J. Linguistics **38** (2002), 527–560. © 2002 Cambridge University Press
DOI: 10.1017/S0022226702001652 Printed in the United Kingdom

The Comp-trace effect, the adverb effect and minimal CP[1]

NICHOLAS SOBIN

University of Wales, Bangor

(Received 14 February 2000; revised 21 December 2001)

Recent work has ascribed the adverb effect, the reduction or elimination of the *that*-trace effect by the addition of an adverbial phrase, to an elaborated CP layer. However, additional observations about a variety of adverb effects with both positive and negative effects on acceptability, including some experimental data, suggest that (i) adverbs may undergo lexical adjunction to a complementizer and (ii) the CP layer may be contracting or folding in rather than expanding. This proposal facilitates explanation of an array of facts including the Comp-trace effect, the adverb effect and other aspects of the behavior of complementizers in relative constructions and in complement constructions.

Recent works on the Comp-trace (henceforth, C-t) effect and the adverb (henceforth, Av) effect have posited a proliferation of structure. This article explores a different approach. Taking advantage of Carnie's (2000) proposal that constituents may adjoin to lexical heads forming complex lexical heads, this paper argues that CP phenomena including the C-t effect and the Av effect may find their explanation in terms of a severe reduction of CP structure, an economy of representation facilitated in part by adjunction to a lexical head. The basic facts of the Av effect are sketched out in section 1. Recent accounts of the Av effect involving both expansion and contraction

[1] I am most grateful to the Department of Linguistics and Philosophy at MIT and to the Department of Linguistics at Harvard University for their incomparable hospitality during my tenure as a visiting scholar at each institution during fall 1996. Special thanks are also due the Office of Research and Sponsored Programs at UALR and its director Andy Covington for partial support of my stay in Cambridge. In addition, my sincere thanks to Steve Anderson, Bob Borsley, Noam Chomsky, Sam Epstein, Byrd Gibbens, Greg Iverson, Jay Keyser, Howard Lasnik, Jim Levernier, Carson Schütze and Anne Marie Sobin for discussing various matters related to this work. I would also like to thank the anonymous *JL* referees for their numerous insightful comments which helped to sharpen my thinking at many points. I also thank audiences at LASSO-UCLA, the University of Missouri-Columbia, and the Linguistics Association of Great Britain for their helpful comments on earlier versions of this work. Any errors are solely those of the author. Finally, many thanks to the students who either participated as subjects in this research or who carried out similar research of their own. Their work and enthusiasm are invaluable.

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of the CP layer are outlined and discussed in section 2. Section 3 offers other data and additional considerations which should be taken into account in offering analyses of the CP layer and of C-t phenomena. Included here are the results of further empirical research bearing on questions of the acceptability both of C-t constructions and of various adverb effect constructions. Section 4 offers an analysis of both the C-t effect and the Av effect based on very reduced syntactic representation and adjunction to lexical heads. Unlike other accounts of C-t phenomena, the analysis advanced here also deals with the matter of variation in acceptability judgments, a significant feature of these constructions. Section 5 concludes.

This work focuses largely on English, since the body of English facts is extensive, and since there are not as yet comparable quantitative data from other languages. That is an area for future research.

1. The Av effect

The Av effect, as discussed by Culicover (1991a, b, 1992, 1993), Browning (1996) and, most recently, Rizzi (1997), is illustrated in (1)–(3).

(1) (a) %Who did you say that would hate the soup?
    (b) Who_i … say $[_{CP}\ t_i'\ [_{C'}\ [_C$ that$]\ [_{IP}\ t_i$ …
(2) (a) Who did you say would hate the soup?
    (b) Who_i … say $[_{CP}\ t_i'\ [_{C'}\ [_C\ -\text{WH}]_i\ [_{IP}\ t_i$ …
(3) Who did you say that without a doubt would hate the soup?

Sentence (1) illustrates the C-t effect,[2] and (3), the Av effect. As shown in (3), an adverbial phrase positioned after a complementizer appears to mitigate or completely undo the C-t effect. A central assumption of this work (as well as of much other recent and earlier work on this subject, e.g. Sobin (1991), Culicover (1993) and Browning (1996)) is that a trace in subject position is only licensed by a C which is coindexed with it, as in (2). The C-t effect in (1) results when the C and the trace in subject position are not coindexed. Under these assumptions, the problem is to explain how the adverb effects the indexing of the relevant C in (3) to license the subject trace, allowing (3) as grammatical.

[2] Following Sobin (1987), (1a) is marked as involving variation in acceptability judgments, in contrast to the stark and systematic unacceptability of a construction with *whether*, such as (i).

(i) *Who did you ask whether would hate the soup?

Sentence (3) is unmarked here, implying full acceptability. However, Browning (1996: 237, fn. 1) points out that for some speakers, including herself, the additional adverb consistently improves acceptability, but does not consistently lead to complete acceptability. Further, though it is generally claimed that the Av effect holds for both *that*- and *whether*-trace constructions, Browning cites Culicover, noting that 'the improvement in the case of *whether* is less noticeable' (Browning 1996: 238, fn. 2).

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2. Some recent accounts with expanded CP

Two theories centrally addressing these phenomena involve an expanded CP. These proposals are very distinct from one another, so I will treat each of them in turn. After presenting each of them, I will discuss aspects of each analysis still open to question. Both analyses are quite innovative, and each offers interesting insights into what might be going on. Therefore, the questions/problems raised here do not 'disprove' these analyses. However, they do indicate that the explanations offered are not comprehensive and that there is still considerable room for alternative basic research and theorizing in this area. It is in this spirit that I offer this discussion. The first analysis to be considered is that of Browning (1996).

2.1 *CP recursion and the Av effect*

Browning (1996) offers an innovative account of the Av effect in terms of CP recursion, generally assuming the minimalist program as articulated in Chomsky (1993). I will first sketch the analysis and then discuss questions which it raises.

2.1.1 *The analysis*

As noted, a C-t violation results if a subject trace is not licensed by a coindexed C. The relevant structures of (1)–(2) are repeated here.

(1) (b) Who_i … say $[_{CP}\ t_i'\ [_{C'}\ [_{C}$ that$]\ [_{IP}\ t_i$ …
(2) (b) Who_i … say $[_{CP}\ t_i'\ [_{C'}\ [_{C}\ -\text{WH}]_i\ [_{IP}\ t_i$ …

In structure (2b), the subject of the lower clause has moved to the higher SpecCP through the lower one. The trace of the moved subject t_i' and C are in a Spec-head configuration, resulting in Spec-head agreement and coindexation, so the C now governs the subject trace in IP and is coindexed with it. Construction (1b) involves the same movement, but in this account a lexical C (e.g. *that*) cannot bear an index, so despite the fact that a subject trace and *that* are in a Spec-head configuration, the C cannot be indexed, and the subject trace in IP is not governed as it must be.

As for the Av effect, the initially relevant portion of the structure of sentence (3) is given in (4a).

(4) (a) $[_{CP}$ without a doubt $[_{C'}$ that [who would hate the soup …

A consideration in the further derivation of this construction is clause type. Following Cheng (1991) and Watanabe (1992), this account assumes that a clause type characteristic of a non-*wh*-clause (in contrast to a *wh*-clause) is that it has no SpecCP. Thus, a clause with an adverbial filling SpecCP such as (4a) cannot combine with a head (such as *say*) requiring a non-*wh*-complement clause unless some operation can create the requisite empty Spec construction. Following Watanabe, this is the motivation for the next step in

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the derivation, that of extending the construction by moving the complementizer, as in (4b).[3]

(4) (b) $[_{CP}\ [_{C'}\ that_C\ [_{CP}$ AvP $[_{C'}\ t_C$ [who would …

Movement of the complementizer creates the complement clause structure required to complement *say*. Subsequent movement of the *wh*-word[4] through the higher SpecCP creates the construction in (4c).

(4) (c) Who_i … $[_{CP}\ t_i'\ [_{C'}\ that_C\ [_{CP}$ AvP $[_{C'}\ t_{C/i}$ $[t_i$ would …

In structure (4c), one of the traces of *who* and the complementizer *that* are in a Spec-head relation. They undergo agreement, but the lexical complementizer cannot bear an index; however, it may transmit the index to its trace, which can bear an index. Thus, the subject trace in (4c) is governed by a coindexed C.

In response to the question of why vacuous recursion does not apply to clauses without adverbials allowing C-t violations as in (5), it is argued that CP recursion is limited by Greed (Chomsky 1993).

(5) (a) $[_{CP}\ [_{C'}$ that [who would hate the soup …
(b) $[_{CP}\ [_{C'}\ that_C\ [_{CP}\ [_{C'}\ t_C$ [who …
(c) Who_i … $[_{CP}\ t_i'\ [_{C'}\ that_C\ [_{CP}\ [_{C'}\ t_{C/i}$ $[t_i$ …

In particular, the recursive structure in (4) is motivated by the demands on complement clause type of the verb. Those demands are met in (5a), so no such movement is necessary for the merger of the verb with the clause, and hence such movement is not possible here.

2.1.2 *Questions about the CP recursion account*

Despite its appealing aspects, the CP recursion analysis raises a number of questions.

2.1.2.1 (*Co-*)*indexation of lexical complementizers*

First, the essential claim that lexical complementizers cannot bear an index appears doubtful on analysis-internal grounds. As is apparent in (4b–c), the moved complementizer must be linked to its trace for the analysis to succeed. Coindexation is the standard means in such analyses for accomplishing such linking. Though the subscript 'C' establishes the needed relation, it seems more to mask the problem than to offer an explanation. It is somewhat difficult to see how this linking is not coindexing, and yet is enough like it to allow the index to be passed on to the trace of the complementizer.

[3] Browning uses a subscript 'C' rather than an index to link the moved complementizer to its trace, presumably to comply with the stipulation that lexical complementizers cannot bear an index. Also, in the subsequent derivational stages, the adverbial here is abbreviated as 'AvP'.

[4] Browning's example involves movement of a null operator in relative clauses.

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Further, there are indications that the complementizer *that* can in fact be indexed. First, on the assumptions of these other analyses, relative clause constructions such as (6) would most likely have an indexed *that* licensing the trace in subject position.

(6) The person that$_i$ t$_i$ likes anchovies ordered the pizza.

Also, other languages or varieties of languages, including Dutch (Perlmutter 1971, Maling & Zaenen 1978) and French (Kayne 1981), and possibly Black American English (Pesetsky 1982), are observed not to exhibit a *that*-trace effect. Under the normal assumptions, there would be an indexed declarative complementizer licensing the subject trace, as in the Dutch example in (7).

(7) Wie$_i$ vertelde je [$_{CP}$ dat$_i$ [$_{IP}$ t$_i$ gekomen was … ?
who said you that come was
'Who did you say that had come?'
(adapted from Perlmutter 1971: 116)

Thus, a simple stipulation that the overt complementizer *that* cannot be indexed seems open to question.[5]

2.1.2.2 *Agreement positioning*

A further question arises from positing adverbs in a Spec position: why should adverbs be placed in this position, given its character as a position of agreement? Subjects occur here and, when other entities move into Spec position, they are also subject to agreement. Thus, a *wh*-phrase moved into SpecCP agrees with the C head at least on the feature [+WH]. However, there is no proposal that these adverbials involve agreement;[6] hence their positioning here lacks the normal motivation.

2.1.2.3 *Additional facts*

Beyond the facts and considerations already noted, there are, I believe, some additional facts of interest, ones which point toward an analysis of a very different sort. I will postpone a discussion of these to section 3 below, since they are pertinent to both this analysis and the one which we turn to immediately, that of Rizzi (1997).

2.2 '*Split*' *CP and the Av effect*

Rizzi (1997) also offers an analysis involving an elaborated CP, though one which also contracts in certain circumstances, as we shall see.

[5] One referee notes the non-standard British form *Who d'you reckon* ***what*** *done him in?* 'Who do you think that (= what) killed him?', where the *wh*-marking of C also suggests that C may be indexed.

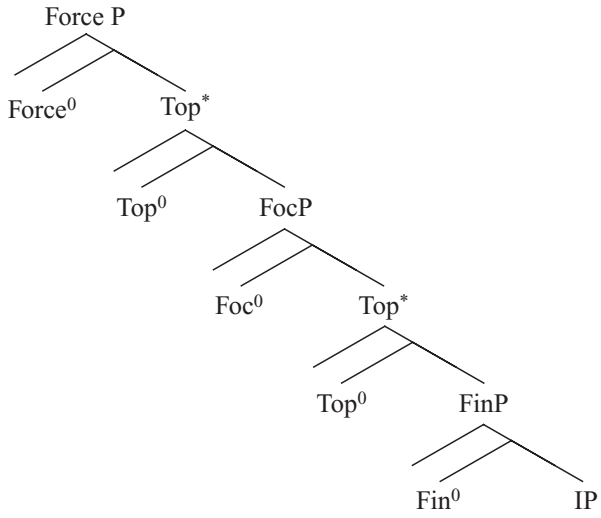
[6] Culicover (1993: 560) notes the same problem for the PolP analysis.

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2.2.1 *The analysis*

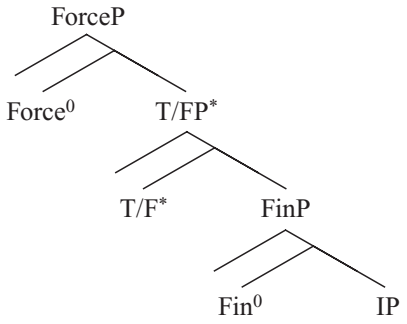
Rizzi (1997) presents a 'split' analysis of CP, one which displays considerable complexity. This is sketched in (8). Here, the CP shell is divided into what Rizzi designates as a high 'Force' layer, and a low 'Finiteness' layer. Sandwiched in between these layers are possible topic and focus positions.[7]

(8)



[7] Rizzi argues that the non-recursive character of FocP can be explained by the observation that [Spec, FocP] is 'new' information, and the complement of Foc^0 is 'given' information. Hence, this complement cannot be another FocP, something containing 'new' information (in Spec). Assuming that this is correct, then the distinction Topic/Focus may not be needed in the general architectural scheme. Instead, we may have the simpler available structure, in (i), with T/FP simply being undifferentiated in the abstract as to what content it might have.

(i)



That is, these are only available structural positions, with no preliminary semantic bias. However, a complication with this possible simplified view is the claim that the question operator seeks out SpecFocP, which doesn't exist per se in (i). Perhaps the non-cooccurrence of FocP with question operators is, like the non-occurrence of FocP recursion, semantically based.

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Both adverb movement and topicalization are analyzed by Rizzi as involving the same positioning, movement to/placement in SpecTopP (p. 300). Thus, topicalization of an argument and fronting of an adverbial result in roughly parallel structures, as in (9).

(9) (a) $[_{ForP}$ … $[_{TopP}$ your article$_i$ Top^0 … $[_{IP}$ she really enjoyed $t_i]]]$
(b) $[_{ForP}$ … $[_{TopP}$ tomorrow Top^0 … $[_{IP}$ she will read it]]]

The declarative complementizer *that* is high, in Force^0 (pp. 301, 312). However, its non-phonetic counterpart (which we may call 'null' *that*) is low, in Fin^0 (p. 312). This is roughly illustrated in (10).[8]

(10) (a) … said $[_{ForP}$ that $[_{TopP}$ yesterday Top^0
$[_{FinP}$ ø $[_{IP}$ she really enjoyed your article]]]]
(b) … said … $[_{FinP}$ ø $[_{IP}$ she really enjoyed your article]]

The infinitival complementizer *for* is also low, in Fin^0 (p. 301), as in (11).

(11) … wanted very much … $[_{FinP}$ for $[_{IP}$ her to enjoy your article]]

Question operators in main questions are claimed to occupy a position lower than ForceP (p. 289), perhaps SpecFocP (p. 298–300), as in (12a); however, *wh*-movement in embedded questions is to/through SpecForceP, as exemplified in (12b) (see also Haegeman & Guerón 1999: 347).

(12) (a) $[_{FocP}$ what$_i$ $[_{Foc'}$ $[_{Foc^0}$ will$_j]$ $[_{FinP}$ $[_{Fin^0}$ $t'_j]$
$[_{IP}$ she t_j see t_i …
(b) *Who do you think $[_{ForP}$ t′ $[_{For^0}$ that] [t will win the prize]]?
(based on Rizzi's (88a), p. 312)

Thus, classic CP elements as well as topic and focus elements appear sprinkled throughout the now complex Force/Fin layer.

Surprisingly, despite this 'elaboration' of CP structure and claims of extended distinctions (e.g. dividing C between a high Force head and a low Finiteness head), the analysis appears to reverse itself in claiming that this complex layer may also 'collapse' into a single-headed layer, with either a Force head or a Finiteness head carrying features of both force and finiteness (pp. 312–315). This is roughly represented in (13).

(13) (a) … said $[_{For/(Fin)P}$ that $[_{IP}$ she really enjoyed your article]]
(b) … said $[_{(For)/FinP}$ ø $[_{IP}$ she really enjoyed your article]]

As for the basic C-t effect, Rizzi (1997: 312) harkens back to the account offered in Rizzi (1990). If ø (null *that*) is selected, then it becomes a governor of the subject trace due to its Agr specification. However, if *that* is selected, the trace in subject position is not properly governed: *that* has no Agr specification, so it cannot govern a subject-positioned trace. Consequently,

[8] This follows Rizzi's presentation, and is modifed below, in (13).

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the construction violates the ECP. As Rizzi notes, the account is not quite complete within the dimensions of this theory since here *that* and null *that* represent two distinct head positions – they are not mutually exclusive. Thus, if both are selected, we see an overt *that*, and yet the subject trace is governed by the additional null *that*, freely allowing C-t constructions such as (1) above. To counter this, Rizzi (1997: 314–315) advances the possibility that this more complex structure is blocked on grounds of economy by a simpler representation involving the selection of a single C-type element, as just sketched above. But as Rizzi also notes, this is problematic to implement since the blocker construction(s) would involve a numeration distinct from that of the construction to be blocked.

Regarding the Av effect, if the Topic-Focus field of the CP complex is activated, then both *that* and null *that* are necessarily selected. The latter governs/licenses a subject trace, and the mandatory appearance of the former explains the purported fact that adverbials in this position appear to require *that*. However, this fact is subject to question, as we will see in data presented later.

2.2.2. *Questions about the split CP account*

Some aspects of the analysis just outlined raise questions, as sketched out below.

2.2.2.1 *Coordinating the selection of 'C' elements*

Some initial questions are raised by constructions like (14)–(15).

(14) Why without telling anyone would Mary leave?
(15) Why for any reason would Mary rob a bank?

Here, there is an intervening adverbial phrase. If such phrases generally force apart the Force and Fin heads, as hypothesized above, then there must also exist a null finite head for interrogatives (null *if*) which is available for selection into a structure. Now, when the two 'C positions' (Force^0 and Fin^0) are split, as when an adverb phrase appears in SpecTop, they are not in any 'local' relationship, so that there is no relationship of selection between them. Nothing appears in general to guarantee that the two positions, possibly distant from one another, will come out declarative or interrogative. For instance, with *that* in Force^0 and one of the SpecTop positions filled, the null *if* or even an overt one might be selected below. Theories which do not have split C engender no such difficulty.

A different interpretation of sentences like (14) would be that there is no relationship between finiteness and force (declarative vs. interrogative), and hence that there is just a single Fin head selecting finite IPs whether they are declarative or interrogative, namely, [+Fin]. Likewise, either declarative or

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interrogative nonfinite clauses would be selected by a single head [−Fin]. But this approach makes it questionable that the Fin head would then stand in for/be interchangeable with the declarative complementizer. Thus, we appear to be in the position either of positing multiple null heads whose motivation is dubious and whose selection is somewhat problematic or of positing a questionable trade-off between a force-specific complementizer and a non-force-specific null head.

A further question concerning constructions such as (14)–(15) involves the moved verb. By hypothesis, the *wh*-phrase and the moved verb are separated by a TopP projection. Normally, the verb (in I) must move into a Spec-head relation with the *wh*-phrase (Rizzi 1997: 299), but under the structural proposals advanced here, this movement appears not to comply with Rizzi's *wh*-criterion. Thus, the verb movement in questions such as (14)–(15) appears to lack a general explanation.

2.2.2.2 *A non-unified theory of movement*

As noted above, *wh*-movement in root questions is claimed to be to SpecFocP, while *wh*-movement in embedded questions is to SpecForceP. This non-unity appears questionable. Rather than being a virtue of the analysis, it requires explanation.

2.2.2.3 That *in subject relative clauses*

Subject relatives also pose questions (very much as noted above in connection with Browning (1996)). Both interrogatives formed on objects and object relatives show optional *that*:

(16) Who did you say (that) Mary saw?
(17) the person (that) Mary saw.

That is, *that* appears to have the same status as optional complementizer in both of these construction types. However, the status of *that* with subjects is quite different in the two constructions. Whereas *that* is often disfavored in an interrogative formed on a subject, as in (18) (= (1a) above), *that* (or a relative pronoun) is required in the corresponding subject relative, as in (19).

(18) Who did you say (%that) would hate the soup?
(19) The person *(that/who) hated the soup (is here).

It appears quite possible that in (19) the complementizer may somehow be required for licensing the subject trace. Thus, the claim made in connection with sentences like (18), that the complementizer *that* cannot govern a subject trace, incorrectly predicts that *that* in (19) should also be impossible, the reverse of the true facts. The question of how constructions like (19) are to be explained in any general terms remains.

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3. Additional facts and other considerations

There are other facts and considerations pertinent to both analyses, to which we now turn.

3.1 *Variation in the* that*-trace effect in English*

Both Browning and Rizzi offer analyses which categorically block C-t constructions and which categorically allow Av effect constructions in English. However, C-t phenomena in English are subject to significant variation. Pesetsky (1982: 328) reports that some African American speakers of otherwise very standard English may allow *that*-trace constructions. Sobin (1983) reports significant variability in the acceptance of *that*-trace constructions by native English speakers in central Arkansas, and Sobin (1987) reports similar results for native English speakers in Iowa and Illinois. Dye (1998), who worked with American informants, and Guest (2001), who worked with British informants, also report such variation.

Very interestingly, empirical studies in the acquisition of English have resulted in similar findings, though the investigators were not originally looking for variation and, in fact, anticipated rejection of *that*-trace constructions. For instance, Thornton (1990) investigated the acquisition of *that*-trace constructions by learners from 2;10 to 5;5 as a part of a larger study of *wh*-movement. One finding was that 11 (of 21) subjects who produced subject extractions used *that* 18% of the time as compared to 25% for object extractions. Thus, some of her subjects produced *that*-trace constructions at a rate roughly comparable to that for object extractions with *that*.

Gathercole & Montes (1997) investigated the degree to which the acquisition of *that*/*que*-trace constructions by bilingual learners of English and Spanish is comparable to that of monolingual learners of each language. Their subjects were second-graders and fifth-graders in Miami. Anticipating that the monolingual English learners would reject *that*-trace constructions, they found that both monolingual and bilingual learners of English had a difficult time recognizing the ungrammaticality in English, though the monolingual and bilingual Spanish learners had much less difficulty recognizing the complementary effect with *que* (a requisite complementizer) in Spanish. Gathercole & Montes' figure 2 (1997: 85) shows English *that*-trace constructions being accepted at a level of approximately 90% by monolingual English second-graders and at a level of approximately 80% by monolingual English fifth-graders.

As a part of a larger study of the acquisition of questions, McDaniel et al. (1995) investigated the acquisition of *that*-trace constructions by children from 2;11 to 5;7. Acceptability judgments were elicited in four separate sessions. In the four successive sessions, *that*-trace constructions were

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accepted by 78%, 59%, 58% and 73% of the subjects, respectively. This compares to other 'ungrammatical' constructions which were accepted by 24%, 21%, 14% and 18% of the subjects, respectively. Adult controls in the study accepted *that*-trace constructions at 20%, while rejecting other 'ungrammatical' constructions 100% of the time (McDaniel et al. 1995: 724). In fact, the adult informants appear generally very conservative in their judgments. 13% rejected all multiple *wh*-questions (including *Who ate what?*) and 45% accepted single-clause multiple *wh*-questions but rejected 'two-clause' questions (*Who thinks Grover ate what?*) (p. 730), constructions which no linguist would construct a grammar to reject.

In sum, empirical research points consistently towards the conclusion that for adults, the *that*-trace effect in English may be 'softer' and more variable than much of the literature anticipates. The *that*-trace effect appears to be weak or absent from the grammars of learners of English. Its acquisition appears to be comparatively late. A number of researchers mention the variability of C-t phenomena and the Av effect (e.g. Culicover 1993 and Browning 1996). However, they offer theories which categorically block *that*-trace constructions and which categorically allow Av effect constructions, and offer no hints as to why such variability exists.

3.2 That-*AvP as a constituent*

Results of an earlier, informal inquiry suggest that, for some speakers, the adverbial in constructions like (3) easily forms a prosodic unit with the complementizer. This is shown in (20a), with the commas marking significant pauses.[9]

(20) (a) Who did you say, that without a doubt, would hate the soup?
(b) Who did you say that, without a doubt, would hate the soup?
(c) Who did you say, that, without a doubt, would hate the soup?

Given a choice between (20a) and (20b), other speakers claim to prefer the prosodic pattern in (20b), though these speakers tend to reduce the complementizer *that* (indicated by the reduced font size of *that*). One informant who claimed to prefer (20b) over (20a) suggested a revision to the prosody in (20c) as better than (20b). In (20c), the complementizer is set off, and the adverbial is further set off. Such prosodic patterning overall suggests the possibility that the complementizer and the adverbial may form a syntactic constituent. Further details of these patterns will be dealt with below, in section 4.3.

[9] The commas that appear in these examples do not necessarily follow English punctuation conventions; they are only intended to reflect spoken pauses. These observations are based on an inquiry among native English speakers from a variety of regions of the U.S.

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Another fact pointing towards the existence of a *that*-AvP constituent is that *that*-AvP sequences appear able to coordinate, as in (21).

(21) (a) John claimed that in the last election and that in all earlier ones ballot boxes were stuffed.
(b) They say that with some work and that with a little luck Sian will win the championship.
(c) It has been shown that on July 4 and that on July 5 the defendant was not in Rhyl.
(d) I promise that during the holidays and that on weekends I will write to you.

Although other coordination patterns are possible, those in (21) are available.[10]

In developing the claim that the phrase/head distinction may be derived rather than primitive and, consequently, that phrases and heads may have overlapping properties, Carnie (2000) argues that lexical heads may combine with phrase-like sequences, projecting a lexical category.[11] Extrapolating to

[10] It may appear that Right Node Raising (RNR) would also explain these possibilities, removing the sentences of (21) as evidence for a *that*-AvP constituent. However, certain facts suggest that a RNR analysis of such sentences is not straightforward. First, the conjoined sequences of RNR constructions are better when they strongly contrast, and not very good when they are very similar. Thus, consider (ia–b):

(i) (a) The lawyers claimed that on July 4 – and Mary testified that on July 5 – Bill was in Rhyl.
(b) *The lawyers claimed that on July 4 – and the lawyers claimed that on July 5 – Bill was in Rhyl.

In (ib), the 4/5 contrast is not nearly enough to felicitously differentiate the coordinated sequences. Yet, the coordination in (ii), with only this difference, is perfectly good:

(ii) The lawyers claimed that on July 4 and that on July 5 Bill was in Rhyl.

Perhaps there is much more to learn about this condition, but on the face of it, this fact does not favor a RNR analysis.

Second, Hudson (1976: 550) notes that RNR constructions, in contrast to other coordinate structures, may involve non-coordinating connectives such as *rather than*, as in his example (5b), given here as (iii).

(iii) I'd have said he was sitting on the edge rather than in the middle of the puddle.

However, as (iv) illustrates, coordinated *that*-AvP constructions as in (21) cannot involve *rather than*.

(iv) *The lawyers claimed that on July 4 rather than that on July 5 Bill was in Rhyl.

Thus, the coordinated *that*-AvP sequences of (21) appear not to be simple instances of RNR.

[11] In this vein, Carnie (2000) analyzes non-verbal predication and construct state nominals in Irish as involving possible merger of a modifier with a nominal head, projecting a (complex/'phrasal') nominal head which undergoes head movement. Although Carnie's Irish examples only involve simple adjectives combining with nouns, more complex modifiers (phrases) are in all probability possible. For example, Welsh, a VSO language related to Irish, displays the same sort of sentence-initial non-verbal indefinite predicates which Carnie analyses as complex heads undergoing head movement in Irish. Sentence (i)

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the present analysis, adjunction to a lexical head in the case of *that*-AvP sequences would result in a structure like (22).[12]

(22) $[_{C^0}\ [_{C^0}$ that] AvP]

Carnie further argues that such complex heads form extraction islands. If correct, then this structure would explain the impossibility of extractions such as in (24b).

(23) (a) I think that Zola will beat Mary with her new strategy.
(b) What do you think that Zola will beat Mary with?
(24) (a) I think that with her new strategy Zola will beat Mary.
(b) *What do you think that with Zola will beat Mary?

One of the questions which Carnie raises is why the formation of complex lexical heads is not more frequent in English. It may be that it is more frequent than he claims. More will be said about this structure and its interaction with *that*-trace phenomena below.

3.3. *Doubly-filled Comp*

An additional fact of some interest is that adverbials may (again subject to some variation) interact with doubly-filled Comp (DFC) constructions as in (25a–d).[13]

(25) (a) I just saw a person WHO, that for all intents and purposes, could pass for Albert Einstein!
(b) There are people WHO, that with very little prompting, would do some extreme things.

---

is one of Carnie's examples, and sentences (ii)–(iii) (based on Bowen & Rhys Jones 1976: 133) are similar examples from Welsh.

(i) Is dochtúir (é) Seôn
COMP doctor AGR John
'John is a doctor.' (= Carnie's (28b))
(ii) Meddyg yw Seôn
doctor is John
'John is a doctor.'
(iii) Meddyg yn Llundain yw Seôn
doctor in London is John
'John is a doctor in London.'

Assuming Carnie's analysis, sentence (iii) shows a prepositional phrase and a lexical head forming a complex lexical head *meddyg yn Llundain*, which undergoes the head movement exemplified in (i)–(ii).

[12] Interestingly, such a structure may be viewed as compatible with Kayne's (1994) proposals on antisymmetry. A bare phrase structure rendition of this structure would be $[_{\text{that0}}$ that_0 AvP]. Here, the lexical head *that* antisymmetrically c-commands the lexical material in AvP. I will not pursue this line of discussion further here.

[13] The capitalization and comma punctuation here reflect emphasis and pausing, respectively.

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(c) Harvard has a player WHO, that with a little more work, could play for the Steelers.
(d) I just saw a sprinter WHO, that in all likelihood, will break the 200 meter record.
(e) *I just saw a person who that could pass for Albert Einstein!

Again, earlier informal inquiry about such sentences revealed that in sentences like (25a–d), an emphasized *who* with pauses setting off the complementizer and adverbial is very 'natural' for some informants. All informants markedly preferred (25a–d) to (25e).

3.4 *Establishing some further empirical baselines*

In order to begin to establish acceptability levels on these and related data, a more systematic inquiry into the intuitions of adult native speakers of colloquial standard English was carried out (see appendices 1 and 2 for further details of this study). This work represents only a small incursion into the much larger problem of establishing empirical baselines for such data. However, despite its limitations of size and scope, some of the results of this work are worth noting.

23 subjects were asked to listen to, read, repeat and then judge certain constructions for acceptability. The constructions queried included basic C-t constructions, Av effect constructions and DFC constructions with and without adverbial phrases like those in (25) above. The sentences were presented in a random order, following a set of 'warm-up' sentences used to tune subjects to the task. One subgroup of 11 subjects judged these and other utterances directly as 'good' – a sentence that the subject might say in the right situation; 'maybe' – a sentence that the subject might not say but might expect to hear someone else say who was not making a mistake; or 'impossible' – a sentence which a native speaker of English would not say this way, even though it might be understandable. A second subgroup of 12 subjects, who were also informed of the 'good'/'maybe'/'impossible' (GMI) distinction, judged the naturalness of such utterances on a more discriminating 0–5 scale, with 0 as 'impossible' and 5 as perfectly natural. With this sketch of the experiment in place, let us next consider what the results show about the acceptability first of basic C-t structures and then of Av effect structures.

The structures that we will consider first include subject and object extractions from embedded declarative clauses with and without *that*, and with and without adverbial phrases, as well as subject and object extractions from embedded interrogative clauses with and without adverbial phrases. Subjects were given two examples of each of these construction types (except, as noted below, in connection with line 5 of (26) and (27)). The resulting average acceptability judgments are summarized in (26)–(27).

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(26) *Average acceptability of C-t constructions with no adverbial phrase*

Wh_{obj} … *that* S:	4.75/	G-100%	M-0%	I-0%
Wh_{obj} … ø S:	5.00/	G-100%	M-0%	I-0%
Wh_{su} … *that* S:	3.63/	G-43%	M-24.5%	I-32.5%
Wh_{su} … ø S:	4.96/	G-95.5%	M-4.5%	I-0%
Wh_{obj} … *whether* S:	1.92/	G-18%	M-36%	I-45%[14]
Wh_{su} … *whether* S:	0.63/	G-0%	M-0%	I-100%

(27) *Average acceptability of C-t constructions with an adverbial phrase*

Wh_{obj} … *that* AvP S:	3.38/	G-77.5%	M-22.5%	I-0%
Wh_{obj} … ø AvP S:	3.25/	G-64%	M-36%	I-0%
Wh_{su} … *that* AvP S:	3.42/	G-68.5%	M-27%	I-4.5%
Wh_{su} … ø AvP S:	3.96/	G-86.5%	M-13.5%	I-0%
Wh_{obj} … *whether* AvP S:	0.97/	G-0%	M-39%	I-61%[15]
Wh_{su} … *whether* AvP S:	1.17/	G-13.5%	M-36%	I-50%

The core data are by-and-large what one would expect. In (26), object extractions with or without *that* (lines 1 and 2) are highly acceptable, as are subject extractions without *that* (line 4). Extractions from *whether* clauses (lines 5 and 6) are of very low acceptability, with object extractions showing slightly higher acceptability. This is all expected from the standard literature. Since the scalar judgments of these items are at the extremes and, since there is virtual complementarity in the distribution of the 'good' and 'impossible' judgements here, I will not pursue their significance further.

An interesting question arises, however, as to whether the data in (26) show a clear C-t effect. The numbers in line 3 of (26) aren't as low as one might expect from the standard literature (though other literature cited earlier does document variability in C-t judgments). Further, the 0–5 group assigned a higher average level of acceptability to the C-t effect sentences than they did to the corresponding Av effect sentences (line 3 of (27)). Since the Av effect is the neutralization of the C-t effect, it is not possible to document a significant Av effect if a significant C-t effect is absent.

To sort this out further, consider first that the average in line 3 of (26) comes from the two sentences shown in (28).

(28) (a) Who did you say that saw Elvis last week?
4.58/ G-64% M-27% I-9%

(b) Who do they think that might visit the Pope?
2.67/ G-22% M-22% I-56%

[14] Due to an error, one of these sentences was omitted. These figures are the responses to the single example offered.

[15] Due to an error, one of these sentences was doubly queried. All responses are averaged into these figures.

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The high level of acceptance of (28a) by the 0–5 subgroup is a bit surprising;[16] the GMI subgroup made somewhat more conservative judgments. Nonetheless, this group too rated (28a) as largely acceptable (with G/M/I = 7(64%)/3(27%)/1(9%)). In fact, translating the 0–5 results into G/M/I results[17] yields G/M/I = 12/0/0. Combining the figures for the two groups, we get G/M/I = 19(83%)/3(13%)/1(4%). That is, 83% appear to judge sentence (28a) as good. Thus, it looks very doubtful that we are seeing, for whatever reason, any robust C-t effect in (28a).[18]

The picture is different in the case of (28b). The 0–5 group gave this sentence an average level of acceptability of 2.67. A Wilcoxon test comparing the acceptability of this sentence to its counterpart without *that*, (29) below, shows a very significant different in the treatment of this pair ($\alpha < 0.005$, $N = 10$).

(29) Who do they think might visit the Pope?
5.00/ G-91% M-9% I-0%

Likewise, the GMI group treated (28b) very differently from (29): whereas (28b) received G/M/I = 2(22%)/2(22%)/5(56%), sentence (29) received G/M/I = 10(91%)/1(9%)/0, a fairly dramatic shift in judgments.[19] Here, it appears reasonably safe to conclude that (28b) displays a more robust C-t effect.[20] Thus, (28b), but not (28a), is of interest in looking for an Av effect.

An adverbial phrase added to (28b), as in (30), appears to increase acceptability on both the scalar and the categorical measures.

(30) Who do they think that next year might visit the Pope?
3.42/ G-82% M-18% I-0%

This looks like the expected Av effect. Though the direction of difference looks right, a Wilcoxon test fails to show significance for the difference in scalar ratings produced by the 0–5 group. However, a χ^2 test does indicate significance for the different treatment of (28b) and (30) by the GMI group as follows. As noted earlier, two judgments are missing for (28b), leaving us

[16] However, my own judgment is that (28a) is relatively good. One factor may be the verb. *Say*, in contrast to *think*, seems to somehow facilitate *that*-trace, a pattern also observable in Sobin (1987). However, no theory that I am aware of offers an explanation of this difference.

[17] Given that all subjects were presented initially with the G/M/I distinction, it is fairly intuitive to extrapolate as follows: G = 5–4; M = 3–2; I = 1–0.

[18] This conclusion is further supported by the finding that a Wilcoxon test applied to the numerical results of the 0–5 group gives results not approaching significance.

[19] A minor error discovered early in the data elicitation process resulted in two judgments being lost from (28b), yielding 9 rather than 11 judgments. This is taken into account in the further analysis offered below.

[20] As a final note, a χ^2 test isn't appropriate for the GMI data here due to low expected values for M and I that would be entailed by an expectation of acceptability. However, such a test will be of use below.

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with nine. In order to make the numbers compatible to perform a χ^2 test, we add the two missing judgments to the G category, maximally biasing the data towards the null hypothesis of no difference, and giving us for (28b) G/M/I = 4(36%)/2(18%)/5(45%). If under this treatment we get a significant result, then this indicates that any possible values for the two missing judgments would not compromise the general significance of the result. Taking (28b) as setting the expected values, a χ^2 test comparing (28b) with (30) (G/M/I = 9(82%)/2(18%)/0) shows a significant difference in their treatment (χ^2 (2, $N = 11$) = 9, 0.02 > p > 0.01).[21]

Another way to measure the level of significance of the different treatment of (28b) and (30) is to translate the scalar values of the 0–5 group into GMI values as discussed earlier. For (28b), this results in G/M/I = 3/6/3, and for (30), G/M/I = 8/3/1. Now, if we combine the GMI results for the two groups and again add the two missing responses (to (28b) from the GMI group) to the G category (thereby maximally biasing the figures towards the null hypothesis), we get for (28b) G/M/I = 7/8/8, and for (30), G/M/I = 17/5/1. Again, a χ^2 test shows the difference to be significant (χ^2 (2, $N = 11$) = 21.54, p < 0.001).

In sum, it appears reasonably safe to conclude that these results contain evidence of a C-t effect for (28b)/(29), and of an Av effect for (28)/(30). More will be said below about (28a).

The kind of variation which we can see here has been documented elsewhere, as noted earlier. One of the main reasons for undertaking this empirical inquiry is to establish some initial picture of the relative acceptability of the DFC constructions of (25). We turn to these next.

The DFC sentences in this experiment included three examples each of *who that* AvP (like those in (25a–d)), *who* AvP, *that* AvP, and *who that* with no AvP, a DFC violation like (25e). The results are summarized in (31).

(31) *Average acceptability of DFC constructions*

who that AvP:	4.22/	G-82%	M-9%	I-9%
who AvP:	4.81/	G-100	M-0%	I-0%
that AvP:	4.58/	G-97%	M-3%	I-0%
who that:	1.06/	G-0%	M-30%	I-70%

Though there is a level of negative reaction to the *who that* AvP combination (line 1 of (31)), it is not at all on a par with true DFC violations (line 4 of (31)). It is important to consider in this context that the Av effect is itself variable – not all speakers find that adverbials restore *that*-trace constructions to full acceptability, as can be seen in the case of (30). Therefore, the variability/less-than-complete acceptability that we see in line 1 of (31) is

[21] If we distribute the two missing judgments for (28b) evenly over all three categories, we get G/M/I = 2.67/2.67/5.67. Again, taking (28b) as setting the expected values (as just discussed), a χ^2 test comparing (28b) with (30) shows a more significant difference in their treatment (χ^2 (2, $N = 11$) = 20.85, p < 0.001).

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expected if it is the Av effect which allows sentences of this type. The data of (25a–d)/line 1 of (31) should not be surprising from one point of view. The Av effect in effect renders the lexical complementizer invisible or null; the complementizer is treated as if it were absent, suspending the *that*-trace effect. It looks like the same thing may happen in a DFC construction. Thus, it appears that the Av effect may indeed be crucial to allowing these DFC constructions. This is the line of analysis that we will pursue further below.

Before leaving this discussion, some other aspects of these data are worth noting. First, these data do not strongly support the claim by some that a pre-clausal adverbial phrase requires *that* (e.g. Rizzi (1997: 313) predicates significant aspects of his CP analysis on the claim that such constructions are completely ungrammatical). There is somewhat reduced acceptability without *that*; however, the sentences in (32) reach a level of acceptability equal to or surpassing the Av effect sentences such as (30) (repeated below), which are generally treated by Rizzi (1997) and elsewhere as acceptable/grammatical.

(30) Who do they think that next year might visit the Pope?
3.42/ G-82% M-18% I-0%

(32) (a) Who did you say just last week saw Elvis?
3.83/ G-82% M-18% I-0%

(b) Who do they think next year might visit the Pope?
4.08/ G-91% M-9% I-0%

From these data, it appears that considering Av effect sentences as grammatical but sentences containing adverbial phrases without *that* as ungrammatical may even constitute a data inversion, a reversal in claimed relative degree of acceptability from actual fact.

Second, the Av effect on *whether* constructions (lines 5 and 6 of (26) and (27)) appears fairly marginal. The data here confirm the conclusions of Dye (1998), who also notes a rise in judgments of *whether*-trace constructions between outright rejection and passive acceptance (in the G/M/I-type task), but not much impetus for outright acceptance. *Whether*-trace constructions with an adverbial phrase do not approach a level of acceptability comparable to that of (30), an Av effect result. Nor do they appear to reach the level of acceptability of C-t violations such as (28a–b), which analyses of the C-t effect generally treat as ungrammatical.

Finally, as can be seen in the case of both *whether*- and *that*-clauses, a pre-clausal adverbial phrase somewhat reduces the acceptability of sentences with object extractions. In these data, a Wilcoxon test applied to the data of the 0–5 group on the deterioration of acceptability of sentences with an added adverb phrase shows a significance level of $\alpha \leqslant 0.005$ ($N = 10$). This consistent negative effect of a pre-clausal adverbial phrase on acceptability is also noted by Dye (1998: 10), who notes in addition that pre-clausal adverbial phrases even reduce the acceptability of sentences with no extraction. Only

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in the case of subject extractions showing a C-t effect, such as in sentence (28b), do pre-clausal adverbial phrases have a positive effect.

As noted earlier, sentence (28a), an apparent C-t construction, fails to show a strong C-t effect. From what has just been said, we might actually expect an added adverbial phrase to have a negative effect on acceptability in this instance, and this is what appears to happen, as we see by comparing (28a) to (33).

(28) (a) Who did you say that saw Elvis last week?
4.58/ G-64% M-27% I-9%

(33) Who did you say that just last week saw Elvis?
3.42/ G-55% M-36% I-9%

For the 0–5 group, who judged (28a) as highly acceptable, the added adverbial phrase deteriorates acceptability significantly ($\alpha < 0.025$, $N = 9$). While there is almost no difference in the treatment of these two sentences by the GMI group, it is nonetheless interesting that here too the adverbial phrase does not increase acceptability, but actually appears to lower it slightly.

One interpretation of such a result is that while on the one hand there may be a positive Av effect with problematic subject extractions such as in (28b), on the other hand (contra Rizzi 1997 among others), the CP layer may not be the most natural position for the adverbial phrases being considered here. That is, it may not be inherently built so as to house them.[22] This position is expanded upon in the analysis to follow.

4. Very minimal CP

Here, I wish to explore the possibility that the basic C-t effect, including its apparent variability, the Av effect, and the other facts just sketched out may be explained in terms of an operation in which CP is reduced or 'folded in' rather than expanded. It is noteworthy that even in an analysis which otherwise elaborates CP structure, Rizzi is led to argue for an unusual structural reduction/unification of parts of the CP layer. Following an original suggestion by Pesetsky (1982) and developed further in Sobin (1987), I pursue here the possibility that CP undergoes an extreme structural simplification: under specific conditions, the Spec and head elements of CP collapse or fuse together into a single indexed element, as will be spelled out below. This process and its interactions with lexical adjunction (Carnie 2000) may be key to explaining a variety of C-t phenomena. I refer to this process simply as 'Fuse'. Since Fuse involves elements which elsewhere have been claimed to undergo agreement, this process might be thought of as an extreme version of agreement, one which may be employed when there is

[22] It is possible nonetheless that there are other adverbs in English and/or other languages which seek relatively high positions. See Alexiadou (1997) and Cinque (1999).

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pressure for the layer to 'thin out' or collapse, and when that collapse will not violate recoverability.

There are facts which possibly indicate that the CP layer may be under very strong pressure to collapse or fold in on itself. For instance, all of the elements which are projected to be present in the CP layer (full phrases and lexical items, not simply bound morphemes/theory-projected functional heads) do not co-occur, a phenomenon embodied in the classic restriction against doubly-filled Comp.[23]

Another possible indication of a compacting of the CP layer is the fact that the function of a non-appearing element which is projected to be present may be taken on by another projected element which does appear, but which otherwise does not have that function. For instance, as seen in (19) (repeated below for convenience), the complementizer *that*, not normally referential, may take over the function of *who*, becoming referential in a relative clause. Likewise, subject relatives may need a C-type element, and yet we see *who* being able to assume such a function.

(19) The person *(that/who) hated the soup (is here).

This is not the only possible interpretation of these facts, but it is a possible one, and one worth considering.

Not only do embedded clauses give the appearance of wanting a thin CP layer, but English root clauses also can be viewed as displaying a severely minimized CP structure – they (like those in many languages) display no complementizer, and only minimally evidence CP in overt *wh*-movements. Perhaps clause-edge structure is kept to the absolute minimum needed for its functions of marking mood, demarkating the borders of thematic domains, and allowing the formation of complex (multi-clausal) interrogatives. In general, it is this line of thinking that I want to develop here in the discussion of Fuse.

The application and effects of Fuse appear to depend in part on the elements involved in the process. The following discussion is divided largely along the lines of two major subcases of Fuse, the case where a chain head is involved and the case where a trace is involved. The differences are small, but the consequences are not. We will deal with each of them in turn.

4.1 *CP reduction involving a chain head*

When a chain head (that is, an indexed *wh*-phrase or null operator) is in SpecCP, Fuse is triggered as in (34).

[23] This would be tantamount to something like IP not tolerating both a subject in SpecIP and an overt lexical head in I, etc. This is not the common situation.

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(34) *Fuse a Chain head*
A Chain head (in SpecCP) may collapse with C if one of these elements (SpecCP or C) is overt (that is, phonetic).[24]

As a consequence of this collapse, CP is simplified: the constituent C′ is eliminated. The resultant head element bears the index of the chain head and has the form of the overt element. It also retains the mood feature of the original C. Still assuming, along with Browning and others, that the C-t effect in (1) is due to the lack of a complementizer coindexed with a trace in subject position, Fuse results in an indexed C, and in licensing a subject-positioned trace where they may occur, as we shall see immediately.[25]

4.1.1 *Simple relative clauses*

This process affects a range of constructions involving CP structure and elements which interact with it. Consider first the relative constructions in (35)–(40). In these sentences, null *that* is represented as $[_{C}\ -WH]$.

(35) (a) the person who ordered the anchovies …
(b) … $[_{CP}$ who$_i$ $[_{C'}$ $[_{C}\ -WH]$ $[_{IP}$ t_i … →
(c) … $[_{CP}$ $[_{C}$ who$]_i$ $[_{IP}$ t_i …

(36) (a) the person that ordered the anchovies …
(b) … $[_{CP}$ Ø$_i$ $[_{C'}$ $[_{C}$ that] $[_{IP}$ t_i … →
(c) … $[_{CP}$ $[_{C}$ that$]_i$ $[_{IP}$ t_i …

(37) (a) *the person ordered the anchovies …
(b) … $[_{CP}$ Ø$_i$ $[_{C'}$ $[_{C}\ -WH]$ $[_{IP}$ t_i … ↛

(38) (a) the person who Mary saw …
(b) … $[_{CP}$ who$_i$ $[_{C'}$ $[_{C}\ -WH]$ $[_{IP}$ Mary … →
(c) … $[_{CP}$ $[_{C}$ who$]_i$ $[_{IP}$ Mary …

(39) (a) the person that Mary saw …
(b) … $[_{CP}$ Ø$_i$ $[_{C'}$ $[_{C}$ that] $[_{IP}$ Mary … →
(c) … $[_{CP}$ $[_{C}$ that$]_i$ $[_{IP}$ Mary …

[24] One referee notes that under the assumptions of derivation by phase, this operation and its companion in (46) below may have to be considered PF operations. These are not the assumptions here, but it should be noted for future consideration.

[25] As it stands, (34), as well as (46) below, is in good measure 'descriptive' of English (with some reference later to other languages), though it comports reasonably well with general notions of economy which are not language-specific. As we have seen, the English facts appear to be somewhat complex. More detailed empirical work on other languages of the general sort sketched here would be of great interest in attempts to extend this analysis. I consider the present work an early step in that direction.

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(40) (a) the person Mary saw …
(b) … [$_{CP}$ Ø$_i$ [$_{C'}$ [$_C$ −WH] [$_{IP}$ Mary … ↛

In (35)–40), (b) shows the relevant details of each CP structure, and (c) shows the result of Fuse if it applies. The arrow indicates that Fuse applies, and the slash arrow, that it does not.

In (35), the Spec element *who* is overt, allowing Fuse to apply, resulting in a CP as in (35c) with the intermediate constituent C′ eliminated, and a single indexed head which now licenses the trace in subject position. A similar situation holds in (36), with the complementizer *that* serving as the requisite overt element. The result of applying Fuse is (36c), with the same reduced structure but with an indexed *that* licensing the subject trace. This account explains the fact noted earlier that *that* in such constructions has a 'pronominal' character – it seems to refer to the relativized DP. (Traditional grammar books include it among the relative pronouns, e.g. Fowler 1983: 130.)

The CP in construction (37) cannot fuse since neither CP element is overt; as a result, the trace in subject position is left without a coindexed C to license it, and (37) is ungrammatical. It is noteworthy that the ungrammaticality of (37) is not predicted by the other accounts discussed here.[26]

Constructions (38)–(40) work in parallel to (35)–(37), though here, no subject trace licensing is involved. Consequently, construction (40) is grammatical, in distinction to (37), despite the nonapplicability of Fuse. Given the processes available, this is the most reduced CP structure available, and there is no unlicensed empty category.

4.1.2 *Doubly-filled Comp constructions*

Consider next doubly-filled Comp constructions, as in (41) (= (25e) above).

(41) (a) *I just saw a person who that could pass for Albert Einstein!
(b) … [$_{CP}$ who$_i$ [$_{C'}$ [$_C$ that] [$_{IP}$ t$_i$ … →

Let us assume that Fuse can apply here. This simplification does not result in a loss of LF-relevant material, since the resultant element bears the mood

[26] Two points are to be noted here. First, as one referee observes, one might claim (following Radford 1997: 332) that in cases like (35), the *wh*-phrase moves directly to C, obviating the non-fused stage shown in (35b). However, we are then left with the question about why it sometimes moves to SpecCP and other times to C. Also, if the positioning of null operators follows the positioning of *wh*-phrases, we incorrectly predict that (37) is simply grammatical.

Second, the same referee also notes the sometimes possible construction exemplified in (i):

(i) %There's a man sells vegetables in the village.

I have taken such reductions to be purely phonetic; however, much more detailed work on these constructions would be of great interest.

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feature of the original C, its central semantic content. Consequently, the construction producible from the elements in (41b) is (42), with the CP structure in (42b), in compliance with recoverability.

(42) (a) I just saw a person who could pass for Albert Einstein!
(b) … $[_{CP}\ [_{C}\ \text{who}]_i\ [_{IP}\ t_i$ …

In such a construction, Fuse again allows a more economical representation than the DFC structure, one with a simplified CP structure. Thus, if Fuse is available, a doubly-filled CP as in (41) forces an otherwise unnecessary/superfluous constituent, C′, something inconsistent with minimal representation. Thus, it might be argued that the more economical representation blocks the less economical one, deriving the effect of the Doubly-Filled Comp Filter.

4.1.3 *The Av effect and DFCs*

Now let's turn to the Av effect with DFC constructions such as (43) (= (25a) above).

(43) (a) I just saw a person who, that for all intents and purposes, could pass for Albert Einstein!
(b) … $[_{CP}\ \text{who}_i\ [_{C'}\ [_{C}\ [_{C}\ \text{that}\ ]\ \text{AvP}]\ [_{IP}\ t_i$ …→
(c) … $[_{CP}\ [_{Ci}\ [_{Ci}\ \text{who}\ ]\ \text{AvP}]\ [_{IP}\ t_i$ …
(d) … $[_{CP}\ [_{Ci}\ \text{who}\ [_{C}\ \text{that AvP}]]\ [_{IP}\ t_i$ …

It may be that the Av effect occurs because adverb phrases in constructions such as (43), as well as in (3), adjoin to C and effectively render it invisible. In more detail, we might account for this effect in terms of adjunction to a lexical head forming a constituent which still exhibits lexical properties, as proposed by Carnie (2000) (see section 3.2 above). As shown in (43b), *that* and the adverb phrase form a single constituent C^0. Since there are two C^0s present, Fuse may apply to this construction in more than one way. If Fuse looks at *that*, then *who* and *that* are fused into a single head, as shown in (43c) (and as just argued for in (41)–(42)). Some evidence that *who* may take over the position of *that* comes from the fact that (43c) may have the prosody shown in (44).[27]

(44) I just saw a person, who for all intents and purposes, could pass for Albert Einstein!

The other possibility is that Fuse looks at the higher C, the one containing not simply the complementizer but the more complex lexical phrase. For computational purposes, this C is evaluated as not being a 'true' lexical item and therefore as empty, as though it were a simple $[_{C}\ -\text{WH}]$. (There will be

[27] To my ear, this is the most natural prosody here.

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further evidence for this proposal below.) Fuse can apply, but it cannot go through completely here, since it would eliminate nonrecoverable material. Therefore, Fuse goes through as in (43d): short of eliminating the complementizer constituent, it forms another lexical adjunction, just as the complementizer did with the adverbial phrase.

These two apparently different results of Fuse may not actually be different. They can be unified as follows. Assume that Fuse simply tries to put the SpecCP and C elements together under a single indexed C, as in (45).

(45) $[_{Ci}$ SpecCP$_i$ C]

Now, if both elements are simple words ('true' lexical items such as *who* and *that*), this must collapse further (in compliance with recoverability) into a single lexical item or fail, since in principle multiple lexically-headed constructions are impossible (e.g. *$[_{DP}$ a book tree]). Full collapse is possible with items such as *who* and *that*, since Fuse preserves the mood feature of C and that mood feature is its only semantic content (as many assume that it is). However, when C isn't a simple/'true' lexical item, it cannot be collapsed, and the fused structure as in (45)/(43d) remains. Thus, (43c) and (43d) are instances of the same process, with the collapse able to proceed further in (43c), as dictated by recoverability.

Next, we turn to the interaction of Fuse with traces.

4.2 *CP reduction involving a trace*

Traces, which are not chain heads, also undergo Fuse; however, they appear to have a distinct triggering condition. The difference is reflected in the very striking contrast (noted earlier) between subject relative clauses as in (35)–(37) (and (19)) and subject extractions as in (1)–(2): whereas a subject relative (with a chain head occupying SpecCP) must have an overt CP element, a subject extraction in English as in (1)–(2) (in which a trace occupies SpecCP) fails if its CP contains an overt element, as in (1).

Following the earlier analyses of Kayne (1981) and Pesetsky (1982), the complementizer *that* is not simply unindexable, as more recent work has claimed; rather, the source of the index is crucial. In terms of the present analysis, a chain head easily fuses with *that*, imparting its index, but a trace most naturally does not. That is, there is a small but impactful difference between the triggering conditions for Fuse involving a trace and for Fuse involving a chain head: whereas Fuse involving a chain head requires at least one phonetic CP element, Fuse involving a trace requires the CP elements to be non-phonetic. Thus, we might state the condition for Fuse involving a trace as in (46).

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(46) *Fuse a trace* (*a non-chain head*)
A trace (in SpecCP) may collapse with C if neither of these elements (SpecCP or C) is overt (that is, phonetic).[28]

As we shall see immediately, Fuse operates uniformly in all other respects, though its effects can be dramatically different.

4.2.1 *Simple C-t constructions*

Sentences (47) (= (2) above) and (48) (= (1) above) illustrate the operation of Fuse involving a trace. Since a trace fuses with a null C (preserving its covert character), a sentence like (47) has a licensed subject trace and is universally acceptable.

(47) (a) Who did you say would hate the soup?
(b) Who_i … say $[_{CP}\ t_i'\ [_{C'}\ [_{C}\ -\text{WH}]\ [_{IP}\ t_i$ … →
(c) Who_i … say $[_{CP}\ [_{C}\ -\text{WH}]_i\ [_{IP}\ t_i$ …

The C-t effect is illustrated in (48).

(48) (a) %Who did you say that would hate the soup?
(b) Who_i … say $[_{CP}\ t_i'\ [_{C'}\ [_{C}$ that$]\ [_{IP}\ t_i$ … ↛

Here, the trace fails to collapse with the overt/phonetic complementizer, leaving an unlicensed subject trace. However, this is subject to variation, to which we turn immediately.

4.2.2 *Fuse and C-t variability*

As discussed earlier, speakers of English show variable acceptance rather than simple rejection of *that*-trace constructions such as (1)/(48), in contrast to categorical rejection of sentences such as (49), involving a subject extraction over *whether*.

(49) *Who did you wonder whether would hate the soup?

As seen in (26) above (and in other such studies), sentences like (49) are much more strongly and consistently rejected than are *that*-trace constructions.[29] Here, it looks as though *that* but not *whether* is indexable/fusable. Thus, Fuse cannot go through with *whether*, and such sentences are consistently unproducible.

[28] Presumably, economy of representation and the fact that there is never an issue of recoverability here should guarantee that this case of Fuse always applies. If it did not apply, any other transfer of index, say via agreement, would be unlikely, since such an agreement possibility would also allow agreement in C-t constructions and DFC constructions, undermining the account being advanced here.

[29] A comparison of the data from the 0–5 group of *that*-trace and *whether*-trace judgments shows *that*-trace constructions to be preferred at a significance level of $\alpha \leqslant .005$ ($N = 12$).

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The variable treatment of *that*-trace constructions has more the flavor of a minor distinction which is somehow being ignored or altered than of a major categorical difference. This variation may now be reduced to one facet of the condition for applying Fuse involving a trace. If the non-phonetic restriction on Fuse involving a trace stated in (46) is suspended (allowing a trace to fuse with *that*), then this condition on applying Fuse effectively reduces to the one involving a chain head, and a *that*-trace construction is produced, as in (50).

(50) (a) %Who did you say that would hate the soup?
(b) … $[_{CP}$ t_i' $[_C$ that] $[_{IP}$ t_i … ~~%~~→
(c) … $[_{CP}$ $[_{Ci}$ that] $[_{IP}$ t_i …

The difference in the two conditions is arguably subtle. Children acquiring English apparently do not acquire the non-phonetic condition early, and other languages may differ in observing it or not, as seen earlier in the Dutch sentence (7), or in the French example in (51).

(51) la fille que je crois qui est arrivée la première
the girl that I think that has arrived first
(Kayne 1981: 119)

Thus, there appear to be languages in which the covertness condition on Fuse involving a trace (stated in (46)) is not strictly adhered to. To go much further in the analysis of Dutch, French and other such languages will require more complete data and is a subject for future research. However, it now appears possible to view the variable treatment of these constructions in fairly simple terms.

4.2.3 *The Av effect in C-t constructions*

As for the Av effect on *that*-trace constructions, it is the same as in earlier cases, as shown in (52).

(52) (a) Who did you say, that without a doubt, would hate the soup?
(b) … $[_{CP}$ t_i' $[_{C'}$ $[_C$ $[_C$ that] AvP] $[_{IP}$ t_i … →
(c) … $[_{CP}$ $[_{Ci}$ t_i' $[_C$ $[_C$ that] AvP]] $[_{IP}$ t_i …

In (52b), the key elements are the trace in SpecCP and the complex C. As before, Fuse may consider either C, the lower true lexical C consisting only of *that*, or the higher complex C, one which is not pure lexical content and which consequently computes as null or simple $[_C$ −WH]. With the non-phonetic condition intact, Fuse cannot apply in the former instance, since lexical *that* is phonetic. However, the second possibility, in which a complex C computes as null, conforms to the non-phonetic triggering condition: both the trace and C are null. Fuse may apply, resulting in (52c), with a licensed subject trace, and thus we get the Av effect on subject extractions. As in

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earlier cases, the complex C consisting of *that* and AvP is left as an adjunct to the new head.

4.2.4 *Variable acceptance of Av effect constructions*

A further question to be addressed here concerns the variability of the Av effect. The cost of creating minimal syntactic constructions such as (52) is the creation of a fairly complex lexical item. As the data from this study and that of Dye (1998) show, pre-clausal adverb phrases (positioned with complementizers) are generally disfavored (except where they 'save' a subject extraction), perhaps due to the lexical complexity involved. It is quite possible that everyone perceives the syntactic simplification, but the reaction to the resultant lexical complication is still a disfavoring factor. Thus, such constructions involve both positive and negative factors which different informants may weigh differently, but with the syntactic simplification normally being favored.

4.3 *Some remarks on prosodic variation*

Let's return now to the question of variation in the prosody of examples like (20) (repeated below for convenience), with some speakers preferring the prosody of (20a), and others preferring that of (20b) or (20c).

(20) (a) Who did you say, that without a doubt, would hate the soup?
(b) Who did you say that, without a doubt, would hate the soup?
(c) Who did you say, that, without a doubt, would hate the soup?

I have assumed that the prosody of (20a) is the one that is revealing of the syntactic analysis of the Av effect. The prosody of (20c) is unproblematic for the analysis here, since it is compatible with this analysis; it is quite plausible that (20c) simply reflects a further 'marking off' of the AvP within the Comp-AvP constituent argued for here. As for (20b), although the C appears not to be marked off prosodically with the adverb, it is nonetheless noticeably reduced and somewhat 'separated' from the verb. It is possible that a pause immediately before the C, which would correspond with its syntactic analysis here, is being suppressed by the presence of another pause immediately after it. To see that such interactions exist, consider the prosody of non-restrictive relative clauses, as in (53).

(53) (a) *War and peace*, which everyone knows for its length, is a beautifully-written work.
(b) Mary, who we all know to be talented, was just admitted to Eastman.

Such relative clauses normally involve pauses, so much so, that it is conventional to indicate them with commas, as in (53). Consider next what

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happens to the prosody when an adverbial phrase is introduced, as in (54)–(55).

(54) (a) *War and peace*, which, without a doubt, everyone knows for its length, is a beautifully-written work.
(b) *War and peace*, which without a doubt, everyone knows for its length, is a beautifully-written work.
(c) *War and peace* which, without a doubt, everyone knows for its length, is a beautifully-written work.

(55) (a) Mary, who, without exception, we all know to be talented, was just admitted to Eastman.
(b) Mary, who without exception, we all know to be talented, was just admitted to Eastman.
(c) Mary who, without exception, we all know to be talented, was just admitted to Eastman.

What we see in (54)–(55) is that while it is possible to render all of the pauses, as in the (a) examples, it is also possible to reduce the pauses around the relative pronoun to a single pause either preceding or following the relative pronoun, as in the (b) and (c) examples. Here, the (c) examples are especially interesting because they involve not significantly pausing before the relative pronoun but instead reducing the prominence of the relative pronoun by a notable drop in intonation (which is elevated again at the onset of the adverb phrase) and a 'brief'/relatively fast articulation of the relative pronoun. (This is indicated above by the reduced font size). Further, a single major pause in that vicinity occurs at the onset of the adverb phrase, as the punctuation in the (c) examples indicates. In such a case, we would not be compelled to say that the constituency is fundamentally different from that of the other relative constructions, but rather that pauses in such proximity to each other may be reduced in favor of one or the other. In such a case, a syntactic boundary markable by a pause may alternatively be rendered as a reduction in prominence of a word.

Non-restrictive relatives are constructions in which the prosody is present independently of any adverbial expression. In contrast, in the Av effect constructions being considered in the sentences of (20), it is the introduction of the adverbial phrase which induces the possible pauses. By hypothesis, the adverbial phrase attaches to C, forming a constituent. The adverbial phrase itself is still capable of being prosodically marked off within that constituent. For those who prefer to do that, the initial pause preceding the C may be retained, as in (20c), or rendered instead as a reduced/de-emphasized C, as in (20b). Hence, some speakers prefer the prosody of (20b) or (20c) to that of (20a), while others prefer the prosody marking the constituent formed by C-AvP, that of (20a). A preference for (20b) is, therefore, not evidence against the analysis offered here. Further, speakers' preferences among the possibilities in (54)–(55) might be different from their preferences among the

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possibilities in (20), since the prosody does not have the same source in the two instances – in (54)–(55), it is partially independent of adverbial introduction, whereas in (20), it is not.

Variance in the acceptability of (25a–d) (repeated below for convenience) may also have prosodic aspects.

(25) (a) I just saw a person WHO, that for all intents and purposes, could pass for Albert Einstein!
(b) There are people WHO, that with very little prompting, would do some extreme things.
(c) Harvard has a player WHO, that with a little more work, could play for the Steelers.
(d) I just saw a sprinter WHO, that in all likelihood, will break the 200 meter record.
(e) *I just saw a person who that could pass for Albert Einstein!

The problem here is a bit different. To informants, sentences (25a–d) might give the appearance of having failed to undergo Fuse, an economy violation. From the standpoint of judging acceptability (a different kind of performance from actual production/use – see Schütze 1996), it may be that one has to have the pause cue, with a pause strongly separating the relative pronoun and the C, rather than the C reduction cue, as discussed in connection with (20), to perceive that the C and the adverb phrase are adjoined, that Fuse has in fact applied, and that there is no consequent economy violation. If this is right, then there should be a correlation between a preference for the prosody in (20a) and finding sentences (25a–d) fully acceptable. As far as I can tell from the earlier informants who I asked, those who strongly prefer (20b) over (20a) also disfavor sentences like those of (25). Milder differentiation between the acceptability of (20a) and (20b) (where they are both judged possible) does not lead to disfavoring (25).[30]

5. Final remarks

This paper has proposed that a structural possibility suggested by Carnie (2000), of adjunction to a lexical head to form a complex lexical head, may allow a fairly simple analysis of C-t constructions which explains a large array of surrounding C-t facts, many of which are not dealt with by other theories. Rather than expansion, the CP layer undergoes an extreme syntactic simplification which I have labelled Fuse, which, in conjunction with the possibility of adjunction to a lexical head, offers explanations of the C-t effect, the doubly-filled Comp filter effect, the Av effect, and much of the

[30] My further experience is that there are people who claim not to say (25a–d) but who find them unremarkable in normal use, though they find sentences like (25e) remarkable (notably, bad) and will call attention to them.

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variation in judgments accompanying these phenomena. This is mere speculation, but it may be that as far as the syntax is concerned, syntactic complication/elaboration is less desirable than lexical complication, so the syntax rejects the former in favor of the latter.

Fuse is not completely exotic. Rather, it is an extreme form of agreement – it involves the same elements and features as agreement would, and it preserves these features in compliance with recoverability. Perhaps it is the form of agreement which an 'ultra-thin' CP layer requires. Under the assumptions of some of the other analyses considered here (that is, those which claim that the null complementizer (but not *that*) may 'agree' or be indexed), if Spec-head agreement were available in CP, then subject relative clauses such as (37) above, repeated here, should be universally acceptable.

(37) (a) *the person ordered the anchovies …
(b) … $[_{CP}$ Ø$_i$ $[_{C'}$ $[_{C}$ $-$WH] $[_{IP}$ t$_i$ … ↛

The fact that they are not suggests that ordinary (non fusing) Spec-head agreement is unavailable to CP.

Perhaps it is recoverability which prevents Fuse from applying more broadly. That is, perhaps crucial elements of CP are purely functional and hence are particularly susceptible to the structurally minimal form of agreement seen in Fuse. This is a matter for further research.

This work has focused largely on English, since comparable data are not yet available on other languages. This is also a topic for future research.

APPENDIX 1
Description of the experimental task

THE SUBJECTS The 23 subjects for this study were undergraduate British university students attending the University of Wales, Bangor. Though from various parts of the country (mostly England), they were all native speakers of what may be termed standard colloquial British English.

THE TASK & MATERIALS The subjects were not made aware of the specific aims of the research. They all were told (in preliminary written instructions which were read with them out loud) that they would judge sentences which might be classed as 'good' – a sentence that the subject might say in the right situation; 'maybe' – a sentence that the subject might not say but might expect to hear someone else say who was not making a mistake; or 'impossible' – a sentence which a native speaker of English would not say this way, even though it might be understandable. They were assured that there were no 'right' or 'wrong' answers, and asked to judge each of these sentences as to how natural it sounded to the subject. One subgroup, of 11 subjects, judged these sentences directly as 'good', 'maybe' or 'impossible' –

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as described above. A second subgroup, of 12 subjects, gave naturalness judgments on a more discriminating 0–5 scale, with 0 as 'impossible' and 5 as 'good'/perfectly natural.

The constructions being judged included basic C-t constructions, Av effect constructions, and DFC constructions with and without adverbial phrases like those above. Crucial sentences referred to in the study are included in appendix 2, along with the average levels of acceptability for these items.

The subjects were asked to listen to, read, repeat, and then judge each test sentence for acceptability. Subjects were first presented with a preliminary set of 'warm-up' sentences used to tune them to the task. No one had difficulty with the preliminary task. The main body of sentences was then presented one-at-a-time in a random order. This task also appeared to be clearly understood by all participating in the study. There were no apparent problems in carrying out the requisite task.

APPENDIX 2
Results of the experimental task

The list below includes the actual sentences cited in this study, along with the average acceptability level. The number to the left is the average acceptability assigned by those carrying out the 0–5 judgment. The GMI figures to the right are the percentage of informants offering that category of judgment; G = 'good'; M = 'maybe'; and I = 'impossible'. The sentences presented here are not in the random order which was presented to the subjects, but are grouped by construction type.

Comp-trace constructions with no AvP

(1) (a) Who did you say that Mary saw last week?
5.00/ G-100% M-0% I-0%
(b) Who do they think that Fidel might visit?
4.50/ G-100% M-0% I-0%

(2) (a) Who did you say Mary saw last week?
5.00/ G-100% M-0% I-0%
(b) Who do they think Fidel might visit?
5.00/ G-100% M-0% I-0%

(3) (a) Who did you say that saw Elvis last week?
4.58/ G-64% M-27% I-9%
(b) Who do they think that might visit the Pope?
2.67/ G-22% M-22% I-56%

(4) (a) Who did you say saw Elvis last week?
4.92/ G-100% M-0% I-0%
(b) Who do they think might visit the Pope?
5.00/ G-91% M-9% I-0%

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(5) (a) Who did you ask whether saw Elvis last week?
0.33/ G-0% M-0% I-100%
(b) Who do they wonder whether might visit the Pope?
0.92/ G-0% M-0% I-100%
(6) (a) Who did you ask whether Mary saw last week?*
(b) Who do they wonder whether Fidel might visit?
1.92/ G-18% M-36% I-45%

*This sentence was inadvertently omitted from the random list.

Comp-trace constructions with an AvP

(7) (a) Who did you say that just last week Mary saw?
3.08/ G-82% M-18% I-0%
(b) Who do they think that next year Fidel might visit?
3.67/ G-73% M-27% I-0%
(8) (a) Who did you say just last week Mary saw?
3.25/ G-64% M-36% I-0%
(b) Who do they think next year Fidel might visit?
3.25/ G-64% M-36% I-0%
(9) (a) Who did you say that just last week saw Elvis?
3.42/ G-55% M-36% I-9%
(b) Who do they think that next year might visit the Pope?
3.42/ G-82% M-18% I-0%
(10) (a) Who did you say just last week saw Elvis?
3.83/ G-82% M-18% I-0%
(b) Who do they think next year might visit the Pope?
4.08/ G-91% M-9% I-0%
(11) (a) Who did you ask whether just last week saw Elvis?
1.08/ G-18% M-27% I-55%
(b) Who do they wonder whether next year might visit the Pope?
1.25/ G-9% M-45% I-45%
(12) (a) Who did you ask whether just last week Mary saw?
0.67/ G-0% M-27% I-73%
0.67/ G-0% M-45% I-55%**
(b) Who do they wonder whether next year Fidel might visit?
1.67/ G-0% M-55% I-45%

**This sentence was inadvertently offered twice in the random list. Both sets of averages are shown here.

DFC constructions

(13) (a) I just saw a person who, that for all intents and purposes, could pass for Albert Einstein. 4.08/ G-82% M-9% I-9%
(b) I just saw a person who, for all intents and purposes, could pass for Albert Einstein. 4.67/ G-100% M-0% I-0%

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(c) I just saw a person, that for all intents and purposes, could pass for Albert Einstein. 4.83/ G-100% M-0% I-0%

(d) I just saw a person who that could pass for Albert Einstein. 1.17/ G-0% M-45% I-55%

(14) (a) There are people who, that with very little prompting, would do some dangerous things. 4.25/ G-82% M-18% I-0%

(b) There are people who, with very little prompting, would do some dangerous things. 4.83/ G-100% M-0% I-0%

(c) There are people, that with very little prompting, would do some dangerous things. 4.50/ G-91% M-9% I-0%

(d) There are people who that would do some dangerous things. 1.00/ G-0% M-18% I-82%

(15) (a) I just saw a runner who, that in all likelihood, will break the 200 meter record this year. 4.33/ G-82% M-0% I-18%

(b) I just saw a runner who, in all likelihood, will break the 200 meter record this year. 492/ G-100% M-0% I-0%

(c) I just saw a runner, that in all likelihood, will break the 200 meter record this year. 4.42/ G-100% M-0% I-0%

(d) I just saw a runner who that will break the 200 meter record this year. 1.00/ G-0% M-27% I-73%

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Author's address: Department of Linguistics, University of Wales, Bangor,
Bangor, Gwynedd LL57 2DG, U.K.
E-mail: n.sobin@bangor.ac.uk

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