

WORD FORMATION AND THE NOTION 'LEXICAL RULE'

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The notion 'lexical rule' has been used to encompass different concepts and intuitions about the optimal division of labor between the lexical and syntactic components of a generative grammar. The lexicalist hypothesis, proposed by Chomsky (1970), established a division between lexical rules viewed as word-formation processes and syntactic rules viewed as transformations. Bresnan (1980) attempts to exploit this distinction in arguing that the class of lexical rules should be expanded to include passive and other former transformations. In this paper it is argued that the system on which this argumentation is based is unworkable and therefore that her argument is invalid. The demonstration that this argument is flawed highlights the need for a set of word formation rules (WFR) with access only to lexical items which are basic in the sense of Chomsky (1970). It is shown that WFRs form a set distinct from rules like passive and that this issue is independent of the decision about whether passive is treated as a lexical or a syntactic process.

1. Introduction*

Lexical rules, like political candidates, periodically lay claim to being all things to all people. The set of assumptions which are represented by the use of this notion in any given context is often implicit and therefore difficult to ascertain. One result of this inexplicitness is that, internal to a given framework, contradictions can arise between overt claims and covert assumptions. The lexicalist hypothesis, proposed by Chomsky (1970), introduced the notion of lexical rule as an opposition to the notion of transformational rule. In this framework the domain of lexical rules consisted of a set of basic lexical items, i.e. those lexical items which were not transformationally derived. In the current proliferation of nontransformational frameworks, including lexical functional grammar (LFG), the class of lexical rules has been greatly expanded at the expense of the "transformational" component. In LFG, it appears that the dividing line between the two rule-types rests on a notion of boundedness. In LFG, lexical rules like passive operate on a bounded domain, the predicate argument structure of verbs, while transformational rules like wh movement operate over an unbounded stretch of constituent structure.¹ In Bresnan (1980) it is claimed that this division between lexical rules and unbounded dependencies is motivated by the lexicalist hypothesis. In this paper, I argue that, in fact, the system proposed by Bresnan not only renders the lexicalist hypothesis itself meaningless but furthermore makes it impossible to capture by any means the insights which were em-

bodied in the lexicalist hypothesis as applied in e.g. Wasow (1977).

The paper is organized as follows: in section two I briefly characterize the proposal in Chomsky (1970) and discuss Wasow (1977), an interesting application of Chomsky's idea. The next section contains a critique of Bresnan's (1980) attempt to treat essentially the same data in the LFG framework. In section four I briefly describe Roeper and Siegel's (1978) analysis of English verbal compounding which is based on subcategorizations frames. Bresnan's treatment of compounding and the problems it faces are considered in section five. In the final section I conclude that there should be a word formation component in the grammar of English whose domain is restricted to the set of lexical items which are basic, roughly in the sense of Chomsky (1970).

2. The Lexicalist Hypothesis

Chomsky (1970) introduced the question of a split between lexical and syntactic rule systems into the generative grammar domain. In his discussion of the differences between gerundive nominals (e.g. John's criticizing the book) and derived nominals (e.g. John's criticism of the book), Chomsky suggested a set of criteria for distinguishing syntactic rules from lexical rules. The most important of these criteria are:

1) Productivity - Syntactic rules were portrayed as highly productive and generally free of lexical exceptions. Lexical rules, on the other hand, were portrayed as idiosyncratic and typically limited to subclasses of the lexicon. Morphologically, this criterion distinguishes the -ing of gerundive nominals from the variety of morphological marking which appears on derived nominals (criticism, refusal, enjoyment, eagerness, ...).

2) Semantic regularity - The semantic relationship between the meaning of a gerundive nominal and its verbal base is both regular and predictable. The meaning of a derived nominal can vary arbitrarily from the meaning of its root (editing - edition).

3) Phrase Structure Configurations - Gerundive nominals occur in sentential frames while derived nominals occur in NP frames. This result follows automatically if gerundive nominals have a sentential source while derived nominals are inserted under NP.

- (1) a. * the proving the theorem
b. the proof of the theorem
- (2) a. * John's unmotivated criticizing the book
b. John's unmotivated criticism of the book
- (3) a. * several of John's complaining(s) about the department
b. several of John's complaints about the department

Gerundive nominals do not occur in NP structures with determiners (1a), adjectives (2a) or quantifiers (3a) while derived nominals do.

4) Base vs. Derived Structures - Gerundive nominals can appear in

transformationally derived structures while derived nominals cannot.

- (4) a. John's being easy to please
b. * John's easiness to please
- (5) a. his offering Bill the job
b. * his offer of Bill (of) the job

Since in (4) John cannot be the deep structure subject of easy, the derived nominal in (4b) is impossible. The case is similar in (5), assuming that the "double object" construction is not a base structure.

Within the framework of the Extended Standard Theory (EST), the notion that lexical rules and syntactic rules have different properties was developed in an interesting way in Wasow (1977). Wasow claimed that the organization of the grammar posited by the EST framework predicts, at least in part, some of the division of properties between the two types of rules. Moreover, as Wasow noted, developing a set of criteria for each set of rules constitutes an empirical prediction that if a rule exhibits properties from one of these lists then it will also exhibit others from the same list or at least that it will not exhibit any properties from the opposite list. The table below contains the grouping of properties proposed by Wasow (slightly modified).

(6) Lexical Rules	Transformations
precede transformations	can be fed by transformations
cannot create structure	need not be structure-preserving
operate on grammatical/ thematic relations ²	operate on phrase structure
can change word class	cannot affect node labels
idiosyncratic	regular

The first contrast represents the assumption, basic to the EST framework, that lexical insertion precedes all transformations. It follows straightforwardly that transformations can feed other transformations but cannot feed lexical rules. The second contrast is closely related to the first. Suppose a lexical rule were nonstructure-preserving, i.e. created a lexical item which required a structure not generated by the phrase structure rules. The result would be that this lexical item could never occur in any well-formed sentence since it could never be inserted in any deep structure. Thus only transformations are allowed to create structures which are not given by the phrase structure rules. The third contrast is based on the assumption that grammatical and/or thematic relations are specified only at the level of deep structure. From this it follows that only lexical rules, which precede deep structure, can refer to these relations. The fourth contrast derives from the assumption that the transformational formalism does not provide a mechanism for changing lexical category labels.³ Finally, the fifth contrast echoes the observation by Chomsky (1970) that transformations are more predictable both morphologically and semantically than lexical rules.

Wasow utilized these criteria in his examination of what have been called passive adjectives, i.e. passive participles which appear in adjective positions. Some of the diagnostics for adjective positions are given below.

1) Adjectival un- vs. Verbal un- - The prefix un- added to adjectives means 'not' as in unhappy. The prefix un- added to verbs means 'do the reverse' as in unzip.

- (7) a. The rope was untied by Wonder Woman.
b. The rope was untouched by human hands.

In (7a) untied can be a verbal passive formed on the verb untie. In (7b), however, untouched must be an adjective formed on the adjectival passive touched since there is no verb untouch.

2) Modifiers - The phrases very much and quite a bit⁴ are adverbial modifiers which occur with verbs as in (8).

- (8) a. We very *(much) respect your opinion.
b. We respect your opinion quite a bit.

But very or quite⁵ by themselves can only modify adjectives.

- (9) a. We are very (*much) angry with you.
b. We are quite (*a bit) angry with you.

Thus in (10) respected has an adjectival source, since it can be modified by very or quite alone (10a,b), as well as a verbal source (10a,c).

- (10) a. Your opinion is very (much) respected.
b. Your opinion is quite respected.
c. Your opinion is respected quite a bit.

3) Complements - Adjectives do not allow either nominal or adjectival complements while verbs allow either.

- (11) a. John is considered a fool.
b. * John is obvious a fool.

The passive participle considered in (11a) must then be verbal since, unlike the adjective obvious, it allows a nominal complement. In (12) there is an adjectival complement, young.

- (12) a. They were educated young.
b. * They were obvious young.

Adjectives like obvious do not allow adjectival complements while verbal passives like educated do. Notice the contrast in (13) with quite.

- (13) a. They were quite educated.
b. * They were quite educated young.

Only the adjectival passive (13a) allows the modifier quite.⁶

Based on these observations, Wasow argues that at least some passive participles in English must be inserted under the lexical category of adjective. Hence, according to the division in (6), these participles must be produced by a lexical rule since their word class has been altered from verb to adjective. This then predicts that the lexical rule of passive adjective formation will differ from the syntactic rule of passive in the other respects detailed in (6). This prediction is empirically confirmed by the following observations. The lexical passive adjective does not allow a nominal complement.

- (14) a. Melvin was offered a good job.
b. * Melvin remained offered a good job.

The nominal complement a good job is possible with be in (14a) which allows a verbal complement but impossible with remain in (14b) which requires an adjectival complement. The lexical passive is restricted to the direct object/Theme of the base verb while the verbal passive is not.

- (15) a. an un letter
b. * an unsent penpal (meaning a penpal to whom nothing has been sent)

- (16) a. The letter was sent to his penpal.
b. His penpal was sent the letter.

In (15) and (16) letter is the direct object/Theme of send and penpal the indirect object/Goal. The lexical passive does not occur with transformationally derived structures like raising while the verbal passive does.

- (17) a. The war was very *(much) believed to be wrong.
b. * The war was quite believed to be wrong.

- (18) The war was believed to be wrong by everyone.

Finally the passive adjective can sometimes be different either morphologically or semantically from the verbal participle (proven - proved).

Thus Wasow concludes that this characterization of lexical vs. syntactic rules provides evidence that English has two rules of passive, one lexical and one syntactic.

3. Passive as a Lexical Rule

Bresnan (1980), relying on the lexicalist hypothesis and presenting data similar to that cited previously, argues that the grammar of English has only a single rule of passive, a lexical rule. The form of argument is as follows. The morphological rule which forms passive participles partitions the set of verbal stems in the lexicon. In addition to the regular -ed suffix, there are subclasses of verbs which have participles in -en (take - taken), verbs which have alternate stems for the participle (break - broken), verbs in which the participles exhibit ablaut (think - thought), and so on. If the grammar of English contains two rules of passive, Bresnan argues, then this morphological distribution will have

to be stated twice in the grammar of English, once to determine the form of passive adjectives and again to determine the form of verbal passive participles. Thus it would appear to be advantageous to have a single rule of passive and avoid this repetition. But this analysis requires the output of passive to serve as input to the lexical rule of passive adjective formation. Since no transformation can feed a lexical rule, the proposed single rule of passive must therefore be a lexical rule.

The conclusion that verbal passive should be considered a lexical rule in English supports the claim of LFG that any rule which is dependent on grammatical relations is a lexical rule. Thus, for example, the alternation between the two uses of give in (19) is captured by the lexical rule of dative.

- (19) a. Johnny gave a bone to the dog.
b. Johnny gave the dog a bone.

The dative rule is predicted to be a lexical rule in the LFG framework both because it affects grammatical relations and because it can feed passive.

- (20) The dog was given a bone by Johnny.

Thus the lexicon contains the following four entries for give.⁷

- (21) a. give < (SUBJ) (OBJ) (TO OBJ) >
b. give < (SUBJ) (OBJ2) (OBJ) >
c. given < (BY OBJ) (SUBJ) (TO OBJ) >
d. given < (BY OBJ) (OBJ) (SUBJ) >

The lexical form in (21c) appears in (22), the passive of (19a).

- (22) A bone was given to the dog by Johnny.

The relationship between (19a) and (22) is now captured not by a transformation but rather by the lexical rule of passive, which relates the two forms of give.

Since Bresnan (1980) explicitly invokes the lexicalist hypothesis, we might wonder what content it has in this framework. Recall from the previous section that the ungrammaticality of (14b) and (15b) could be attributed to the failure of a transformational rule like dative movement to feed the lexical passive rule. In this framework, that alternative is no longer available since dative itself is also a lexical rule. Bresnan proposes to account for the failure of the rule of passive adjective formation to accept (21d) as input by placing a condition on this rule which requires that the input have its subject associated with the role of Theme.⁸ Under this account, the impossibility of e.g. (15b) is attributed to the subject of sent being associated with its Goal in the lexical entry corresponding to (21d).

As Bresnan notes, there is a problem with this analysis which arises

with the contrast between like and please. These verbs have similar semantic structures in which the pairing of thematic roles with grammatical relations has been reversed. While like has its Theme as direct object, please has its Theme as subject.

- (23) a. like (see, hear, fear, hate) < ^{EXP}(SUBJ) ^{THEME}(OBJ) >
 b. please (interest, surprise, excite) < ^{THEME}(SUBJ) ^{EXP}(OBJ) >

In both cases, however, the passive adjective modifies the direct object.

- (24) a. an unseen hand
 b. * an unseen look-out (meaning a look-out who doesn't see anything)
- (25) a. an uninterested audience
 b. * an uninterested performance (meaning a performance that doesn't interest anyone)

The same problem arise with regard as and strike as.¹⁰

- (26) a. regard (consider, respect) as < ^{GOAL}(SUBJ) ^{THEME}(OBJ) ^{LOC}(NCOMP) >
 b. strike (impress, disappoint) as < ^{THEME}(SUBJ) ^{GOAL}(OBJ) ^{LOC}(NCOMP) >

Again, despite the contrast in thematic structure, the passive adjective modifies the direct object.

- (27) a. Cosell is very (much) respected as a lawyer.
 b. Cosell is quite respected as a lawyer.

- (28) a. I am very unimpressed by Reagan as an economist.
 b. I am quite unimpressed by Reagan as an economist.

There are at least two possible solutions to this dilemma. One, which Bresnan (1980) adopts, is to suggest that the thematic structure assigned in (23) and (26) is incorrect and that it can somehow be modified to produce the desired results. Any modification would need a concept of Theme which is motivated by something other than the notion 'subject of the passive adjective.' Since no such concept has yet been provided, I leave this alternative open.

Another possibility is to abandon Theme as the appropriate notion and to try to recapture the intuition of the original lexicalist hypothesis that the lexical form of e.g. give in (21a) is more basic than the lexical form of give in (21b). This could be accomplished by defining a class of basic lexical items to which, in effect, no rules had applied and which would distinguish (21a) from the remainder of the lexical entries in (21). The active form (21a) would be the only input available to word formation rules (WFRs) like passive adjective formation and none of the impossible adjectives would be produced.

The effect of this proposal, however, is that it completely vitiates

the argument for a single lexical rule of passive. This is so because the morphological advantage on which Bresnan's argument was based is lost if the active form serves as the input to the adjective formation rule. It would no longer be possible to state the distribution of participle marking as part of a single rule since two rules of passive will be necessary, an adjectival one which allows only (21a) as input and a verbal one which allows (21a) and (21b) as input. The advantage Bresnan claims results only if (21c) is available as input to the adjective formation rule. But if (21c) is allowed as the input to the adjective rule, how could the necessary concept of basic lexical item be defined in such a way as to distinguish (21c) from (21b,d)?

Before drawing any general conclusions from this discussion, I would like to consider possible formulations of another word formation rule in English in the next two sections.

4. Verbal Compounding

In an extended treatment of verbal compounding, Roeper and Siegel (1978) proposed the First Sister Principle (FSP) to characterize those arguments of a verb which are possible as first elements of such compounds. Verbal compounds are adjectives (-ing, -ed) and nouns (-er) formed by preposing an argument of the verb and adding the appropriate suffix. Some examples follow.

- | | | | | |
|------|----|---------------------|-----------|-------------|
| (29) | a. | odd-sounding name | (Adj + V) | |
| | b. | fast-moving train | (Adv + V) | |
| | c. | profit-sharing plan | (N + V) | [N from NP] |
| | d. | cave-dwelling bat | (N + V) | [N from PP] |

Roeper and Siegel observed that these compounds are possible when the first element can be the first (i.e. leftmost) sister of the verbal base in its subcategorization frame. Contrast the impossible compounds in (30) with those in (29).

- | | | | |
|------|----|--------------------------|--|
| (30) | a. | * angry-making remark | (meaning a remark that makes people angry) |
| | b. | * fast-finding money | (meaning money that is found fast) |
| | c. | * drawer-putting sweater | (meaning a sweater that is put in drawers) |
| | d. | * cat-scratching chair | (meaning a chair that cats scratch) |

Transitive verbs like make, find and put, which have their direct objects as first sister, cannot form compounds with an adjective (30a), an adverb (30b) or a prepositional object (30c). An active verb cannot form a compound with its subject (30d), which is neither a sister of the verb or included in the subcategorization frame.

Unlike the verbal compounds formed with -ing (and -er), compounds formed with -ed can contain the subject of the active verbal base.

- | | | |
|------|----|-----------------|
| (31) | a. | moth-eaten coat |
|------|----|-----------------|

- (31) b. government-financed project
c. rain-soaked ground

Furthermore, unlike the active transitive cases above, -ed verbal compounds allow adverbs and prepositional objects.

- (32) a. well-read book
b. widely-noticed article
c. home-grown tomatoes

In order to account for the properties of these -ed compounds, Roeper and Siegel propose a lexical rule of passive which operates on subcategorization frames and which feeds compounding. This rule deletes the direct object and creates a slot for a postposed agent. These "passive" subcategorization frames serve as input to the compounding rule, producing (31) and (32).

5. Syntactic Adjacency

Bresnan (1980) notes that the acceptability and properties of the -ed compounds follow directly from the FSP and the existence of passive lexical entries, which are independently necessary in LFG. Recall, however, that under the Roeper and Siegel analysis the domain of the FSP is structurally-specified subcategorization frames. In the LFG framework, subcategorization is functionally specified in terms of grammatical functions and not structurally specified in terms of phrase structure configurations. Bresnan suggests as an alternative a principle of syntactic adjacency which stipulates that the elements of a compound must occur adjacent to each other in some surface environment.¹¹

It is not difficult to see, however, that the principle of syntactic adjacency does not adequately replace the FSP in characterizing well-formed verbal compounds. For example, consider give. Compounds are possible with the direct object of give and other such verbs but not with the indirect object.

- (33) a. life-giving medicine
b. magazine-selling lady
c. letter-writing friend

- (34) a. * patient-giving medicine (meaning medicine that gives patients something)
b. * woman-selling lady (meaning a lady that sells things to women)
c. * student-lending department (meaning a department that lends to students)

The impossibility of the compounds in (34) would follow from the FSP under the assumption that dative is a syntactic rule.¹² Clearly the difference between (33) and (34) cannot be attributed to any effect of syntactic adjacency since e.g. give can occur adjacent to either its direct object or its indirect object. In this case, no condition in terms of thematic roles is adequate. Restricting these compounds to the Theme argument would rule out all of the well-formed examples

except (29b). Excluding Goal arguments would rule out well-formed compounds, e.g. duck-calling whistle and theater-goers. Clearly if the FSP is a reasonably adequate representation of the generalization involved in compounding then no condition based on thematic roles will be possible since it selects the immediately postverbal argument independently of its thematic role. With give, we only need to say that it can occur in an -ing compound with its direct object (33a) or an -ed compound with its subject (God-given talent) or an adverb (oft-given speech). This result is predictable if the only possible input to the compounding rule is the lexical form of give in (21a).

Consideration of possible verbal compounds in English points again to the necessity of distinguishing the lexical form of give in (21a) from the other entries in (21). The rule which forms these compounds accepts as input basic lexical items roughly in the sense of Chomsky (1980), that is the lexical entry from which the others can be derived by the rules of passive and/or dative. Without this concept of basic lexical item, the system of lexical rules proposed in Bresnan (1980) cannot adequately predict the set of well-formed English verbal compounds. Rephrasing slightly, the data in this section support the hypothesis offered at the end of section three that there is a class of WFRs in English which accept as input only a restricted set of the lexical entries posited in Bresnan (1980).

6. Conclusion

The advantage of the lexicalist hypothesis as explicated in Wasow (1977) was that by dividing lexical rules and syntactic rules into separate classes certain types of potential interactions were excluded, exclusions which were seen to be empirically verified. We have seen that it is not important whether a particular rule is formulated as a lexical rule or a transformation but rather whether a framework provides a non-arbitrary way of predicting the observed rule interactions. In the present LFG framework, no mechanism to accomplish this is available. I have suggested here that the notion of basic lexical item would provide such a mechanism. But if this suggestion is adopted then Bresnan's argument for a single rule of passive based on the morphological similarity of adjectival and verbal passives fails. Bresnan's argument is further weakened by the fact that the perfect participle, which has the same argument structure as the active base and hence cannot be collapsed with passive, is morphologically identical to the passive participle. I conclude, then, that no argument has been offered which shows that passive must be a lexical rule.

I have not, however, argued that passive cannot be a lexical rule in the LFG framework (or any other framework). Under the assumption that WFRs form a designated subclass of lexical rules which allow only basic lexical items as input, the distinction proposed as the lexicalist hypothesis can be maintained. What must be emphasized is that, contrary to the assumption in Bresnan (1980), the notion of lexical rule in LFG is not the same notion of lexical rule characterized by Wasow in (6). Rather, the implicit notion of lexical rule in LFG seems to be based on a concept of boundedness, i.e. lexical rules are those rules which operate on the restricted domain of predicate argument structure. Here

I have pointed out that once this notion is made explicit, the argument in Bresnan (1980) that passive is a lexical rule is invalid. Furthermore, I have shown that an adequate characterization of word formation rules in English requires a notion of basic lexical item. One device which would enable LFG to achieve this is a representation of multiple levels of structure internal to the lexicon. The observed rule interactions could then be assured by allowing word formation rule to operate only on the initial level of this representation. It remains to be seen whether or not this proposal can be executed in an interesting way.

Footnotes

* The idea that current lexical approaches to certain problems have overlooked some of the essential insights of generative grammar is also developed in Kuroda (1981). My own thinking on this general issue was influenced by our discussions. I would also like to thank Sandy Chung, Bill Davies, Dave Perlmutter, Yashy Tohsaku and Janis Williamson for comments on an earlier version of this paper. The responsibility for any errors is, of course, my own.

¹ In more recent formalizations of LFG such as Kaplan and Bresnan (1981), unbounded dependencies like wh movement are represented by a distinguished type of control relation called constituent control. This account maintains the same distinction between lexical rules and unbounded rules discussed in the text.

² Grammatical relations, at least for English, are assumed to be defined configurationally, e.g. the NP immediately dominated by S is the subject. Thematic relations are a representation of semantic structure in terms of roles like Agent, Goal and Theme in the sense of Gruber (1965) and Jackendoff (1972, 1976).

³ The validity of this assumption depends on whether or not lexical categories are represented in terms of features. The only issue here is whether this contrast follows from other elements of the framework or is an independent parameter.

⁴ The contrast between quite as an adjectival modifier and quite a bit as a verbal modifier was pointed out to me by Janis Williamson.

⁵ Actually, quite can also modify predicate nominals, although perhaps with a slightly different meaning.

(i) Haig is quite an idiot.

⁶ This observation is due to Janis Williamson.

⁷ The notation used is that given in Bresnan (1980). TO OBJ is the grammatical function (GF) assigned to the dog in (19a), OBJ2 is the GF assigned to a bone in (19b) and BY OBJ is the GF assigned to Johnny in (20). In more recent work (Bresnan, to appear), BY OBJ has been replaced with OBL_{AG} (for oblique Agent) and TO OBJ with OBL_{GO} (for oblique Goal).

⁸ Of all of the proposed thematic relations, Theme is the most dif-

ficult to pin down. The central notion of Theme for Gruber (1965) was that entity which underwent change or was directly affected by the action. In Jackendoff (1976) the notion of Theme was abandoned. Anderson's (1977) reply to Wasow (1977) discussed a notion of Theme which is partially determined by syntactic factors.

⁹EXP represents the thematic role of Experiencer. This notion actually derives from Fillmore's (1974) case grammar framework which posits a level of semantic representation similar to thematic roles.

¹⁰NCOMP is the GF assigned to predicate nominals like a lawyer in (27) and an economist in (28) in the system of Bresnan (1980). LOC represents the thematic role of Locative where a standard of comparison is taken to be an extension of the basic notion of location.

¹¹An argument in support of syntactic adjacency is derived from Adj + N compounds like hairy-chested. Bresnan argues that the source of these compounds is the prenominal modifier position since adjectives like asleep which do not occur in prenominal position are also excluded from compounds (e.g. *asleep-footed). Since nouns do not subcategorize for adjectives, Bresnan concludes that some principle like syntactic adjacency is required.

¹²Roeper and Siegel do not adopt this position since they consider the dative alternation to be a lexical process. Instead they propose a formalization of the compounding rule based on optional vs. obligatory subcategorization of arguments which excludes the examples in (34). However, their proposal does not account for the impossibility of -ed compounds of double object verbs formed with their direct objects like *talent-given man (meaning a man to whom talent is given). Briefly, this is so because it is possible to delete the optional indirect object argument by the lexical passive rule and then fill the obligatory direct object slot and prepose it. Thus their account as it stands is inadequate. The other suggestion they offer is an extrinsic ordering of compounding before the dative rule.

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