Constituency in Deletion and Movement
Remarks on Lechner (2001)

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July 24th 2002

I have argued that the assumption of incremental left-to-right syntactic structure-building can explain a number of otherwise puzzling contrasts in the results of syntactic constituency tests, such as coordination, binding, movement and deletion (Phillips, 1996, 2003). Briefly, non-root merger in a left-to-right derivation leads to systematic changes in constituency over the course of the derivation. Since different syntactic tests apply at different stages in the derivation – due to their linear order properties – they see different 'snapshots' of the constituent structure of the sentence. This derivational perspective can explain why different structural tests yield apparently conflicting results, and can also predict which constituents each individual structural test should be able to access.

Although the assumption of left-to-right structure building may appear radical from the perspective of much work in syntactic theory, when viewed from a broader perspective on the cognitive science of language, it is far from radical. We know for certain that speakers of a language possess a mechanism for incrementally structuring and interpreting sentences – this is what you are using to understand this sentence. My claim is simply that this same mechanism can help us to understand many otherwise mysterious grammatical phenomena. On the other hand, the assumption that there is a separate, time-independent system of mental computation that underlies grammatical knowledge is much more controversial, and receives much less independent motivation. In the end, though, it is an empirical question what kinds of structure building systems our mind contains.

One of the constituency puzzles that I have analyzed in terms of incremental structure building is a contrast between the scope and connectivity possibilities in VP-fronting and VP-ellipsis. When a partial VP is fronted stranding an adverbial PP, the stranded PP behaves syntactically as if it is deeply embedded inside the fronted portion of VP, as shown by the fact that material in the fronted portion of VP can bind and take wide scope with respect to stranded material (1). As pointed out by Pesetsky (1995), this gives rise to an apparent paradox for the structure of VP. The constituent structure required to front part of VP while stranding a PP corresponds to a traditional left-branching VP-structure. On the other hand, the constituent structure required to account for the binding and scope phenomena is more likely the kind of right-branching 'VP-shell' structure proposed by Larson (1988) and others.

(1)　a.　John said he would give books to them,
　　　　　　... and give books to them he did [on each other's birthdays].
　　　b.　Mary said she would congratulate every boy,
　　　　　　... and congratulate every boy she did [at his graduation].

    c.   John said he would read every book,
          ... and read every book he did [at breakneck speed].

                               (collective and distributive scope readings)

VP-ellipsis presents a striking contrast with VP-fronting. It is possible to delete partial VPs, stranding adverbial PPs. However, this systematically blocks the same binding and scope properties that were shown to possible in the case of VP-fronting. Anaphors and bound variable pronouns inside the stranded portion of VP cannot be licensed by material inside the deleted portion of VP (2). Similarly, there is a loss of scope possibilities. Whereas (3a) is ambiguous between a collective and a distributive reading, (3b) allows only the collective reading.

(2)   a. * John gave books to them$_i$ on each other$_i$'s birthdays,
            and Mary did [on each other$_i$'s first day of school].
    b. * Mary congratulated every boy$_i$ at his$_i$ graduation,
            and Sue did [at his$_i$ 21st birthday party].

(3)   a.   Mary read all the books quickly.   (collective and distributive scope readings)
    b.   Mary read all the books quickly, and John did slowly. (collective reading only)

I have argued that this contrast between VP-fronting and VP-ellipsis can be understood as an automatic consequence of incremental structure building. In VP-fronting, the stranded adverbial appears to the right of both links of the movement chain, hence the movement occurs *before* the stranded adverbial is added, at which point the fronted portion of VP is a constituent in its own right. Hence, no constituency conflict arises in the case of VP-fronting. In VP-ellipsis, on the other hand, the constituency required for stranding and the constituency required for ellipsis stand in direct conflict, since the ellipsis site in the second clause must be licensed by a constituent of VP in the antecedent clause. The stranded adverbial must have a corresponding phrase in the antecedent clause, with which it contrasts. I assume that these two adverbials must be structurally parallel. If the adverbial in the antecedent clause appears low in a right-branching VP-structure, then it destroys the constituency required for partial VP-ellipsis in the second clause. If, on the other hand, the adverbial in the antecedent clause is adjoined high in the VP, it preserves the constituency required for partial VP-ellipsis in the second clause, but fails to license the right-branching structure required license anaphors and bound variables in the stranded adverbial, or to license distributive scope readings. For more detailed discussion see Phillips 1996, 2003; for PowerPoint slides that show the step-by-step unfolding of the relevant derivations, visit www.ling.umd.edu/colin.

Note that the contrast between VP-ellipsis and VP-fronting is just one of a number of constituency contrasts that can be accounted for by assuming left-to-right structure building.

In this context, Lechner (2001ab) discusses the contrast between VP-ellipsis and VP-fronting, and presents a number of criticisms of the incremental structure building analysis and an alternative account of the contrast, based on construction-specific

differences between VP-fronting and VP-ellipsis. In what follows, I review Lechner's criticisms and his proposal, and comment on the extent to which they improve upon the incremental structure building analysis.

Connectivity Effects in the Antecedent Clause

Lechner's first criticism is based on an empirical problem involving the clauses that serve as antecedents for ellipsis. Although the clause targeted by VP-ellipsis shows a loss of connectivity effects (i.e. left-to-right binding) between the deleted material and stranded adverbials, as shown in (2-3) above, the clause that is the antecedent of VP-ellipsis does not, as shown by examples like (4-6), which show the effects in the antecedent clause of Condition A, Condition C and bound variable anaphora, respectively.

(4)   John gave books to them$_i$ on each other$_i$'s birthdays, and Mary did on their first day of school.

(5)   * John gave the books to her$_i$ on Mary$_i$'s birthday, and Jill did at Christmas.

(6)   Mary congratulated every boy$_i$ at his$_i$ graduation, and Sue did at her 21st birthday party.

Lechner correctly points out that the behavior of the antecedent clause does not follow from the incrementality-based account, given the assumption that the structural position of the stranded material is parallel across the ellipsis clause and its antecedent. Binding is predicted to fail in the antecedent clause just like in the clause targeted by ellipsis.

In order to account for the contrast between the antecedent clause and the ellipsis clause, Lechner assumes that the stranded material and its correspondent occupy different positions in the two clauses. The stranded material in the ellipsis clause occupies a high VP-adjoined position, accounting for the absence of left-to-right scope and binding effects; the correspondent in the antecedent clause occupies a low position in a right-branching VP-structure, accounting for the presence of left-to-right binding effects. This is possible, according to Lechner, because the low-attached correspondent may be ignored for computation of parallelism requirements in VP-ellipsis.

It is important to note two things about the contrast between the ellipsis clause and the antecedent clause, neither of which appears to follow from Lechner's account.

First, the contrast between the antecedent clause and the ellipsis clause is specific to binding phenomena, and does not hold for scope phenomena, where the two clauses show clear parallelism, as can be seen in examples like (3b) above.

Second, the contrast between binding and scope in the antecedent clause is not restricted to VP-ellipsis. It is also found in the antecedent clause for VP-fronting. When the fronted portion of VP corresponds to a *subpart* of an antecedent VP, scope possibilities in the

antecedent clause are restricted (7: Phillips 2003: ex. 97), but binding possibilities are not affected in the same way (8).

(7)   John wanted to read all the books in less than a week, and read all the books he did, but in way more than a week. [collective reading only]

(8)   John wanted to congratulate every boy$_i$ at his$_i$ graduation, and congratulate every boy he did, but not until shortly before Christmas.

Thus, the correct analysis of the properties of the antecedent clause must distinguish scope and binding, and must not rely upon construction-specific properties of VP-ellipsis. In this respect, Lechner's alternative appears to both under-generate and over-generate, since it focuses on general structural properties of the antecedent clause in VP-ellipsis.

It is possible in this instance that Lechner's analysis could be fine-tuned so as to include VP-fronting antecedents and to exclude scope effects, although this remains to be determined.

In the incremental structure building approach, a possible approach to this problem is to assume that retroactive adjustment of the structure of the first conjunct to accommodate ellipsis and fronting fails to cancel previously established binding relations (Phillips 2003: fn.35). However, such an approach entails a style of analysis that is very different from the analyses that I have pursued elsewhere, since it amounts to a claim that examples (4-6, 8) are only superficially grammatical. This is a direction that I am reluctant to take.

In sum, it appears that something special needs to be added to both my account and Lechner's in order to capture the contrast between binding and scope possibilities in the antecedent clauses for VP-ellipsis and VP-fronting.

Scope Freezing and Antecedent Contained Deletion

Lechner's second argument against the incremental structure building account does not in fact directly address claims of incrementality. It focuses instead on independent claims in Phillips 1996 about an economy principle that favors right-branching structures ('Branch Right').[1] Despite the fact that this criticism is orthogonal to the main claim of incremental structure building, it is worthwhile to consider its consequences.[2]

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[1] The similarity between the names *Merge Right* (the constraint that forces left-to-right structure building) and *Branch Right* (an economy constraint that favors right-branching structures) in Phillips 1996 has led to some unfortunate confusion. Furthermore, the arguments in favor of *Branch Right* is rather weaker than the evidence for left-to-right structure building (see Kaan 2000 for representative criticisms). For this reason, I have focused in later work on the evidence for left-to-right structure building, and largely dropped any attempt to argue for the preference for right-branching structure (cf. Phillips 2003). The case for a preference for right-branching structure (a.k.a. *local attachment*) in

Lechner points out that examples like (9) show a lack of scope ambiguity. The scope of the universally quantified NP *every handout* is 'frozen' inside the scope of the stranded adverbial *to one of the students*, and no wide-scope universal reading is available.

(9) a. David planned to give every handout to one of the students… $\forall > \exists / \exists > \forall$
     b. …and [$_{VP}$ give every handout] David did to one of the students. *$\forall > \exists / \exists > \forall$

Lechner claims that the availability of the wide-scope indefinite reading in (9b) runs counter to the predictions of the Branch Right constraint, under the assumption that wide scope reflects structurally high attachment. This is correct, but is irrelevant to the issue of incremental structure building. More relevant is the issue of why the narrow-scope indefinite reading is unavailable in (9b). All other things being equal, incremental structure building should allow the stranded adverbial containing the indefinite NP to attach low inside the reconstructed VP, and so should allow the narrow-scope indefinite reading.

Of course, all things are not necessarily equal. In this case, it is important to consider the scope possibilities in VP-fronting in more detail.

We have already seen above in (7) that scope possibilities in VP-fronting are restricted when the fronted VP corresponds to a subpart of VP in an antecedent clause. Lechner's examples in (9) have exactly the same property. The fronted VP *give every handout* in (9b) corresponds to a subpart of the VP in the antecedent clause in (9a). Thus, it is not so surprising that it shows scope restrictions just like (7). A more relevant test of scope in VP-fronting would involve cases in which the fronted VP corresponds to the *entire* VP in the antecedent clause.

Another factor that must be taken into account is the phonological phrasing required for narrow and wide scope readings, and the phonological phrasing required for partial VP-fronting. The phonological phrasing required for left-to-right scope relations in VP is shown informally in (10a), and the phrasing required for stranding of the PP is shown in (10b). The two bracketings are clearly at odds with each other. On the other hand, the phonological phrasing in (10b) is clearly compatible with the phonological phrasing required for the wide-scope indefinite reading.

(10) a. [John read] [every book to one of the students]
      b. …and [read every book he did] [to one of the students]

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on-line sentence comprehension remains strong, and I have presented experimental evidence in support of this (Phillips & Gibson 1997; Phillips & Lieberman 2002). However, the argument is logically independent of the argument for left-to-right structure building.

[2] It is interesting to note that although Lechner criticizes the predictions of the *Branch Right* economy constraint, by the end of his paper he introduces a constraint that is almost identical to *Branch Right*.

It is possible to at least partially control for these phonological effects by using quantificational NPs that are both phonologically heavy and used in a context where they are contrastive. (11) shows that there is a clear scopal ambiguity between the NPs *every single song* and *one or other of his first-graders* in a simple monoclausal sentence. (12-13) show how the scopal possibilities are affected by VP-fronting and VP-ellipsis. In (12) the possible scope readings vary depending on the presence in the antecedent clause of a correspondent of the stranded PP *to one of his second-graders.* In (12a) the fronted portion of VP corresponds to a subpart of the antecedent VP, and only the collective (i.e. wide-scope indefinite) reading is available, just like in (9b). In (12b), on the other hand, the same fronted VP corresponds to the entire antecedent VP, and both collective and distributive (i.e. narrow-scope indefinite) readings appear to be available. In (13), meanwhile, which is an instance of stranding in regular VP-ellipsis, like example (3b) above, it is clear that only the collective scope reading is available.

I should point out that while the scope judgments in (11) and (13) indicate a clear-cut contrast, the judgments for (12) are not so clear-cut. The judgments appear to be consistent with the incrementality-based prediction, although this requires further confirmation. However, (12b) certainly does not show the strong scope-freezing effect seen in examples like (9b). This suggests that the predicted low attachment of the stranded adverbial PP in VP-fronting may be available after all.

(11)   John intended to sing every single song to one or other of his first-graders.
                    [ambiguous: collective and distributive readings both available]

(12) a.   John didn't want to sing just some of the songs. He intended to sing every single song to one or other of his first-graders, and sing every single song he did to one or other of his second-graders. [collective reading only]

     b.   John didn't want to sing just some of the songs. He intended to sing every single song, and sing every single song he did to one or other of his second-graders. [collective & distributive readings both available]

(13)   John sang every single song to one or other of his first graders, and Mary did to one or other of her second-graders. [collective reading only]

Therefore, it appears that once confounding factors have been controlled for, the scope-freezing effect becomes less clear, and the scope facts tend to align themselves more squarely with the predictions of incremental structure building.[3]

Lechner also presents a related counter-argument based on the possibility of Antecedent Contained Deletion in examples like (14). See Lechner (2001a) for details.

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[3] Note that although Lechner uses scope-effects like (9b) to argue against the incrementality-based account, he leaves the scope-freezing effect as an unexplained observation (Lechner 2001:9).

(14)　　　Mary asked him to give a book to some of the boys,
　　　　　…and [give a book] he did [to every boy Mary wanted him to ___]

However, since Lechner's argument in this case depends entirely upon his assumptions about how scope-freezing effects should be captured, this should not be treated as an independent argument.

Locality Constraint on VP-gaps[4]

A third empirical criticism presented by Lechner concerns a constraint on the size of the constituents that can be targeted by VP-fronting and VP-ellipsis. Both VP-fronting and VP-ellipsis can target VPs that contain an embedded clause (15-16). It is also possible, as we have seen above, for either process to strand VP material. However, it is not possible for either VP-fronting or VP-ellipsis to simultaneously target a VP containing an embedded clause while stranding material from the embedded clause, as (17-18) show.

(15)　　　Wallace wanted to confirm that Gromit had prepared the porridge, and confirm that Gromit had prepared the porridge he did

(16)　　　Wallace confirmed that Gromit had prepared the porridge before breakfast, and Preston did too.

(17) a.　Wallace wanted to remember how Gromit rescued the sheep, and remember how Gromit rescued the sheep he did at the farm. (PP in matrix VP only)
　　 b.　Wallace wanted to confirm that Gromit had prepared the porridge, and confirm that Gromit had prepared the porridge he did before breakfast. (PP in matrix VP only)
　　 c.　Wallace needed to resolve to fix the motorcycle, and resolve to the fix the motorcycle he did in the garage. (PP in matrix VP only)

(18) a.　Wallace remembered how Gromit rescued the sheep at the farm, and Wendolene did at the wool shop. (PP in matrix VP only)
　　 b.　Wallace confirmed that Gromit had prepared the porridge before breakfast, and Preston did late at night. (PP in matrix VP only)
　　 c.　Wallace resolved to fix the motorcycle in the garage, and Gromit did in the basement. (PP in matrix VP only)

This constraint can be summarized in an admittedly descriptive fashion as follows:

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[4] This discussion focuses on material that was discussed in an earlier version of Phillips (2003), but which was removed in the final version of the paper due to space limitations. This earlier version of the paper may be downloaded from www.ling.umd.edu/colin.

(19)   *Clause constraint on VP-gaps*
        In the sequence [… Aux [$_{VP}$ *null*] adverbial …] the adverbial is interpreted as
        a clausemate of the Aux.

Lechner correctly points out that this constraint fails to derive the generalization from deeper principles of grammar. Lechner then goes on to argue that the constraint *can* be derived from deeper principles under his assumption that stranding in VP-fronting involves movement of the stranded material from a position deep within the VP to a higher adjunction site, above the fronted portion of VP. If the stranded material (the 'remnant', in Lechner's terms) has to undergo movement in VP-fronting, then this can explain why it is sensitive to island constraints in examples like (20).

(20)   She attempted to refute the allegation that they met on each other's birthdays
    a.   …and [$_{VP}$ refute the allegation that they met on each other's birthdays] she did
    b.   .✳.and [$_{VP}$ refute the allegation that they met] she did [on each other's birthdays]

In this case, Lechner's presentation of the facts is misleading. He characterizes the constraint as one involving (i) island-sensitivity and (ii) VP-fronting only. Both of these claims are incorrect, and depart from my original characterization of the facts. First, the constraint applies to *all* clause boundaries, and not only to syntactic islands, as shown by (17b,18b). Second, the constraint applies to VP-fronting and VP-ellipsis alike, as shown by (18). Neither of these facts follows from Lechner's account as presented.

It is possible that Lechner's account could be revised so as to capture the fact that stranding is sensitive to all clause boundaries in VP-fronting. This would require the introduction of a stipulation that forces remnant movement to be clause-bounded. Such a constraint would effectively restate the facts, just as my own stipulation in (19) does. However, it would be more difficult to extend Lechner's account of the constraint on stranding to include VP-ellipsis. This is because Lechner's analysis of the basic contrast between stranding in VP-fronting and VP-ellipsis crucially relies on the assumption that remnants in VP-fronting reach a high position in VP via movement (which can reconstruct for purposes of binding, etc.), whereas remnants in VP-ellipsis reach a high position in VP without movement (thus preventing reconstruction for binding etc.).[5]

In this case, then, Lechner is correct to point out that the constraint on clause boundaries in VP-fronting and VP-ellipsis does not follow directly from the assumption of incremental structure building. The additional constraint that I present must be an

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[5] In the case of VP-ellipsis, it would be straightforward both in Lechner's account and in mine to prevent direct merger of the stranded phrase into a higher clause, or, equivalently, to claim that when a remnant merges directly into a higher clause, it can only be interpreted in the higher clause. However, this approach is only sufficient to rule out the examples in (18) if it is also impossible for remnants to reach the higher clause via movement. It remains to be seen whether this loophole could be closed in Lechner's account.

independent property of grammar. However, the alternative that Lechner proposes ultimately fares much worse, since it does not account for the facts, even descriptively.

Comparative Ellipsis

The central claim of my work on constituency is that many contrasts between the constituency properties of different structural diagnostics can be explained by the linear order properties of the individual diagnostics, in conjunction with the assumption of left-to-right structure building. This claim contrasts with the widespread assumption that constituency contrasts reflect the quirks of individual constructions. The best way of showing that a given constituency contrast does not reflect construction-specific rules is to show that the same constituency contrast can be observed *internal* to a single construction, by varying its linear order properties. This is exactly what I have done in the case of comparative ellipsis, where I have shown that comparative ellipsis shows the constituency properties of VP-fronting when it has the linear order properties of VP-fronting, and shows the constituency properties of VP-ellipsis when it has the linear order properties of VP-ellipsis.

Examples (21a-b) are representative of this. In (21a) the ellipsis site appears to the left of the stranded material, just as the gap left by VP-fronting appears to the left of the stranded material. Accordingly, (21a) allows both collective and distributive scope readings. In (21b), however, there is a correspondent of the stranded material which appears to the left of the ellipsis site, just as in standard VP-ellipsis. Therefore, (21b) allows only the collective scope reading. Similar effects can be observed with bound variable anaphora (Phillips 2003: section 4.3.2).

(21) a.   John read as many books as Bill did in a week.
                                          (collective and distributive readings both ok)
        b.   John read as many books in a week as Bill did in a month.
                                          (collective reading ok, distributive reading impossible)

Contrasts like (21a-b), internal to a single construction, appear to favor a linear order-based analysis of constituency contrasts, rather than one based upon construction-specific rules. It is therefore not clear how such contrasts could be captured in an account like the one Lechner proposes. Lechner does not address these facts.

Terminological Issues

A final issue concerns some terminological misunderstandings that have arisen from the proposal of incremental left-to-right structure building. These can be found in Lechner's papers, but I do not mean to single out Lechner in this regard, as they can be found elsewhere.

Parsing Analysis? Given the obvious resemblance between a grammar that assembles structures from left-to-right and a parsing system, it is tempting to refer to my proposal as a 'parsing analysis', implicitly contrasting this with a 'grammatical analysis'. This is

inaccurate, or at least departs from the way in which these terms have normally been used in the linguistic literature.

In a model of language that draws a clear distinction between a time-independent structure-building system called the *grammar* and a time-dependent structure-building system called the *parser*, it is possible to argue about whether an unacceptable sentence is unacceptable because it violates a requirement of the grammar, or because it somehow disrupts the operation of the parser. Therefore, when somebody proposes a 'parsing solution' for a syntactic problem, they are claiming that a phenomenon that was thought to reflect properties of the grammar in fact reflects properties of the parser. Such accounts can be found, for example, in Hankamer's discussions of 'unacceptable ambiguity' in the 1970s (Hankamer 1973), and in Berwick & Weinberg's account of Subjacency effects in the 1980s (Berwick & Weinberg 1984).

On the other hand, in a model of language that assumes a single, time-dependent structure building system, it does not make any sense to argue about whether a phenomenon reflects the workings of the grammar or the workings of the parser, since there is no distinction between the two.[6] Therefore, my claim that constituency contrasts are explained by incremental left-to-right structure building is not a 'parsing analysis' in the normal sense. Rather, it is a claim about how the grammar works. In this respect, it is no different from any other grammatical analysis of a syntactic phenomenon … apart, perhaps, from the fact that the existence of an incremental structure building mechanism in the human brain is extremely well motivated.

Top-Down Structure Building. A 'top-down' parser is a parser that begins with a root node, such as 'S', and then expands the root node by projecting its daughters, and then projects the daughters of each of those nodes, and so on until it arrives at the terminal nodes. A 'bottom-up' parser works in the opposite direction, starting with the terminals and ending at the root node. This terminology is well established in the computational linguistics literature. Notice that neither of these systems is subject to any linear order constraints; the only constraint is that they build structure either from top-to-bottom or from bottom-to-top.

A number of authors have described incremental left-to-right systems of the kind that I have proposed as 'top-down' systems (e.g. Richards 1999; Boeckx 1999; Guimaraes

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[6] Although no distinction is assumed between the grammar and the parser, it is still possible to analyze syntactic phenomena as reflecting misanalysis/unacceptable ambiguity or as reflecting memory-based constraints. The only difference is that these are no longer properties of an independent parser.

In fact the question of whether island constraints reflect hard-wired grammatical constraints or the memory-bounded nature of the parser is a question that we have been actively investigating in our experimental work. Based in particular on studies of the parsing of island environments that support parasitic gaps (Phillips & Wong 2000; Phillips & Rabbin, *in progress*), we are currently skeptical of attempts to derive island constraints from memory limitations.

1999, 2002; Sawada 2001). This is unfortunate, since a left-to-right system is *not* a top-down system in the normal sense.

The closest analog of left-to-right grammatical systems in the computational linguistics literature is what is known as 'left-corner' parsers. Moreover, left-corner parsers have generally been thought to be the most plausible mechanism for the human parser.

Conclusion

I could not, and do not, claim that an incremental view on syntactic structure building can explain all constituency phenomena. My claim is rather that incrementality can help to explain many aspects of the variation among constituency diagnostics.

Lechner (2001ab) presents a number of empirical challenges for the incrementality-based account of the contrast between VP-fronting and VP-ellipsis, and argues that the contrast can be explained in a more 'conservative' syntactic approach. I agree with Lechner that some of the empirical challenges require solutions that do not follow automatically from incremental structure building. However, I hope to have shown here that the rhetorical argument based on what is more 'conservative' or 'radical' is inconclusive at best, and that on the empirical side Lechner's own analysis faces at least as many challenges as the incrementality based account, while failing to address important aspects of the data.

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