijlstra 2014), but there is contentious debate concerning its comparison to downwards Agree (Preminger 2013). In minimalism, the innate language faculty is reduced to concepts of Merge and (feature-motivated) Agree, hence an account that is based on only these principles is intuitively desirable. The evidence in this thesis is not strong enough to explicitly support such a relationship, but may be enough to motivate further theoretical exploration of one.

As briefly mentioned in section 2.2, VPE can be grammatical without TOO if the conjunct AND has focus features.

(49) a. Emma likes linguistics, and [$_F$ Susan] does too.

b. *Emma likes linguistics, and [$_F$ Susan] does.

c. Emma likes linguistics, [$_F$ AND] Susan does.

This is in line with the Obligatory Implicatures approach introduced in section 3.2. According to OI, TOO is obligatory when its omission would lead to an incorrect

exhaustive implicature (Bade 2014). (49b) is ungrammatical because, since 'Susan' is focused, the omission of TOO creates the implicature that no one other than Susan likes linguistics, which contradicts the antecedent clause ('Emma likes linguistics').

However, in (49c), 'and' is focused, rather than 'Susan'. Hence the set of focus alternatives concerns the conjunction of two propositions. Therefore, the focus alternatives are conjuncts concerning a set of two people liking linguistics, and the exhaustive implicature is that there are no other sets of two people that like linguistics, which is an appropriate and compatible reading of (49c). The differences in grammaticality in (49) can be considered support for OI as an explanation for the often obligatory nature of TOO.

6.1.2 NPE

There is a strongly significant ($p < 0.0001$) improvement in the acceptability of [+1CONTRAST] NPE. These results can be contrasted to the [+2CONTRAST] NPE items from the contrast condition. As is expected given two contrastive elements, the inclusion of TOO degraded acceptability. However, there was also an anomaly in this condition.

Code	Sentence	Contrast	Avg.
NTS(1)	Charlie drank five beers last night, and Thomas drank five, too.	[+1CONTRAST]	-0.227
NTS(2)	Fred sent out twelve applications before getting a job, and Carlos sent out twelve, too.	[+1CONTRAST]	-0.331
N0S(1)	Molly plays four sports, and Jacob plays four.	[+1CONTRAST]	-0.718
N0S(2)	Linda bought five books, and her brother bought five.	[+1CONTRAST]	-0.486
NTSo(1)	Henry bought four new houseplants, and Cath bought one too.	[+2CONTRAST]	-0.021
NTSo(2)	Kyle read three books last month, and Maggie read four, too.	[+2CONTRAST]	-0.915
N0So	Tasha ate five doughnuts, and Callum ate three.	[+2CONTRAST]	0.171

Table 11 Average z-score judgements for NPE items.

Two sentences with contrasting numbers, contrasting subjects and TOO were included (NTSo). The NP in E for NTSo(1) was licensed by 'one', whereas in NTSo(2) it was licensed by 'four'; the latter is far less acceptable. This can be explained as a case of syntactic ambiguity. 'One' was intended as a Num head, but could

easily be interpreted as a case of one-replacement, which would prevent it from being contrastive to the preceding number ('four') and hence reduce the number of contrastive elements from 2 to 1. A similar effect can be achieved using an indefinite determiner, which ONE can also be interpreted as. One-replacement would give ONE the status of standing in for N' (Carnie 2013: 168), and indefinite determiners occur in D, neither of which are structurally parallel to Num, as well as being of different semantic types. The inclusion of the AdjP 'new houseplant' forces ONE to be a Num head, and hence is less acceptable than the version with ellipsis. These comparisons are illustrated below.

(50) Henry bought four new houseplants,

a. and Cath bought one too. *One-replacement*

b. ?and Cath bought one new houseplant too. *Number*

c. and Cath bought a new houseplant too. *Indefinite determiner*

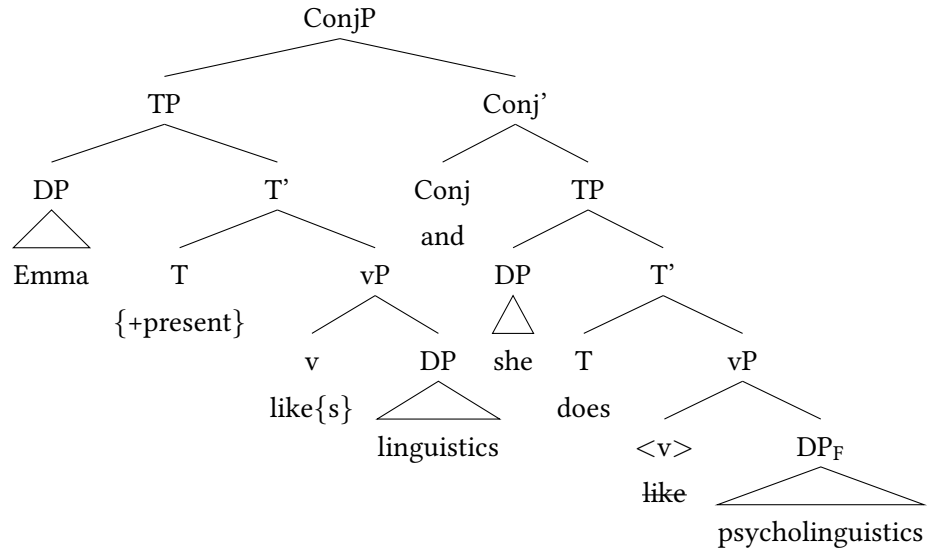
All additives were significantly more acceptable than their omission. AS WELL and ALSO (left-branching) were preferred to TOO or right-branching ALSO, but the differences were not generally significant. Comparing TOO to the other additive types returned p-values > 0.05 for both ALSO conditions, however there was a strongly significant preference compared to AS WELL. This may be due to the default interpretation of AS WELL being its cumulative reading, unlike the other particles (an idea discussed in section 3.4).

6.1.3 Gapping and pseudogapping

Gapping and pseudogapping are distinct but similar phenomena, in that both elide the verb, but pseudogapping retains tense features and employs *do*-support in T, whereas gapping employs affix-hopping to lower tense elements to v, which is elided. In both cases, the subject and object survive ellipsis, unlike the other kinds of ellipsis discussed in this thesis. An example of (coreferential) pseudogapping is given below.

(51) a. Emma$_i$ likes syntax, and she$_i$ does psycholinguistics (*too).

b.



Both necessitate contrastive objects, but pseudogapping allows coreferential subjects, which gapping does not. Considering the focus-sensitive nature of TOO, and the relationship between focus and contrast, having both subject and object contrast is expected to decrease acceptability if TOO is present. Table 12 shows averages across both gapping and pseudogapping examples, accounting for number of contrastive elements and TOO presence.

	[+1CONTRAST]	[+2CONTRAST]
[+TOO]	-1.000	-1.091
[−TOO]	-1.349	-0.540

Table 12 Average z-score judgements across gapping and pseudogapping items.

Whilst a second contrastive element degraded acceptability in the TOO condition, it is an unexpectedly small difference (0.091); this was not significant (p=0.3). In contrast, the omission of TOO was far more acceptable with two contrastive elements than one (a difference of 0.809), and was strongly significant.

This may be due to the markedness of pseudogapping in general, which most items in this condition were; since gapping does not allow coreferential subjects, it could only contribute to the [+2CONTRAST] condition. Gapping judgements mapped far more closely to expectations; [+TOO] gapping items were judged as far less acceptable (-1.13) than [−TOO] items (-0.62), a strongly significant difference. Despite being naturally occurring in many contexts, the pseudogapping sentences in the experiment were all judged as strongly unacceptable, both with and without TOO. The average judgement was -1.13, significantly lower than the average across all experimental items, which was -0.53. There was also less variation. While the Standard Deviation across all items was 0.45, for pseudogapping it was only

0.16, meaning participants were largely in agreement that these constructions were strongly unacceptable. This effect was maintained for other additive types, which were judged as strongly unacceptable, but more acceptable than no additive.

It is unclear why pseudogapping was judged so harshly. In her seminal work on the phenomena, (Levin 1979: 28) identifies three factors which condition the acceptability of pseudogapping, based on a pilot study of (non-linguist) native speakers; the items did not include TOO.

i. The order of the subject and auxiliary verb in the embedded clause, with a preference for Subject-Aux over Aux-Subject.

ii. Whether there is a comparative frame between A and E, for example if the conjunct is 'more than'; comparison improves acceptability.

iii. A preference for coreferential subjects in A and E.

TOO seems to be another factor that interacts with these. All experimental items in this condition had the same value for each of the above properties; Subject-Aux word order, no comparative frame, and the same subject for both A and E. Therefore, acceptability must also be conditioned by TOO in addition to these factors. The data also undermines the effect of these conditions. Specifically, Levin (1979) proposes a preference for coreferential subjects (only objects contrast), whereas my participants judged sentences with different subjects as more acceptable than those with the same subject (without TOO).

6.1.4 Stripping

Stripping is analogous to sluicing; the mechanism uses focus movement (where sluicing uses wh-movement) to front the object of a clause, followed by PF-deletion of TP (Depiante 2000, Hunter & Yoshida 2016, Merchant 2005, Nakao 2009). Hence, it elides everything in TP (except what is moved), including adjuncts, such as the phrase 'before noon' in (52).

(52) Smith$_i$ ate the stale bread before noon, and [$_{DP}$ the stale roll]$_j$ [$_{TP}$ ~~he$_i$ ate t_j before noon~~] too. (Johnson 2019: 567)

For stripping, additives must be higher than TP; this may be the reason that the right-branching ALSO condition was judged as less acceptable than stripping with no additive, as it was likely parsed as being c-commanded by the verb it follows, which would place it in TP, the ellipsis site.

Surface strings that show stripping and lack material between conjuncts can also be interpreted as having a complex, conjunctive object, as opposed to the conjunction having scope over both clauses. This ambiguity arises from 'and' being the conjunct used for both clausal conjunction (as with stripping) and for DP conjunction (as with complex objects).

(53) Amy studies nursing and sociology (too).

(53) is ambiguous in terms of whether the conjunction has scope over the clause (stripping) or joins two DPs (complex object). Without TOO, the stripping reading is very unnatural, and would require specific marked intonation. However, the stripping reading can be forced by including intervening material between conjuncts, separating their structures. The stripping items in the survey all split clauses using a comma, and had some kind of modifier phrase, such as the prepositional phrase 'at university' in (54a).

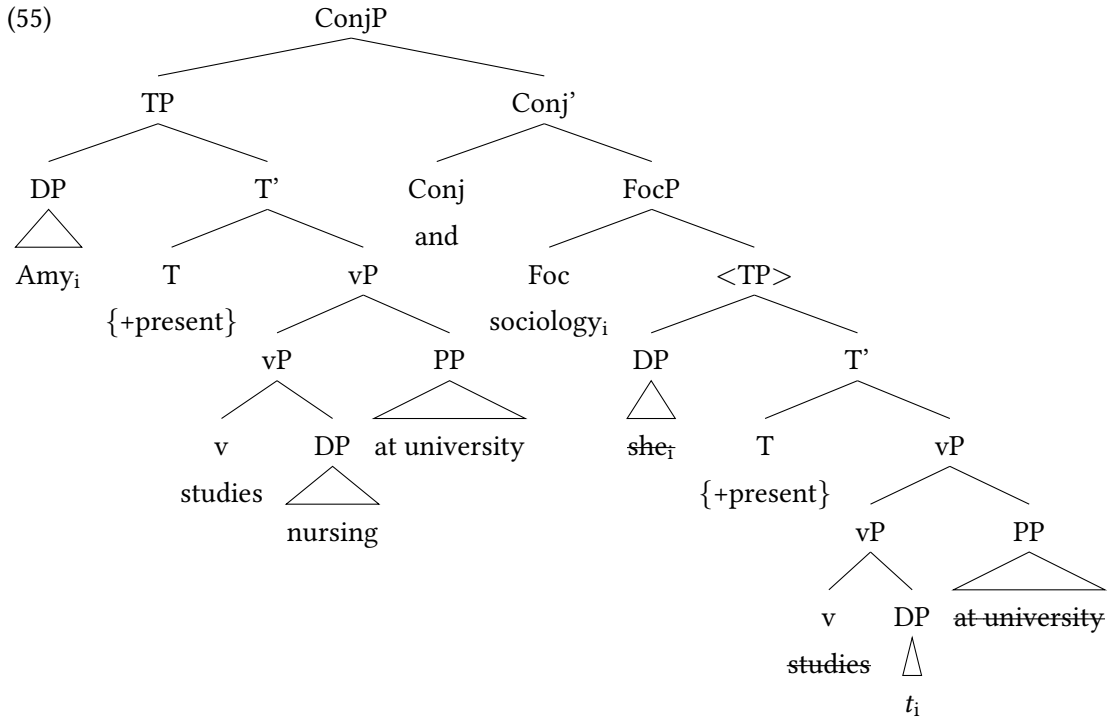
(54) a. Amy studies nursing at university, and sociology.

b. [$_{\text{ConjP}}$ [$_{\text{TP}}$ Amy$_{\text{i}}$ studies nursing at university,] [$_{\text{Conj'}}$ and [$_{\text{FocP}}$ sociology$_{\text{i}}$ [$_{\text{TP}}$ ~~she$_{\text{i}}$ studies t_{i} at university~~]]].

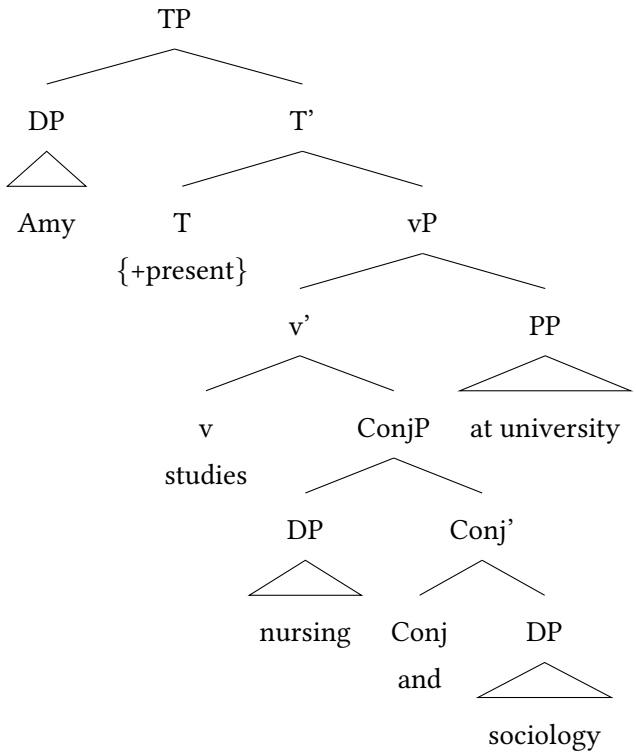
c. Amy studies [$_{\text{ConjP}}$ [$_{\text{DP}}$ nursing] and [$_{\text{DP}}$ sociology]] (at university).

Item S0O(1), given in (54a) has the underlying structure in (54b) and illustrated in (55). Without the adjunctive PP, the sentence could have the structure (54c), illustrated in (56). The phrase 'at university' modifies the vP, hence must have scope over it, and cannot be embedded within the DP (which would allow a complex object reading). If it occurs at the end of the clause (as in 54c), it could modify the entire ConjP, which would also allow a complex object reading. Despite being inaccurate, this type of reading may be the reason for stripping's relative acceptability without TOO, in that it was not parsed as stripping at all.

(55)



(56)



6.1.5 T' ellipsis

Like pseudogapping, T' ellipsis is an infrequent and marked structure, and had comparatively low judgements. There was a strongly significant preference for too over other additive particles for T' ellipsis, and a preference for any additive particle over none, but the average judgements across additive types were still very negative.

Code	Sentence	Avg. z-score
TTS(1)	Mary likes baking, and her sister too.	-0.615
TTS(2)	Lauren eats fish sometimes, and Amelia too.	-0.651
T0S(1)	James watches the football every week, and his housemate.	-1.158
T0S(2)	Zoe listens to music while cooking, and her boyfriend.	-1.333

Table 13 Average z-score judgements of T' ellipsis sentences.

T' ellipsis is susceptible to a similar issue as stripping without intervening material, namely competition between the desired ellipsis reading and a possible complex object reading. The three possible structures are shown below, using TTS(1).

(57) Mary likes baking, and her sister too.

a. [$_{\text{ConjP}}$ [$_{\text{TP}}$ Mary$_{\text{i}}$ [$_{\text{vP}}$ likes baking]] [$_{\text{Conj'}}$ and [$_{\text{TP}}$ her$_{\text{i}}$ sister [$_{\text{T'}}$ ~~likes baking~~]. *T' ellipsis*

b. Mary$_{\text{i}}$ likes [$_{\text{ConjP}}$ baking and her$_{\text{i}}$ sister]. *Complex object*

c. [$_{\text{ConjP}}$ [$_{\text{TP}}$ Mary$_{\text{i}}$ likes baking,] [$_{\text{Conj'}}$ and [$_{\text{FocP}}$ her sister$_{\text{i}}$ [$_{\text{TP}}$ ~~she$_{\text{i}}$ likes t_{i}~~]]]. *Stripping*

Too has been omitted from the structures above as it is not clear where it is in the derivation. Since T' is elided, it must be higher than this to escape deletion, so cannot be in the clause-internal focus position (as it is for VPE). The complex object reading is the default when too is omitted, and its inclusion seems to force the T' ellipsis reading. Other items in this condition were incompatible with a complex object reading due to semantic implausibility; for example, it is very unnatural to infer from TTS(2) that Lauren eats Amelia sometimes. The ambiguity issue largely, if not exclusively, pertains to TTS(1). It is unlikely that it was parsed differently to its counterpart TTS(2), as the average scores for both are similar; a t-test comparing these two items returned a p-value of 0.76, meaning the difference is likely due to chance. If TTS(1) were parsed with a complex object reading, it would likely be judged as far more acceptable than TTS(2).

6.2 Interaction and Explanation

6.2.1 Similarity

The data in section 5.2 showed that too is more necessary for ellipsis than for non-ellipsis constructions. The reason for this may be due to discourse similarity, an idea supported by empirical data. Winterstein & Zeevat (2012) note that discourse similarity appears higher (based on experimental evidence) for cases of anaphoric reduction, compared to cases of repeated material; in their words, there is a 'stronger mark of similarity' (Winterstein & Zeevat 2012: 10) for anaphoric reduction. A similar observation was made in Kaplan's seminal work on too, which states that when 'the semantically identical material occurs in full rather than in anaphorically reduced form, too is less obligatory' (Kaplan 1984: 512). An explanation for this is that repeated material allows ambiguity, whereas anaphoric reduction relies on an antecedent to provide meaning, hence must be coreferential with said antecedent.

(58) Emma likes linguistics,

a. and Emma likes psychology (too).

b. and she likes psychology (too).

c. and she hates biology #(too).

d. and she does psychology, too.

The sentences in (58a) and (58b) could have different referents compared to the matrix clause. This is more likely with (58a), assuming two entities named Emma are

available in the discourse (and likely distinguished in some way, such as gesturing). If both referents are the same, the latter should be pronominal, adhering to pragmatic notions such as the Maxim of Quantity (Grice 1967), or the Q-principle (Horn 1972); if a speaker knows the referents are the same, this should be indicated with pronoun usage. By not using a pronoun, (58a) creates the implicature that there are two distinct referents. (58b) is ambiguous; if 'she' is stressed, and context allows it, it could refer to someone other than Emma. If both clauses have the same referent, the felicitous utterance would either have to stress 'and', or include TOO, hence without either of these distinct referents are not only possible, but likely. (58c) could also have different referents, but this is not the default interpretation; the lack of discourse similarity between matrix and embedded clauses (which differ in argumentation orientation) mean TOO is not necessary, and its use would be infelicitous. (58d), which is an example of VPE, is the least likely option to have separate referents, particularly since TOO associates with 'psychology', meaning this is the single contrastive feature necessary for its felicitous use. There is an overall trend, both in these examples and in Winterstein & Zeevat (2012); the less material pronounced, the stronger the similarity between clauses, and hence the greater the necessity for TOO.

The results in section 5 also showed that, given multiple contrastive elements, TOO degraded acceptability more strongly for fully pronounced sentences than ellipsis constructions, which is also likely due to the underlying similarity necessary for ellipsis. A reduction in discourse similarity alleviates the need for TOO, and can also render its inclusion infelicitous when the difference is strong enough, as in (58c) and the control from Winterstein & Zeevat (2012). In ellipsis contexts, some kind of similarity must be maintained between A and E due to the ellipsis mechanism maintaining identity between ε and its antecedent, but non-ellipsis constructions are not subject to the same similarity constraint. Ellipsis constructions, even with two contrastive elements, have more similarity between clauses then their non-elided counterparts, meaning TOO is less acceptable in the latter due to a more complete lack of similarity.

This similarity is both semantic and syntactic. Section 2.3 explained that, at a deep level of structure (the derivation fed to LF), an ellipsis site and its antecedent must be identical, despite superficial mismatches. Hence, ε and its antecedent maintain perfect similarity, discourse or otherwise, without scope for ambiguity. The syntactic identity necessary for grammatical ellipsis under PF-deletion can therefore be considered the reason for the necessity of TOO for ellipsis, mediated via the concept of discourse similarity.

6.2.2 Contrast

Relying on discourse similarity to explain the relationship between TOO and ellipsis does not take into account contrast or focus, key concepts for both ellipsis and TOO. If syntactic identity is the reason for obligatory TOO in ellipsis contexts, it should be necessary in (59a), which instead is ungrammatical both with and without TOO.

In contrast, (59b) is grammatical (but tautologous), and must omit TOO, despite discourse similarity and perfect identity.

(59) a. *John$_i$ eats and he$_i$ does (too).
b. John$_i$ eats and he$_i$ eats (*too).
c. John$_i$ eats and Mark$_j$ does *(too).

The difference between (59a) and (59c) is contrast. The latter adheres to the first conjunct of the Contrast Condition, repeated below.

(60) For ε to be elided, ε must be inside a phrase E that has an antecedent A such that either:
a. $[\![A]\!] \in F(E)$ and $[\![A]\!] \neq [\![E]\!]$; or
b. $[\![A]\!] \subseteq F(E)$ (Stockwell 2020: 5)

This is equivalent to the necessary presupposition of TOO.

(61) For TOO to be felicitous, it must modify a proposition p which has an antecedent q such that:
a. $[\![q]\!] \in F(p) \wedge [\![p]\!] \neq [\![q]\!]$

The same condition can be derived by the application of Obligatory Implicatures. If TOO is omitted from a sentence with a focused constituent, the implicature given in (33) (section 3.2) arises. Hence, the inclusion of TOO gives rise to the non-negated version of this implicature (i.e. the presupposition of TOO, given in 62). This is equivalent to (61); both state that some version of proposition p is true and present in the context, and that this is distinct to the one uttered.

(62) $\exists p[p \in C \wedge p = 1 \wedge p \neq [\![q]\!]^0]$ (Bade 2014: 46)

Bade's formulation doesn't account for the focus-sensitive nature of TOO in defining the proposition, which can be summarised by the CTH, given in (20), and repeated below.

(63) The associated constituent of stressed postposed additive particles is the contrastive topic of the clause in which they occur. (Krifka 1998: 113)

The research in section 3 showed that TOO is only felicitous if its antecedent and host propositions have exactly one contrastive, focused element (x), the associate of TOO. Proposition p which includes TOO can be formally represented as $p(x_f)$, since it is x and no other part of p that alternates. Therefore the focus group of this proposition, normally represented as $[\![p]\!]^f$ can be written as $p([\![x]\!]^f)$. In other cases, more than one element of a sentence can have focus features and hence contrast to form focus alternatives (Krifka 1998), but this does not co-occur with TOO. (64a) captures this in formal notation.

(64) For too to be felicitous, it must modify a proposition p with associate x, which has an antecedent q with associate y such that:

a. $[\![p]\!] = p(x_f) \wedge q = p(y_f) \wedge y \in [\![x]\!]^f \wedge x \neq y \wedge \exists q(q \in C)$

The first conjunct, $[\![p]\!] = p(x_f)$, defines the ordinary semantic value of p as the proposition applying to its focused associate x. The proposition q is defined as the same proposition, but applying to focused associate y, which must be in the focus group of x, denoted as $[\![x]\!]^f$, making x and y alternatives.[11] To be proper alternatives, they cannot be the same, hence $x \neq y$. Finally, the proposition q exists, and is in the context C.

The same condition applies to ellipsis, at least of the type analysed by Stockwell (2020), whose Contrast Condition can be reformulated as below.[12]

(65) For ellipsis of ε to be grammatical, it must be contained in phrase E, with contrastive element x that contrasts to antecedent A (with contrastive element y) such that:

a. $[\![E]\!] = p(x_f) \wedge A = p(y) \wedge A \in [\![E]\!]^f \wedge x \neq y \wedge \exists A(A \in C)$

Considering the similarity between the presupposition of too, and the Contrast Condition on ellipsis, it is plausible that the two can be reduced to a single constraint, deriving from principles of Alternative Semantics and focus interpretation. For example, Kaplan (1984) assumes that the presupposition of too is lexically embedded. An analogous presupposition may be embedded in the E feature necessary for ellipsis (Merchant 2001), which would give a syntactic explanation for the ungrammaticality of ellipsis constructions that lack linguistic antecedents. If there is no proper alternative present in the preceding discourse, a head could not take the E feature, hence PF-deletion would not be triggered, just as how the use of too would be infelicitous. If both the Contrast Condition and the felicitous use of too rely on the same mechanism for focus, the reliance of ellipsis on too is a natural outcome of this mechanism, and not its own phenomena in need of explanation.

7 Conclusions and Future Directions

The interaction of too and ellipsis is complex and multifaceted, with multiple factors affecting the relationship. The general necessity of too is well attested, and can be largely explained by the theory of Obligatory Implicatures (Bade 2014), but this theory makes no special mention of ellipsis. The data in this thesis showed that ellipsis is a significant variable in determining how obligatory too is, which requires explanation beyond the general OI theory.

There is tension between contrast and similarity inherent to both. Underlying similarity is necessary for grammatical ellipsis, due to syntactic identity between ε and its antecedent. Since too is more obligatory for constructions with stronger similarity, this may be the reason it is more necessary for ellipsis constructions than

[11] $F(x)$ and $[\![x]\!]^f$ are equivalent, both denote the focus group of x.
[12] The exception to this is if A denotes a set.

non-ellipsis constructions. This cannot be the only factor conditioning the necessity of TOO in ellipsis contexts, as it would also permit tautologous ellipsis which is ungrammatical as it does not adhere to the Contrast Condition (Stockwell 2020).

The necessity of TOO varies across varieties of ellipsis, with the key factor in improving acceptability being whether they adhere to the first conjunct of the Contrast Condition on ellipsis (Stockwell 2020), being proper alternatives which have exactly one contrastive, focused feature. This condition is very similar to the presupposition of TOO, which is essentially also a proper alternative with one contrastive element. If exactly one contrastive element is not present TOO degrades acceptability.

Focused constituents also impact acceptability; TOO is more necessary for contrastive subjects than objects, and hence may have some element of stronger focus. This is in line with Kaplan (1984) who proposes that the variable necessity of TOO is a result of the prominence of its associate; more prominent (i.e. focused) constituents need TOO more strongly. However, Kaplan's account does not predict acceptability differences between contrastive elements when these elements are the verb and its arguments (i.e. vP-internal elements), despite such differences arising in the data concerning both ellipsis and non-ellipsis constructions. This may be due to the specific presuppositional nature of TOO; where the contrastive elements do not invoke a proper alternative, TOO is infelicitous, and this may extend to adjuncts due to their optional nature. One avenue for further research concerns the relationship between types of contrastive elements, and whether they necessitate TOO.

Previous literature has also failed to account for differences between additive particles, largely conflating TOO, ALSO, and AS WELL, despite the fact they behave differently. In particular, ALSO is far more free in terms of word order and scope. Although all three particles tested (including two placements for ALSO) improved acceptability of ellipsis constructions, there were two order preferences. This may be due to an underlying interaction between additive particle scope, and the size of the ellipsis site, but further research is necessary before any conclusions can be drawn.

It is possible that both the ellipsis mechanism (adhering to the Contrast Condition) and the presupposition of TOO are products of the same embedded focus mechanism, such as the formulation in section 6.2.2. The simplicity of this mechanism makes it an intuitively desirable option, in line with the simplicity emphasised throughout minimalist theory. If there is a single underlying mechanism, grounded in more general principles of focus, then reliance and interaction between TOO and ellipsis is merely an expected outcome of this mechanism, and not a distinct phenomena in need of explanation.

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Appendices

Experimental items

The first character in the code for each item refers to ellipsis type and presence, the second to additive type/presence, and the third/fourth to contrastive elements. Where items don't differ according to these factors, they are labelled (1) or (2) to differentiate them. A key is provided.

Character 1 (ellipsis)		Character 2 (additive)		Character 3 (and 4) (contrast)	
Code	Ellipsis type	Code	Additive	Code	Contrastive element(s)
V	VPE	T	TOO	S	Subject
N	NP ellipsis	A	ALSO	V	Verb
S	Stripping	W	AS WELL	O	Object
T	T' ellipsis	0	None	o	Other (e.g. number)
P	Pseudogapping				
O	Object ellipsis				
G	Gapping				
0	None				

Table 14 Key for experimental item codes.

Code	Sentence
VTS(1)	Mia studies psychology, and her best friend does too.
VTS(2)	Emma reads mostly non-fiction, and Anne does too.
V0S(1)	Anna goes running most days, and Steve does.
V0S(2)	Susan prefers noodles to rice, and her friends do.
NTS(1)	Charlie drank five beers last night, and Thomas drank five, too.
NTS(2)	Fred sent out twelve applications before getting a job, and Carlos sent out twelve, too.
N0S(1)	Molly plays four sports, and Jacob plays four.
N0S(2)	Linda bought five books, and her brother bought five.
STO(1)	Jamie likes whiskey a lot, and red wine too.
STO(2)	Sam goes to the gym regularly, and the climbing wall too.
S0O(1)	Amy studies nursing at university, and sociology.
S0O(2)	Leah takes the bus to the gym, and to the pool.
TTS(1)	Mary likes baking, and her sister too.
TTS(2)	Lauren eats fish sometimes, and Amelia too.
T0S(1)	James watches the football every week, and his housemate.
T0S(2)	Zoe listens to music while cooking, and her boyfriend.
PTO(1)	Monica wears blazers often, and she does pencil skirts, too.
PTO(2)	Nellie watches a lot of sitcoms, and she does thrillers, too.
P0O(1)	Joe wears a lot of scarfs, and he does hats.

Code	Sentence
P0O(2)	Andy eats a banana every day, and he does an apple.
0TS	Millie wants to be a teacher, and Anita wants to be a teacher too.
00S	Oliver enjoys doing jigsaw puzzles, and Liam enjoys doing jigsaw puzzles.
0TV	Charlotte reads a lot of horror stories, and she writes a lot of horror stories, too.
00V	Hazel buys second hand clothes, and she sells second hand clothes.
0TO	Ethan plays the trombone, and he plays the violin, too.
00O	Ivy runs marathons, and she runs the 100m too.
0TSV	Gloria eats a lot of fresh fruit, and Sonia buys a lot of fresh fruit, too.
00SV	Sebastian owns a house in town, and Leo rents a house in town.
0TVO	Eddie cycles to the pub, and he drives to work, too.
00VO	Diane wears Louboutins to work,
0TSO	Zack drinks a lot of smoothies, and his brother drinks a lot of vodka, too.
00SO	Phoebe always bets on red, and her boyfriend always bets on black.
VAS	Lily prefers tea to coffee, and her mother also does.
VAS	Emily handwrites her notes, and her sister does also.
VWS	Isaac uses a Bluetooth mouse, and his brother does as well.
NAS	Lydia has two cats, and Jack also has two.
NAS	Kieran owns three pans, and his roomate owns three also.
NWS	Eliot bought two bottles of wine for the table, and Jenny bought two as well.
SAO	Toby built his computer, and also his bike.
SAO	Mark goes to the office on Mondays, and Thursdays also.
SWO	Connor plays games on his Xbox, and on his PC as well.
TAS	Fatima goes to school every day, and also her sister.
TAS	Maeve dyed her hair when she was sixteen, and her sister also.
TWS	Connie owned rabbits as a child, and her daughter as well.
PAO	Luke loves watching rugby, and he also does football.
PAO	May listens to pop music, and she does rock also.
PWO	Richard adopted a dog, and he did a cat as well.
OTV	Seth watches tennis every week, and he plays, too.

Code	Sentence
O0V	Lucy owns a piano, and she plays.
PTSO	Maxine drinks martinis, and Rhianne does daiquiris too.
P0SO	Bella eats fruit for breakfast, and Josie does cereal.
NTSo	Henry bought four new houseplants, and Cath bought one too.
NTSo	Kyle read three books last month, and Maggie read four, too.
N0So	Tasha ate five doughnuts, and Callum ate three.
GTSO	Shauna has a dog, and Polly, a cat, too.
G0SO	Hugh plays the saxophone, and Giles, the cello.

Filler items

Filler items belonged to one of four categories, denoted by their code: Strong Acceptable (SA), Weak Acceptable (WA), Weak Unacceptable (WU), and Strong Unacceptable (SU). Averages given below refer to average judgements (across z-scores) for each item from *Design sensitivity and statistical power in acceptability judgment experiments*, Sprouse & Almeida (2017).

Code	Sentence	Avg.
SA10	Peter accurately counted the money.	1.413
SA9	Daniel jogged to the gym and Kayla walked to the restaurant.	1.365
SA8	Amanda hinted to Jack that there will be a pop quiz on Monday.	1.360
SA7	Sarah counted the change accurately.	1.359
SA6	Stop bullying me! shouted the overweight child fearfully.	1.353
SA5	Beth hitchhiked to Los Angeles and Robert drove to San Diego.	1.305
SA4	The ice quickly melted on the table.	1.296
SA3	John believes without a doubt that his team will win.	1.290
SA2	Shannon walked to school and Corey biked to practice.	1.278
SA1	The laptop with the silver case and the ipod with the pink earbuds are in your suitcase.	1.267
WA10	What the police believe is that they will catch the thief.	0.373
WA9	The farmers were arguing when across the sky flew an alien spacecraft.	0.368
WA8	There might appear to be leaves in the yard.	0.367
WA7	Stanley watched as the ball bounced a funny little bounce right into the shortstop's glove.	0.365

Code	Sentence	Avg.
WA6	They all have listened and they have all done so intently.	0.365
WA5	The glass fell just a short fall to the floor, but it broke anyway.	0.363
WA4	Mary raucously laughed.	0.354
WA3	This is the girl who I think will babysit your child next Thursday.	0.351
WA2	The politicians said that we should use less gas, but the actual doing of it has proved very challenging.	0.341
WA1	Robert yelled at a boy as obnoxious as his cousin.	0.338
WU10	How likely to be a stock market crash is there?	-0.332
WU9	John flattered Mary while insulting himself.	-0.334
WU8	Natalie surprised Jared while boring herself.	-0.336
WU7	Blake said that he would beard his tormentor before the night was up, but the actual doing of it proved rather difficult.	-0.336
WU6	Jessica shouted at a girl as nervous as her daughter.	-0.339
WU5	Max may have been studying, but Jason may have done so too.	-0.339
WU4	Brandon said he requested one of the tutors, but I don't which tutor.	-0.340
WU3	The dinosaur with terrible teeth's roar was monstrous.	-0.343
WU2	I received a gift two weeks ago like the gift that Aaron did.	-0.344
WU1	That the principal would fire Euclid was expected by the reporters?	-0.348
SU10	When these books they started to arrange an hour ago, I thought they would tidy the rest of the room.	-1.369
SU9	What was that the computer needed explained by the technician?	-1.371
SU8	There has been considered a man violent.	-1.386
SU7	There has been considered a suspect guilty.	-1.395
SU6	Who was that the principal would fire expected by the reporters?	-1.412
SU5	There might leaves appear to be in the yard.	-1.459
SU4	Who did that Mary was going out with bother you?	-1.494
SU3	There might life seem to be on other planets.	-1.503
SU2	There might discounts seem to be at Best Buy.	-1.616
SU1	There might fossils seem to be several miles underground.	-1.631

Averages

Averages are of z-scores, not raw judgements. The full set of data, including demographic information, raw judgements, τ values, and t-tests, is available upon request.

Item	Average	Gold Standard	No Outliers	No Outlier Participants	Kendall's τ
VTS(1)	-0.120	0.410	-0.039	-0.062	0.114
VTS(2)	-0.340	-0.100	-0.272	-0.321	-0.160
V0S(1)	-1.040	-1.360	-1.042	-1.053	-1.044
V0S(2)	-0.940	-1.280	-0.943	-0.978	-1.034
NTS(1)	-0.360	-0.140	-0.223	-0.330	-0.227
NTS(2)	-0.420	-0.170	-0.305	-0.388	-0.331
N0S(1)	-0.750	-0.810	-0.755	-0.706	-0.718
N0S(2)	-0.560	-0.490	-0.559	-0.585	-0.486
STO(1)	-0.190	0.250	-0.123	-0.141	0.005
STO(2)	-0.500	-0.290	-0.497	-0.468	-0.331
S0O(1)	-0.590	-0.570	-0.593	-0.580	-0.491
S0O(2)	-0.280	0.140	-0.192	-0.246	-0.078
TTS(1)	-0.670	-0.760	-0.666	-0.664	-0.615
TTS(2)	-0.700	-0.740	-0.703	-0.689	-0.651
T0S(1)	-1.030	-1.650	-1.031	-1.078	-1.158
T0S(2)	-1.120	-1.820	-1.123	-1.199	-1.333
PTO(1)	-1.000	-1.300	-0.998	-1.040	-1.039
PTO(2)	-0.890	-1.100	-0.891	-0.881	-0.961
P0O(1)	-1.160	-1.720	-1.164	-1.203	-1.287
P0O(2)	-1.220	-1.820	-1.223	-1.300	-1.411
0TS	-0.220	0.110	-0.153	-0.171	-0.047
00S	-0.700	-0.760	-0.703	-0.702	-0.636
0TV	-0.290	0.080	-0.197	-0.238	-0.140
00V	-0.470	-0.310	-0.318	-0.434	-0.367
0TO	-0.240	0.170	-0.143	-0.175	-0.057
00O	-0.320	0.040	-0.199	-0.292	-0.145
0TSV	-0.760	-0.670	-0.762	-0.731	-0.687
00SV	-0.320	0.050	-0.224	-0.279	-0.129
0TVO	-0.830	-0.960	-0.828	-0.844	-0.806
00VO	-0.320	-0.020	-0.224	-0.271	-0.160
0TSO	-0.880	-1.230	-0.880	-0.915	-0.961
00SO	-0.080	0.500	0.003	-0.008	0.207

Item	Average	Gold Standard	No Outliers	No Outlier Participants	Kendall's τ
VAS(L)	-0.550	-0.450	-0.552	-0.555	-0.450
VAS(R)	-0.550	-0.390	-0.552	-0.497	-0.434
VWS	-0.320	0.090	-0.221	-0.305	-0.129
NAS(L)	-0.310	0.060	-0.216	-0.292	-0.103
NAS(R)	-0.460	-0.390	-0.334	-0.438	-0.331
NWS	-0.300	0.170	-0.198	-0.250	-0.041
SAO(L)	-0.340	0.020	-0.181	-0.317	-0.140
SAO(R)	-0.630	-0.530	-0.626	-0.606	-0.506
SWO	-0.210	0.250	-0.108	-0.171	0.000
TAS(L)	-0.990	-1.440	-0.990	-1.019	-1.096
TAS(R)	-0.870	-1.150	-0.865	-0.869	-0.951
TWS	-0.820	-1.090	-0.821	-0.869	-0.853
PAO(L)	-0.930	-1.290	-0.931	-0.961	-0.977
PAO(R)	-0.920	-1.390	-0.920	-0.990	-1.008
PWO	-1.000	-1.450	-1.001	-1.057	-1.075
OTV	-0.290	0.160	-0.186	-0.221	-0.083
O0V	-0.540	-0.430	-0.541	-0.509	-0.439
PTSO	-1.000	-1.490	-0.998	-1.045	-1.054
P0SO	-0.950	-1.420	-0.954	-1.024	-1.018
NTSo(1)	-0.240	0.210	-0.136	-0.208	-0.021
NTSo(2)	-0.850	-1.100	-0.850	-0.873	-0.915
N0So	-0.100	0.480	-0.032	-0.024	0.171
GTSO	-1.050	-1.380	-1.049	-1.036	-1.127
G0SO	-0.280	0.140	-0.163	-0.225	-0.062

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