

Relative Clauses in Bavarian: A Distributed Morphology Approach to Morphosyntactic Variation*

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1 Introduction

Central Bavarian, spoken in the German state of Bavaria and in Austria (Wiesinger, 1989), exhibits an unusually complex system of relative pronouns in that it allows relative pronouns and relative complementizers to co-occur. Moreover, the relative pronoun may optionally be omitted, but only under specific morphosyntactic conditions. Omission is subject to stylistic and intraspeaker variation.

Previous approaches to this phenomenon, namely Bayer (1984), rely on surface filters under Government and Binding Theory. Bayer argues that relative pronoun omission must be accounted for syntactically, in order to satisfy the Empty Category Principle (ECP) and Binding Theory. In this paper, I argue that relative pronoun omission can be accounted for at PF under the Distributed Morphology (DM) framework (Halle & Marantz, 1993; Embick & Noyer, 2007), with the addition of variable Impoverishment (Nevins & Parrott, 2010).

In §2, I outline the conditions under which relative pronouns may be omitted in Bavarian. In §3, I review the analysis presented by Bayer (1984) and in §4, I propose an account of relative pronoun omission using the DM framework, as well as demonstrate how alternative proposals are unable to derive these facts. Finally, §5 provides concluding remarks and presents avenues for future research.

2 Relativization in Bavarian

In Standard German, relative clauses are introduced by a relative pronoun (d-pronoun) that resembles the definite article, as seen in (1a-b). The relative clause must be introduced by a d-pronoun (1c). No relativizing complementizer exists in Standard German (1d).

(1) Standard German

- a. Der Mann, **der** aus München kommt, grüßt
the.M.NOM man who.M.NOM from Munich comes greets
mich.
me
'The man who comes from Munich greets me.'

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- b. Die Frau, **die** zu Hause ist, liest gerne.
 the.F.NOM woman who.F.NOM at home is, reads gladly
 ‘The woman who is at home reads gladly.’
- c. *Der Junge, ____ Max kennt, ist ein cooler Typ.
 the.M.NOM boy Max knows is a cool dude
 Intended: ‘The boy Max knows is a cool dude.’
- d. *Das Mädchen, das dass/was ein neues Auto
 the.N.NOM girl who.N.NOM that/what a new car
 gekauft hat, fährt zu schnell.
 bought has drives too fast
 Intended: ‘The girl who bought a new car drives too fast.’

In Bavarian, relative clauses are typically introduced with both a d-pronoun and the relative complementizer *wo* (2a), disobeying the Doubly-filled COMP Filter (Chomsky & Lasnik, 1977).

(2) Bavarian

- a. I hab des Oachkatzl, **des** **wo** er gessn hod,
 I have the.N.ACC squirrel which.N.ACC that he ate has
 gfangn.
 caught
 ‘I caught the squirrel (which) that he ate.’
- b. I hab des Oachkatzl, **des** er gessn hod, gfangn.
 I have the.N.ACC squirrel which.N.ACC he ate has caught
 ‘I caught the squirrel which he ate.’
- c. I hab des Oachkatzl, **wo** er gessn hod, gfangn.
 I have the.N.ACC squirrel that he ate has caught
 ‘I caught the squirrel that he ate.’
- d. *I hab des Oachkatzl, ____ er gessn hod, gfangn.
 I have the.N.ACC squirrel he ate has caught
 Intended: ‘I have caught the squirrel he ate.’

D-pronouns match their antecedent in number and gender, and exhibit case in accordance with their syntactic role in the relative clause. It is also possible to omit the relative complementizer (2b), and under specific morphosyntactic conditions, to omit the d-pronoun (2c). However, it is not possible to omit both the d-pronoun and the relative complementizer (2d).

As in Standard German, Bavarian d-pronouns resemble the definite article, with the exception of the plural dative. The forms of the Bavarian d-pronouns are given below, in Table 2.

	Masculine	Neuter	Feminine	Plural
Nominative	der	des	die	die
Accusative	den	des	die	die
Dative	dem	dem	dera	denen

Table 2: Bavarian Relative Pronouns, with syncretisms shaded

Observe that a number of syncretisms are present among the d-pronouns. Most importantly, the neuter, feminine, and plural accusative d-pronouns are syncretic with their nominative counterparts. Additional syncretisms are observed between the masculine and neuter dative d-pronouns, and between the feminine and plural nominative and accusative.

2.1 Conditions for d-pronoun omission

Nominative d-pronouns are the least restricted in that they may be omitted regardless of whether they match the antecedent in case.¹ In (3a), a nominative antecedent is modified by a relative clause with a nominative d-pronoun, in (3b) by a relative clause with an accusative d-pronoun, and in (3c) by a relative clause with a dative d-pronoun. In all cases, the d-pronoun may be omitted with no effect on grammaticality.

- (3) a. Mi griast der Bua, (der) wo aus Minga
me.ACC greets the.M.NOM boy who.M.NOM that from Munich
kummt.
comes
‘The boy who comes from Munich greets me.’
- b. I kenn den Bua, (der) wo aus Minga kummt.
I.NOM know the.M.ACC boy who.M.NOM that from Munich comes
‘I know the boy who comes from Munich.’
- c. Mia hoifn dem Bua, (der) wo aus Minga
we.NOM help the.M.DAT boy who.M.NOM that from Munich
kummt.
comes
‘We help the boy who comes from Munich.’

Omission of a masculine accusative d-pronoun is ungrammatical when the relative clause modifies a nominative (4a) or dative (4d) antecedent. Masculine accusative d-pronouns may only be omitted if the antecedent is also accusative (4c), i.e., the case of the d-pronoun and the antecedent is the same. However, the same does not hold true for non-masculine d-pronouns, which may be omitted when the antecedent is nominative (4b) or dative (4e), as well as when it is accusative.

¹Where the masculine and non-masculine (feminine, neuter, plural) d-pronouns pattern alike, I provide data only for the masculine. Where they differ, I also provide data for the neuter, the patterning of which is representative of the feminine and plural.

- (4) a. Mi kennt der Mō, *(den) wo des
 me.ACC knows the.M.NOM man who.M.ACC that the.N.NOM
 Oachkatzl ogriffn hod.
 squirrel attacked has
 ‘The man who the squirrel attacked knows me.’
- b. Mi hasst des Oachkatzl, (des) wo I gfangn
 me.ACC hates the.N.NOM squirrel who.N.ACC that I.NOM caught
 hab.
 have
 ‘The squirrel who I caught hates me.’
- c. I kenn den Mō, (den) wo des Oachkatzl
 I.NOM know the.M.ACC man who.M.ACC that the.N.NOM squirrel
 ogriffn hod.
 attacked has
 ‘I know the man who the squirrel attacked.’
- d. Mia hoifn dem Mō, *(den) wo des Oachkatzl
 we.NOM help the.M.DAT man who.M.ACC that the.N.NOM squirrel
 ogriffn hod.
 attacked has
 ‘We help the man who the squirrel attacked.’
- e. Mia ham dem Oachkatzl, (des) wo I gfangn
 we.NOM have the.N.DAT squirrel who.N.ACC that I.NOM caught
 hab, ned vertraut.
 have, not trusted
 ‘We didn’t trust the squirrel that I caught.’

To explain this fact, recall from Table 2 that the masculine is the only gender with a distinct accusative d-pronoun; non-masculine accusative d-pronouns are syncretic with their nominative counterparts. Therefore, neuter accusative *des* patterns like nominative *des* and may be freely omitted with no case matching restrictions. The same holds true for feminine/plural accusative *die*.

As with the masculine accusative, omission of a dative d-pronoun is possible only if the antecedent is also dative (5c). Omission of a dative d-pronoun following a nominative (5a) or accusative (5b) antecedent results in ungrammaticality. This holds true regardless of the gender or plurality of the d-pronoun.

- (5) a. Mi kennt der Mō, *(dem) wo da Franz
 me.ACC knows the.M.NOM man who.M.DAT that the.M.NOM Franz
 ghoifa hod.
 helped has
 ‘The man who Franz has helped knows me.’

- b. I kenn den Mõ, *(dem) wo da Franz
 I.NOM know the.M.ACC man who.M.DAT that the.M.NOM Franz
 ghoifa hod.
 helped has
 ‘I know the man who Franz has helped.’
- c. Mia vertraun dem Mõ, (dem) wo da Franz
 We.NOM trust the.M.DAT man who.M.DAT that the.M.NOM Franz
 ghoifa hod.
 helped has
 ‘We trust the man who Franz has helped.’

Finally, relative clauses may be extraposed, appearing after an intervening verb (6a) or direct object (6b), or at the beginning of the sentence (6c). However, the d-pronoun is obligatory when the relative clause is moved from its antecedent, demonstrating that d-pronoun omission can only occur following a local antecedent.

- (6) a. Der Franz hod dem Mõ ____ ghoifa [*(dem) wo
 the.M.NOM Franz has the.M.DAT Man helped who.M.DAT that
 mir aa ghoifa ham].
 we also helped have.
 ‘Franz helped the man whom we helped too.’
- b. I geb dem Mõ ____ die Birn [*(dem) wo
 I give the.M.DAT man the.F.ACC pear who.M.DAT that
 der Franz ghoifa hod].
 the.M.NOM Franz helped has.
 ‘I give the pear to the man whom Franz has helped.’
- c. [*(dem) wo der Franz kennt] den Mõ ____
 [who.M.ACC that the.M.NOM Franz knows] the.M.ACC man
 kenn I.
 know I
 ‘I know the man whom Franz knows.’

In summary, d-pronoun omission may only occur under specific circumstances, which are captured in (7):

- (7) A relative pronoun may be omitted in Bavarian iff:
- i. It is local to its antecedent
 and
 - ii. It is nominative or morphologically identical to the nominative, *or*
 - iii. It matches its antecedent in case

If a relative clause is not local to its antecedent, the d-pronoun must be overt. If a relative clause is local, the d-pronoun must be overt, unless it meets at least one of two conditions. First, a d-pronoun may be omitted if it is nominative or if it is non-masculine accusative, in which case it is syncretic with its nominative counterpart. Second, a d-pronoun may be omitted if it matches its antecedent in case.

3 Previous Accounts

Perhaps the most comprehensive account of Bavarian relative pronoun omission is that of Bayer (1984). His approach is concerned primarily with explaining how d-pronoun omission (or under his proposal, deletion) can be reconciled with the constraints imposed by the Empty Category Principle (ECP) (Chomsky, 1981) and Binding Theory, i.e., how the trace of the d-pronoun can be properly governed, even after the d-pronoun has been deleted.

To this extent, Bayer proposes a set of three surface filters, the first of which is [−oblique]-Transmission in COMP (−OT). D-pronouns that are nominative or that are syncretic with the nominative, are [−oblique] while the rest are [+oblique]. This is shown in Table 3. Bayer argues that in order to be properly governed, the trace of the d-pronoun must be c-commanded by an element with a [±oblique] feature. −OT transmits [−oblique] to the complementizer *wo*, ensuring that if a [−oblique] d-pronoun is deleted, the trace will remain properly governed.

	Masculine	Feminine	Neuter	Plural
Nominative	−	−	−	−
Accusative	+	−	−	−
Dative	+	+	+	+

Table 3: [±oblique] Relative Pronouns (from Bayer, 1984)

The second mechanism is Deletion in COMP (DC), which serves to optionally delete both [+oblique] and [−oblique] pronouns that are followed by *wo*. Because DC takes place after −OT, no ECP violation occurs when [−oblique] pronouns are deleted.

The deletion of [+oblique] d-pronouns, however, is more complicated, and requires a third mechanism, Case Transmission (CT). CT provides for the transmission of Case from an adjacent antecedent to *wo* after the d-pronoun has been deleted. This serves two purposes. First, it ensures that only d-pronouns that are local to their antecedents can be deleted. Second, it ensures that *wo* can bind the trace of the d-pronoun by satisfying the case-matching requirement.

These mechanisms apply between D-Structure and S-Structure, so that the trace of the d-pronoun can be properly governed before LF. Bayer argues that phonological rules can not account for d-pronoun deletion, as *wo* must have Case in order to bind the trace of the d-pronoun. However, it can not receive Case until CT has applied. If d-pronoun deletion were to occur at PF, CT could not take place and the coindexation necessary for satisfaction of the ECP would not pass to LF.

However, recent approaches to morphosyntax have obviated a number of aspects of Bayer’s proposal. First, his proposal is concerned primarily with satisfying the ECP; however, because traces have been eliminated in favor of copies, this problem is easily accounted for under minimalist syntax. Furthermore, because minimalism requires that syntactic operations are limited to those required to achieve interpretability at the interfaces, operations such as −OT, DC, and CT are no longer possible.

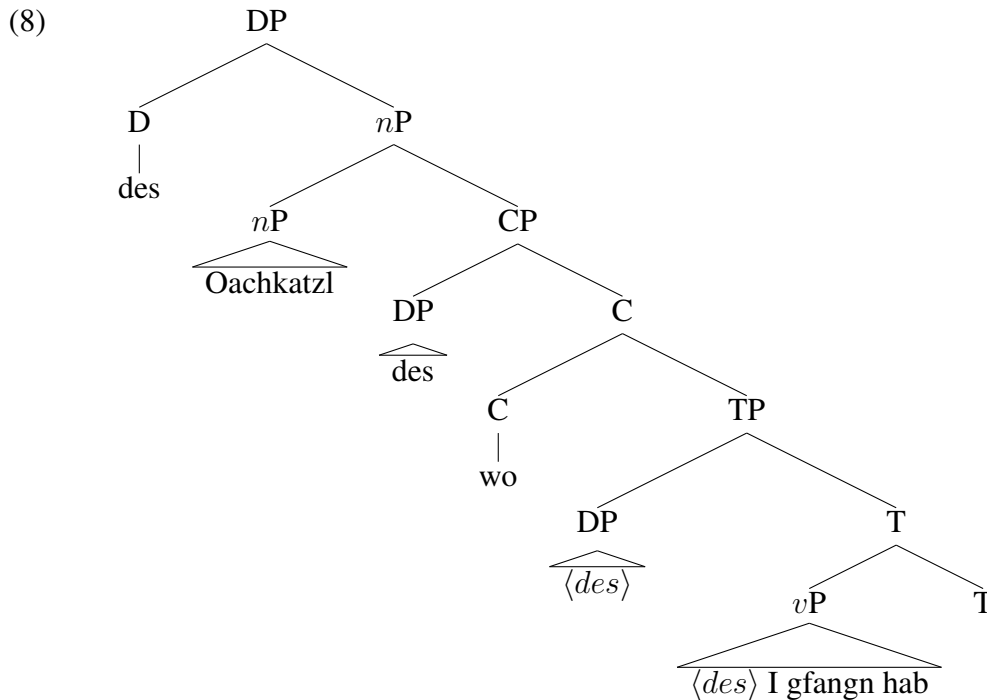
An additional consideration is Bayer’s nonstandard decomposition of the [±oblique] feature, whereby accusative d-pronouns receive either [−oblique] or

[+oblique], depending on their gender. Although this captures the surface morphology, there is no discussion of how this varying assignment of [\pm oblique] takes place. Moreover, it is unclear why accusative and nominative d-pronouns should have the same set of features, rather than having the same pronunciation for two distinct bundles of features.

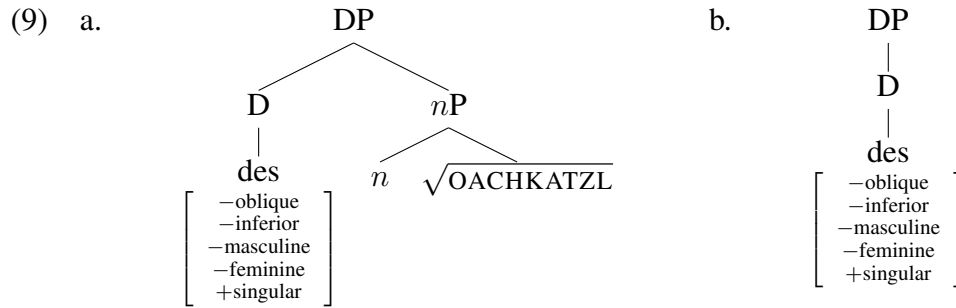
4 Proposal

The present analysis employs the Distributed Morphology framework (Halle & Marantz, 1993; Harley & Noyer, 1999; Embick & Noyer, 2007), which provides for an account not only of the variation between overt and null d-pronouns, but also of the syncretisms observed in the d-pronoun paradigm. With regard to the syntactic derivation, this proposal is compatible with the standard assumptions of minimalist syntax (Chomsky, 1998, 2001).

Relative clauses are argued to have the structure diagrammed in (8), which represents the structure of the subject noun phrase in (4b). Here, the modifying relative clause is adjoined to the antecedent *nP*. Note that through the syntactic derivation, d-pronouns are abstract morphemes, i.e., feature bundles with no phonetically overt form. A d-pronoun consists minimally of a D feature indicating its category, interpretable φ -features (person, number, and gender), an uninterpretable Case feature [*uCase*], and an interpretable relative feature [*iRel*]. Abstract Case assignment and the movement of the d-pronoun to [Spec,CP] are motivated by Agree.



At PF, morphological case features are added to the D head (McFadden, 2004), resulting in the following structures for the antecedent DP (9a) and the d-pronoun (9b):



Morphological case features consist of binary primitive features, an approach which has been adopted for German (Bierwisch, 1967), Latin (Halle, 1997), Arabic (Embick & Noyer, 2007), and Icelandic (McFadden, 2004), among others. In Bavarian, the case features added to D can be determined by the schema in Table 4, where the highest argument, nominative, receives [–inferior], and where [+oblique] is assigned to dative nouns by specific heads such as *haifn* ‘to help’ or *vertraun* ‘to trust’.

	NOMINATIVE	ACCUSATIVE	DATIVE
oblique	–	–	+
inferior	–	+	+

Table 4: Bavarian Case Decomposition

Gender features may be decomposed as shown in Table 5, where masculine nouns are assigned [+masculine], feminine nouns are assigned [+feminine], and neuter nouns are [–masculine, –feminine]. Finally, [±singular] distinguishes singular nouns from plural nouns. Thus, following feature insertion, the D node consists of a feature bundle which is fully specified for [±singular, ±oblique, ±inferior, ±masculine, ±feminine].

	FEMININE	MASCULINE	NEUTER
masculine	–	+	–
feminine	+	–	–

Table 5: Bavarian Gender Decomposition

After morphological case features have been inserted, the Vocabulary Insertion operation takes place. The Vocabulary items available for insertion are presented in (10):

- (10) a. *der* ↔ [–oblique, +masculine]
 b. *den* ↔ [+inferior, +masculine]
 c. *dem* ↔ [+oblique, +inferior, –feminine]
 d. *die* ↔ [–oblique]
 e. *dera* ↔ [+oblique, +feminine]
 f. *des* ↔ [–oblique, –masculine, –feminine]
 g. *denen* ↔ [+oblique, –singular]

h. $\emptyset \leftrightarrow \textit{elsewhere}$

Under standard assumptions of DM, Vocabulary items are underspecified for features, providing an account of the syncretisms observed in the d-pronoun paradigm by allowing a single Vocabulary item to be inserted at various nodes. For example, because *dem* (10c) is underspecified for $[\pm\textit{masculine}]$, it may be inserted at both masculine and neuter dative nodes. The most underspecified Vocabulary item, *die* (10d) is specified only for $[-\textit{oblique}]$, allowing it to be inserted at both nominative and accusative feminine and plural nodes.

Vocabulary Insertion obeys the Subset Principle (Embick & Noyer, 2007; Halle, 1997), such that the Vocabulary item matching the greatest number of features on the D node is inserted. Furthermore, a Vocabulary item may not be inserted if it is specified for a feature not present on the D node.

Consider for instance a neuter nominative D node containing the features $[\textit{+singular}, -\textit{oblique}, -\textit{inferior}, -\textit{masculine}, -\textit{feminine}]$, such as for *Oachkatzl* ‘squirrel’. While both *die* (10d) and *des* (10f) match the node in a subset of features, *des* matches a greater number and is inserted.

As seen in (10), an overt exponent is available for every Bavarian d-pronoun, so under normal circumstances, the d-pronoun is inserted. However, when no overt Vocabulary item satisfies the Subset Principle, the elsewhere case applies. This may result from Impoverishment, which deletes a feature from a given node (Arregi & Nevins, 2006).

I propose that d-pronoun omission is the application of an Impoverishment operation which deletes case features on the D node, thereby preventing an overt Vocabulary item from being inserted, and requiring the insertion of the phonologically null elsewhere exponent. Here, two Impoverishment operations are necessary, which are given in (11):

- (11) a. $\left[\begin{array}{l} \alpha \textit{ oblique} \\ \beta \textit{ inferior} \end{array} \right] \rightarrow \emptyset / \left[\textit{DP} \left[\begin{array}{l} \alpha \textit{ oblique} \\ \beta \textit{ inferior} \end{array} \right] \left[\textit{nP} \dots \left[\textit{CP} \textit{ ____ } \right] \right] \right]$
 b. $[-\textit{oblique}] \rightarrow \emptyset / \left[\textit{DP} \textit{ D} \left[\textit{nP} \dots \left[\textit{CP} \textit{ ____ } \right] \right] \right]$

The operation in (11a) deletes the case features on a D node when the case features match those of the antecedent, and (11b) deletes the $[-\textit{oblique}]$ feature on any D node that is local to its antecedent.

Note that this proposal requires the nontrivial assumption that Impoverishment can access higher syntactic structures. Relevant research by Ackema & Neeleman (2004) suggests that Impoverishment may apply to domains larger than the word. Specifically, they argue that the domain for Impoverishment is the Phonological Phrase; while additional research is needed to determine whether their proposal is compatible with Bavarian, it is reasonable to assume that conditions like those in (11) are possible.

For an example of the application of these operations, consider the sentence in (4c), restated below:

- (4c) I kenn **den** **Mō, (den)** wo des Oachkatzl
 I.NOM know the.M.ACC man who.M.ACC that the.N.NOM squirrel
 ogriffn hod.
 attacked has
 ‘I know the man who the squirrel attacked.’

After morphological case features have been inserted, both the d-pronoun *den* and the antecedent *den Mō* consist of the feature bundle [−oblique, +inferior, +masculine, −feminine, +singular]. When the operation in (11a) applies, the features [−oblique] and [+inferior] are deleted, after which no Vocabulary item is eligible for insertion, thus requiring insertion of the null exponent.

However, a problem for this proposal arises from the fact that under standard assumptions of DM, Impoverishment applies categorically. Thus, every time the condition for Impoverishment is met, the specified case features on the D node are deleted, making insertion of an overt vocabulary item impossible.

But while the assumption of categorical Impoverishment would make this approach untenable, Nevins & Parrott (2010) argue that variable rules (Labov, 1969; Cedergren & Sankoff, 1974, and others) may be incorporated into morphosyntactic theory by way of variable Impoverishment. Unlike categorical Impoverishment, variable Impoverishment operations apply with a specific probability p_a , and are indicated by the symbol $\% \rightarrow$, as in (12):

- (12) a. $\left[\begin{array}{l} \alpha \text{ oblique} \\ \beta \text{ inferior} \end{array} \right] \% \rightarrow \emptyset / \left[\text{DP} \left[\begin{array}{l} \alpha \text{ oblique} \\ \beta \text{ inferior} \end{array} \right] \left[\text{nP} \dots \left[\text{CP} \text{ ____ } \right] \right] \right]$
 b. $[-\text{oblique}] \% \rightarrow \emptyset / \left[\text{DP} \text{ D} \left[\text{nP} \dots \left[\text{CP} \text{ ____ } \right] \right] \right]$

Notably, Nevins & Parrott (2010) argue that Impoverishment operations are driven by markedness, and exist to reveal the unmarked structure. In the case of Bavarian, it seems to be driven by morphological economy, whereby a feature bundle matching a local feature bundle can be deleted, as can the least marked case, the nominative. It is also worth considering that Doubly-Filled COMP is marked cross-linguistically.

Finally, this approach predicts that d-pronoun omission can not occur in other contexts, such as in relative clauses introduced by a propositional phrase, as given in (13):

- (13) a. I kenn des Kind, **auf des** **wo** I
 I-NOM know the.N.ACC child for whom.N.ACC that I-NOM
 obacht geben soll.
 attention give should
 ‘I know the child, whom I should look after.’

- b. * I kenn des Kind, **auf wo** I obacht geben
 I-NOM know the.N.ACC child for that I-NOM attention give
 soll.
 should
 Intended: ‘I know the child, whom I should look after.’

Although the d-pronoun both matches its antecedent in case and is syncretic with the nominative, apparently satisfying the case-matching conditions of both Impoverishment operations, the d-pronoun is the complement of a preposition and therefore inaccessible. Thus, neither Impoverishment operation is able to apply and the d-pronoun is correctly predicted to be obligatory.

4.1 Alternative explanations

In this section, it is demonstrated how several alternative approaches are unable to account for this phenomenon, including whether d-pronoun omission is a matter of phonological economy, whether d-pronoun omission can be accounted for through ordered or context-dependent Vocabulary items, or whether an approach such as Combinatorial Variability (Adger, 2006; Adger & Smith, 2010) can be used to derive these facts.

4.1.1 Case-matching or phonological matching?

One concern to address is the fact that in most cases (except for the plural dative), the d-pronoun and the definite article of the antecedent are identical. It might therefore be the case that d-pronoun omission is simply elision of a repeated phonological element. However, two important facts contradict this possibility.

	Masculine	Neuter	Feminine	Plural
Nominative	da	as/s’	d’	d’
Accusative	an	as/s’	d’	d’
Dative	an/am	an/am	da	de

Table 6: Phonologically Reduced Determiners

First, Bavarian exhibits reduced determiners, as shown in Table 6 (Zehetner, 1985). However, as seen in (14), omission of the d-pronoun is still possible following an antecedent with a phonologically reduced determiner.

- (14) I kenn d’Frau, (die) wo der Franz kennt.
 I.NOM know the.F.ACC-woman, who.F.ACC that the.M.NOM Franz knows
 ‘I know the woman who Franz knows’

Moreover, the d-pronoun may also be omitted when it modifies a noun phrase with an indefinite article, as seen in (15). Given that d-pronoun omission is possible regardless of the phonological form of the determiner of the antecedent, as well as its sensitivity to morphological case features, phonological matching seems to be an unlikely solution to this problem.

- (15) Mi kennt a Madl, (des) wo den Franz kennt.
 Me.ACC knows a.N.NOM girl, who.N.NOM that the.M.ACC Franz knows
 ‘A girl that knows Franz, knows me’

4.1.2 Context-dependent Vocabulary items

One possible way of accounting for both the locality and case-matching restrictions on d-pronoun omission may be to propose that the null exponent is a context-dependent Vocabulary item that can be inserted only in specific contexts. For instance, for the null nominative d-pronouns, we may propose Vocabulary items such as those in (16), which would be added to the Vocabulary list given in (10).

- (16) a. $\emptyset \leftrightarrow [-\text{oblique}] / [{}_{\text{DP}} \text{D} [{}_{\text{nP}} \dots [{}_{\text{CP}} \text{ ____ }]]]$
 b. $\emptyset \leftrightarrow [-\text{oblique}, +\text{masculine}] / [{}_{\text{DP}} \text{D} [{}_{\text{nP}} \dots [{}_{\text{CP}} \text{ ____ }]]]$
 c. $\emptyset \leftrightarrow [-\text{oblique}, -\text{masculine}, -\text{feminine}] / [{}_{\text{DP}} \text{D} [{}_{\text{nP}} \dots [{}_{\text{CP}} \text{ ____ }]]]$

However, this seems to require a separate null morpheme for each omissible d-pronoun. As the syncretisms among the overt d-pronouns can be accounted for by postulating underspecified Vocabulary items that are insertable at different nodes, it is unintuitive and theoretically dissatisfying that the same would not hold true of the null exponent.

Furthermore, it is argued by Halle & Marantz (1993), Embick (2003), and Embick & Noyer (2007), among others, that when Vocabulary Insertion takes place, the more specific Vocabulary items (that is, those which are context-dependent) are inserted first. Thus, in order for an overt d-pronoun to ever be inserted, a separate probabilistic mechanism would still be necessary to ensure that both overt and null d-pronouns can be inserted.

4.1.3 Combinatorial variability

One final possibility is the Combinatorial Variability algorithm, proposed by Adger (2006) and rigorously applied to the verbal inflection paradigm of Buckie (Scotland) English by Adger & Smith (2010).

The Combinatorial Variability algorithm generates Vocabulary items which are maximally underspecified while ensuring a particular bundle of n-features can always be mapped to a single phonological exponent. For instance, in standard English, the feature [+participant] (first and second person) is always associated with zero inflection, while [+singular] is associated with both $-\emptyset$ and $-s$ (*I/you* and *he/she/it*). Thus, $-s$ cannot be mapped to a 1-feature bundle, but must be specified by [–participant, +singular].

For verbal $-s$ in Buckie, Adger & Smith (2010) apply the combinatorial variability algorithm and return the Vocabulary items in (17). They demonstrate that this system not only allows for variation, but also predicts the frequency with which variable forms are observed in natural speech.

- (17) a. [singular: +, participant: –] $\rightarrow -s$

- b. [singular: -] → ∅
- c. [participant: +] → ∅
- d. [pronominal: -] → -s [Adger & Smith, 2010, ex. 103]

These Vocabulary items are not in competition per se, but are chosen stochastically such that if a node contains three features each associated with a 1-feature Vocabulary item, they will all have a 33% chance of being selected. In the case of a non-pronominal subject, such as ‘the men’, the T head will contain the features [participant: -, singular: -, pronominal: -]. Both -s and -∅ are eligible to be inserted, so the system predicts a 50/50 split between these realizations.

It seems possible that such an approach could be used to generate Vocabulary items for the Bavarian d-pronouns; under certain locality conditions, a node such as [-oblique, -inferior, +singular, +masculine, -feminine] could have two available Vocabulary items, one overt and one null, which would be probabilistically inserted.

However, generating these Vocabulary items with the algorithm proposed by Adger & Smith (2010) is problematic, due to the fact that without a dubious feature such as [\pm overt], it is impossible to distinguish between overt and null d-pronouns based on features alone. An attempt to derive the Vocabulary list for Bavarian d-pronouns will result in exhaustion of the available features without ever being able to unambiguously map a bundle of n features to a single phonological exponent.

5 Conclusion

The analysis presented here can be summarized as follows: following the syntactic derivation, case features are added to the D node at PF as usual. Prior to Vocabulary Insertion, the variable Impoverishment operations apply with probability p_a . When one of these operations occurs, none of the available Vocabulary items is eligible for insertion at the D node. Thus, a phonologically null exponent is inserted as the elsewhere case. If the Impoverishment operations do not or can not apply, such as when the conditions of case-matching and/or locality are not met, Vocabulary Insertion proceeds on the basis of the Subset Principle. The Vocabulary item matching the greatest number of features on the D node is inserted.

An additional advantage of this approach is that it allows for the encoding of sociolinguistic or stylistic information. Although the frequency of d-pronoun omission was not examined here, future work may utilize spoken or written corpora to determine the rates at which d-pronouns are omitted in Bavarian. Because the two proposed Impoverishment operations operate independently, we may hypothesize that nominative and non-nominative d-pronouns can be omitted at differing frequencies. If this hypothesis is confirmed by a corpus analysis, the variable Impoverishment proposal would be well supported.

Another area for future research to consider is additional types of relative clauses, such as those modifying an abstract noun phrase, as in (18). This type of relative clause is introduced in Standard German with *was* ‘what’, and in Bavarian with *wos* ‘what’.

- (18) Ois, wos I seh is bläd.
 all what I see is dumb

‘Everything I see is dumb.’

It is also worth considering dialectal variation within Bavarian. In the Austrian variety of Bavarian, the relative complementizer *wos* is used, as seen in (19)²:

- (19) Do gibt’s grad iagend an neichen Track von de Vamummtn,
There gives-it now such a new track from die Vamummtn
dea wos hoasd “Hawara Schleich Di.”
who.M.NOM that be.called “Dude get.lost you”
‘There’s a new track now from die Vamummtn, that’s called “Get Lost, Dude”’

This distinction may lead to differences in the conditions under which d-pronouns may be omitted. In addition, Bavarian shares its use of Doubly-filled COMP in relative clauses with Alemannic/Swiss German, Hessian, and other southern German dialects (Brandner & Bräuning, 2013). Data from these varieties may shed light on the mechanisms which underlie this phenomenon.

In conclusion, this paper has demonstrated that the Distributed Morphology framework, with the addition of variable Impoverishment, is able not only to provide an account of the Bavarian relative pronoun paradigm, including the syncretisms found therein, but also of the fact that the presence of the relative pronoun exhibits intraspeaker variation.

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²This example comes from a music video by the Austrian rap group Die Vamummtn, available on YouTube at <http://youtu.be/YFvnuZN3ow4>

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