C/T MERGE LOCATIONS FOR FOCUS

Virginia Motapanyane
University of New Brunswick - Saint John

ABSTRACT

Romanian constructions with preverbal focus compared with English clefts point to a parametric approach: languages display different strategies for overt movement to focus according to their parametric setting for [wh/focus] or [tense/focus]. The analysis of [focus] as syntactically dependent on [wh] or [tense] provides a uniform treatment for important variation in focus constructions (e.g., preposing through clitic doubling chains versus clefting) and in interrogative clauses (e.g., presence versus absence of V2 effects in embedded interrogatives).

1. INTRODUCTION

In the framework of the Minimalist Program (Chomsky 1995), this paper aims to account for contrastive strategies of fronting to focus in English and Romanian. Focused constituents land within the Complementizer Phrase (CP) in English, and within Tense Phrase (TP) in Romanian, as indicated by the word order in (1). In (1c) focus follows the preverbal subject.

(1)  a. It is THIS BOOK (that) John wants to buy.
    b. It is JOHN who wants to buy this book.
    c. Fiecare CÂTE O CARTE ar trebui să aducă.
       everyone each one book would should to bring
       'It is a book everyone should bring.'

Romanian word order is disallowed in English (1d), whereas clefting rules out the sentence in Romanian (1e).

(1)  d. *John THIS BOOK wants to buy.
    e. *E CÂTE O CARTE (care/că) fiecare ar trebui să aducă.
       is each one book which/that everyone would should to bring

Crosslinguistic variation in this theoretical program is morphologically driven: it arises at the level of formal features which enter the numeration, and undergo SELECT and MERGE. The classes of syntactically relevant features are limited to formal features, whereas semantic features are invisible for computations.

Taking into account these conceptual conditions on computation and variation, constructions with preverbal focus present the following challenge: focus is a semantic, non-categorial feature which has an unexpected
syntactic impact (since it should be invisible for computations). From this perspective, the discussion of preverbal focus should either weaken the theoretical assumptions (by defining focus as a syntactically relevant feature), or confirm them (by demonstrating that focus effects derive from certain lexical properties in the morphological component).

This paper supports the theoretical assumptions of the Minimalist Program by arguing that [focus] features merge in the lexicon/pre-syntactic level with the semantically related features [wh] and [tense], whose formal status ensures the transition of [focus] in the grammar. That is, the features [focus/wh] specified on C, or [focus/tense] specified on T enter the checking process as complex formal features. Furthermore, the choice of the host formal feature (i.e., either [wh] in C or [tense] in T) leads to different checking configurations, which induce the crosslinguistic variation in (1).

The claim that [focus] features lack independent morpho-syntactic status has two theoretical consequences: (i) it excludes the treatment of focus as a separate functional head; and (ii) it points to a Focus Parameter, so that languages opt either for [wh] or [tense] as the host formal feature for [focus]. The latter option is constrained by language internal properties (e.g., clitic doubling, availability of null operators). Comparative paradigms of focus constructions in English and Romanian provide ample empirical support for this claim.

2. EVIDENCE FOR A CORRELATION BETWEEN [FOCUS] AND [WH]/[TENSE]

Empirical evidence for the syntactic dependence of focus on [wh] and [tense] comes from languages with morphological markers for focus, as well as languages in which fronting to focus is constrained by the presence of [tense] features.

2.1. The correlation [focus]/[wh]

Current studies of English focus constructions agree in defining focus movement as a form of wh-movement.\(^1\) They emphasize the correlation

---
\(^1\) Overt movement to focus is similar to wh-movement insofar as it creates a non-argumental chain (A'-chain) with quantificational properties. However, the merging process may differ for focused and wh-phrases (e.g., clefting merges the focused constituent in SPEC-CP instead of moving it to this position), and it results in different structural configurations. In other words, constraints specific to wh-clauses may be irrelevant to focus constructions, especially if they involve clefts or Focus Topicalization, as in English.
between the syntax of wh-phrases and the syntax of focus (Chomsky 1977, Rochemont 1978, 1986; cf. Mueller & Sternefeld 1993), to the extent that
wh-movement is considered movement to focus. This correlation is better
captured in languages with morphological markers for focus, as in
Bulgarian (2). The crucial evidence consists in the obligatory double feature
specification of the morpheme li for interrogative features [Q] and [focus].

\begin{align}
(2) \quad & a. \quad \text{PARITE li nameri Ivan?} \\
& \quad \text{money-the Q found John} \\
& \quad \text{‘Is it the money John has found?’} \\
& b. \quad *(\text{Ivan}) \text{PARITE li nameri.} \\
& \quad \text{John money-the li found} \\
& c. \quad \text{Nameri li parite Ivan?} \\
& \quad \text{found Q money-the John} \\
& \quad \text{‘Did John find the money?’}
\end{align}

In (2a), the enclitic morpheme li situated in C (Rivero 1993, Rudin 1993)
attracts focused constituents to SPEC-CP. This strategy is restricted to inter-
rogative clauses, where li also carries [Q] features, and triggers V-move-
ment to C, as in (2c). Note that in (2c) the morpheme lacks a [focus] compo-
nent and it functions only as a yes-no question marker. Thus, (2c) shows
that [Q] and [focus] specifications on li may be dissociated. However, the
morpheme may surface in syntax as [Q] only, as in (2c), but not as [focus]
only, as in (2b). The ungrammaticality of (2b), with fronting to focus in a
declarative clause, brings the proof that li is not recognized as a [focus]
feature carrier by itself. A similar behavior of the focus morpheme is sig-

2.2. Evidence for a correlation [focus]/[tense]

The tests proposed in this section show that fronting to focus in
Romanian is related to the nominal, or the [case] feature of T: only clauses
in which the [case] feature is checked against a DP/NP argument allow for
fronting to focus within TP. Infinitive complements provide a good exam-
ple for this claim. Old Romanian had infinitive clauses with ‘strong’ tense,
licensing Nominative subjects in postverbal position, as in (3a). In that
context, fronting to focus is also attested, as in (3b). Modern Romanian
‘nominalized’ the infinitive complements, which fail to license lexical sub-
jects, as in (3c). In this structure, fronting to focus is excluded (3d).

\begin{align}
(3) \quad & a. \quad \text{Era vremea [a-\text{\~n}rascump\text{\~a}rea vod\text{\~a} str\text{\~a}mb\text{\~a}tatea sa.]} \\
& \quad \text{was time-the to him-REFL.DAT make-up king-NOM injustice his} \\
& \quad \text{‘It was time for the king to make up for his injustice.’} \quad (\text{Sincai: 40})
\end{align}
b. ...să aibă vreme [SPRE DREGTORIA DUMNEZEIASCĂ a-i ajutori.]
to have time towards guidance-the holy to them help (Sincai: 45)
'...it is towards God's guidance that he should have time to guide them.'

c. Nu e permis [a se apleca (*cineva) peste fereastră.]
not is allowed to REF.L.ACC bend someone over window
'Bending over the window is forbidden.'

d. *Nu e permis [PEST.FEREASTĂ a se apleca.]
not is allowed over window to REF.L.ACC bend

The ungrammaticality of (3d) indicates that the absence of [tense]/[case] features prevents fronting to focus. Note that the [V] component of [tense] is always strong in Romanian, and attracts overt V-movement to T. However, the nominal component of [tense] varies in strength, and overt NP movement to SPEC-TP is optional, leading to free alternation between SVo and VSO order in the language.

To sum up this section, the association between [focus] and [wh] features in C may be overt, as in languages with morphological marking, or covert, as in English. Other languages, as Romanian, present [focus] in association with [tense]. In both cases, the syntactic realization of [focus] depends on the presence of the host formal feature.

3. FRONTING TO FOCUS IN ROMANIAN

The empirical evidence indicates that [focus] associates with [wh] in C in English, as opposed to [tense] in Romanian. This section will argue that language internal properties constrain this parametric option, which leads, in the case of Romanian, to TP structures with multiple Specifiers.

3.1. Exclusion of [focus] in C

A natural account for the dissociation between focus and the head C in Romanian follows from the properties of wh-movement in this language, which prevents the derivation of clefts, as in English. Notably, SPEC-CP in Romanian is not a position for structural operators and it does not license null operators, such as are needed for clefting.

Dobrovie-Sorin (1990, 1994) argues that wh-phrases, bare quantifiers and quantified NPs in Romanian differ with respect to their intrinsic properties and that this is reflected in syntax: when moving to a scope position (presumably SPEC-CP), some of them, such as cine 'who' in (4a), form operator-variable chains, while others, such as care 'which' in (4b), form chains with clitic pronouns. The latter lack quantificational properties and disable SPEC-CP as a position for structural operators.
(4)  a.  Nu ştiam PE CINE\textsubscript{i} ai invitat t\textsubscript{j}.
    not knew pe-whom have invited
    ‘I did not know whom you invited.’

   b.  Nu ştiam PE CARE\textsubscript{j} l\textsubscript{j}-ai invitat t\textsubscript{j}.
    not knew pe-which him have invited
    ‘I did not know which one you invited.’

The generalization is that free alternation of cine ‘who’/care ‘which’ in SPEC-CP is possible because Romanian is a language with object clitic doubling, in which wh-movement must be dissociated from quantification. An important consequence of this parametric choice is the absence of null operators in SPEC-CP.\textsuperscript{2} If clefts necessarily involve null operators (Chomsky 1977), then fronting to focus to SPEC-CP would lead to illicit derivations in Romanian, as in (5):

(5)  *E MAŞINA care/că Paul a cumpărăt.
    is car which/that Paul has bought

Therefore, restriction of preverbal focus to TP, as opposed to movement to CP, follows from the interaction of focus and wh-movement with a language internal property, that is, clitic doubling.

\textsuperscript{2} As noticed by an anonymous reviewer, the lack of null operators in Romanian entails the absence of certain structures whose derivation relies on empty operator raising. Indeed, Romanian lacks that-relatives (i) and infinitive relatives (ii). Parasitic gaps are licensed only by wh-phrases with intrinsic quantification features, that is, ce ‘what’ in (iii) vs. care ‘which’ in (iv), (v). Although ‘tough’-constructions are present, as in (vi), their derivation consists in object-to-subject raising, avoiding quantificational chains (Motapanyane 1998); this explains the obligatory supine vs. infinitive complementation, the latter being the usual option in Romance.

i.  *Maşina ce am cumpărăt-(o) e rosie.
    car-the that have-ISG bought it is red
    ‘The car I bought is red.’

   ii.  *un moment a aminti
        a moment to remember

   iii.  Ce\textsubscript{j} ai primit t\textsubscript{j} înainte de-a comanda e\textsubscript{j}?
         what have-2SC received before of to order
         ‘What did you receive before ordering?’

   iv.  Pe care\textsubscript{j} l\textsubscript{j}-ai primit t\textsubscript{j} înainte de-a-\textsuperscript{*}(l\textsubscript{j}) comanda e\textsubscript{j}?
         on-which it have-2SC received before of to it order
         ‘Which one did you receive before ordering?’

   v.  Carte\textsubscript{i} pe care, am primit-o, înainte de-a \textsuperscript{*}(o\textsubscript{j}) comanda e\textsubscript{j} ...
        book-the on-which have-ISG received it before of to it order
        ‘The book I received before ordering...’

   vi.  Aceste probleme sunt greu de rezolvat/\textsuperscript{*}a rezolva.
        these problems are difficult of solved-SUPINE/to solve-INF.
3.2. Multiple SPEC·TP

Since the option [focus/wh] is excluded in Romanian, let us see how the alternate option [focus/tense] is implemented. The word order in preverbal focus constructions, as illustrated in (1c), is subject-focus verb. Several tests indicate that the preverbal focus position intervenes between the subject in SPEC·TP and the inflected verb in T. A first set of tests, in (6) and (7), confirms that preverbal subjects are in SPEC·TP, whereas (8) shows that the focus position is also a SPEC·TP.

Preverbal subjects in Balkan languages have been analyzed as Topics adjoined to a maximal projection (Rudin 1993, Izvorski 1994). Romanian subjects may receive a Topic reading, when they adjoin to CP/TP, as in (6a), or a neutral reading, when they surface in a preverbal position within TP. The distinction between Topic subjects and neutral subjects becomes clear when the subject is a bare quantifier. In (6), oare is a question morpheme in C; bare quantifiers cannot occur in Topic, as in (6b), above oare. Also, they disallow concurrent operator-variable chains, such as formed by mereu 'always' and ceva 'something' in (7a).

(6) a. Ion, oare și- a cumpărat mașină?
   John Q himself-DAT has bought car
   'Did John buy himself a car?'

   b. *Cineva, oare și- a cumpărat mașină?
      somebody Q himself/herself has bought car

(7) a. *Mereu CEVA ne aduce Ion.
      always something US-DAT brings John

      The ungrammaticality of (6b) and (7a) which contrasts with (7b, c) indicates that the latter have the subject bare quantifier in a SPEC·TP for subjects; movement to SPEC·TP for subjects does not interfere with the movement of a bare quantifier to a focus position within TP.

   (7) b. Cineva CEVA ne va aduce!
      somebody something US-DAT will bring
      'There must be something that someone will bring us!'

      c. Nimeni NIMIC nu șii-ar face fără pile.
         nobody nothing not you-DAT would do without connections
         'There's nothing anyone would do for you if you don't have connections.'

Irrespective of A or A' status of the subject position, free alternation of bare quantifiers and other nominal classes in this position indicates that it corresponds to SPEC·TP as opposed to Topic.
Verbs move overtly to T in Romanian, leading to optional SVO/VSO. Thus, the preverbal subject in SPEC-TP in (7b, c) enters into a SPEC-head relation with the verb in T. The word order shows that the preverbal focus, an A'-position targeted by overt movement of bare quantifiers, intervenes between these two constituents. Restriction on multiple focus, as in (8), further indicates that this is a Specifier position, as opposed to adjunction to a maximal projection.

(8) a. *Paul MAȘINA_1 IOANEI_i-ar fi dat-o_i, nu bicicleta Mariei.
   Paul car-the Joan-DAT her-DAT would have given it not bicycle-the Mary-DAT
   b. Mașina, Ioanei, Paul i-ar fi dat-o cu plăcere.
   car-the Joan-DAT Paul her-DAT would be given it with pleasure
   'As for the car, for Joan, Paul would have given it with pleasure.'

On the basis of the tests in (6) to (8), fronting to focus undergoes the derivation in (9).

```
TP
   SUBJECT
   T'
   FOCUS
   T'
   [V+T]
   VP
```

Constituents moved to the subject position in (9) check the nominal [EPP] (Extended Projection Principle) feature of T, whereas constituents in focus check the optional [focus] feature of T. When the DP subject is also underspecified for [focus], it is expected that (9) has a TP with a single Specifier. Therefore, the parametric setting for [focus/tense] implies derivations with multiple SPEC-TP, to which constituents move to check the [EPP] features of T and the [focus] feature of T, respectively.\(^3\)

\(^3\) Any type of constituent may front to the focus-SPEC-TP, including adjuncts:

i. Ion [pentru o fată]_ROC s-a certat cu Radu
   John for a girl refl has fought with Radu
   'It was for a girl that John fought with Radu.'

   This is expected under current hypotheses that 'adjuncts' occupy SPEC-positions in the structure (Kayne 1994) and undergo SPEC-to-SPEC movement. However, movement to focus in adjunct clauses is disallowed, as in (ii) vs. the non-focus structure in (iii).

ii. *Era supărat pentru că Ion [pentru o fată]_ROC s-a certat cu Radu.
    was upset because that John for a girl refl has fought with Radu
4. FRONTING TO FOCUS IN ENGLISH

Taking into account the language internal properties which interfere with fronting to focus (i.e., the status of scope bearing Specifiers, and the type of A'-chains), it is expected that English will set the focus parameter in opposition to Romanian. Thus, the setting for the [focus/wh] option in English coincides with the availability of null operators and the status of Specifier positions, which qualify as positions for structural operators in all contexts.

4.1. Clefting

Fronting to focus in Romanian involves structures with multiple Specifiers due to the complexity of feature specification on T. Thus, (9) complies with checking theory by projecting a Specifier for [tense] features, and a Specifier for the [focus] feature. Presumably, similar conditions for checking operate in structures with the option for [focus/wh] features specified on C. Since the focused phrase is underspecified only for [focus], another constituent must check the [wh] feature of C leading to a structure with multiple SPEC-CP. Clefting is an example of a multiple SPEC-CP structure (which maintains the analysis in Chomsky 1977) in which the focused constituent is merged in the highest SPEC-CP, and does not interfere with movement of wh-phrases to SPEC-CP, as in (10a). That-relatives have the [wh] feature checked by a null operator as in (10b). Absence of verb movement to C in (10) may follow from a feature correlation such as revealed by the Romanian examples in (3). In Romanian focus correlates to the [D] feature as opposed to the [v] feature of T. Generalizing this condition, one may assume that focus correlates to the [D] component of the host formal feature. As such, [focus] in (10) correlates to the [D] feature as opposed to the [V] feature of [wh], and does not trigger verb movement to C. Thus, (1a) and (1b) have the configurations in (10b) and (10a), respectively:

iii. Era supărăt pentru că Ion s-a certat cu Radu pentru o fată.

was upset because that John has fought with Radu for a girl

'The was upset because John had fought with Radu for a girl.'

The ungrammaticality of (ii) must concern the quantificational properties of adjunct clauses which interfere with wh-movement in general, on independent grounds.
The structure in (10) mirrors the structure of TP with [focus/tense] features on T, as proposed in (9). This confirms that preverbal focus entails a similar syntactic pattern in English and Romanian, and the systematic contrasts follow from parameter settings, which constrain fronting to focus either within CP or within TP.

4.2. Topicalization

Topicalization involves the A'-movement of a nominal constituent to a scope position. The restricted class of constituents that can be focused in this way contrasts Topicalization with clefting, which applies to any type of constituents. If Topicalization is movement to SPEC-CP, as in Drubig (1992), or adjunction to IP, as in Rochemont (1986), the restriction to nominals is puzzling. On the other hand, if Topicalization involves movement to SPEC-TP, the restriction\(^4\) to nominals is motivated: only constituents with [D] features can check the [EPP] feature of T, by moving to the highest SPEC-TP.\(^5\)

Along this line, the analysis in (9) extends to Topicalization structures, so that (11) has the representation in (12).

\(^4\) The restriction of Focus Topicalization to nominals excludes constituents which lack nominal/referential features, as is the case of the PP in (ii):

i. It was ON VACATION that I went there (not to work).

ii. *ON VACATION I went there (not to work).

\(^5\) Collins (1997) argues that constituents other than DP/NP may check the [EPP] feature of T. However, this has to be licensed through overt head adjunction of V to T, as is the case in locative and quotative inversion. There is no overt V-movement to T in Topicalization structures, so that the restriction on the class of constituents that may check [EPP] must hold.
The hierarchical order of Specifiers contrasts (12) and (9). This is expected, since preverbal focus (be it fronting as in (9) or as in (12)) involves a form of wh-movement. As mentioned in section 3, wh-movement observes different conditions in English and in Romanian. In particular, English, as opposed to Romanian, displays Specifiers which qualify as positions for structural operators in all contexts, including configurations with Topicalization, and are located at the highest level of the structure. SPEC·TP in (12) has sentential scope, and qualifies as a position for structural operators, while it also checks the [EPP] feature of T.

The analysis of Topicalization as fronting to SPEC·TP accounts for the contrasts between Topicalization and scrambling or wh-movement (Mueller & Sternefeld 1993). It also entails a dissociation between Topicalization and negative constituent preposing; the latter involves movement to SPEC·CP and obligatory V-movement to C, whereas the former excludes these operations.

5. CROSSLINGUISTIC VARIATION IN INTERROGATIVE CLAUSES

Wh-phrases have been characterized in the literature as intrinsically marked for focus, so that wh-movement is movement to a focus position (Rochemont & Culicover 1990). Double underspecification of wh-phrases for [wh] and [focus] implies double checking against the respective syntactic features specified on functional heads. While this requirement is universal, how it is implemented depends on language internal properties. It would follow from the focus parameter proposed in this paper that the movement of wh-phrases varies crosslinguistically according to the location of [wh] features and to the host feature for [focus]. In particular, wh-phrases check both features against C in English, as in (13a), whereas they undergo dissociated checking in Romanian, as in (13b): [focus] is checked against [focus/tense] in T, and [wh] is checked against the [wh] of C. Thus, (13) represents the crosslinguistic variation induced by the focus parameter in interrogative clauses.
Distribution of [focus] and [wh] features in Romanian between different functional heads imposes overt checking on wh-phrases: FF (Formal Feature) raising at LF targets C for [wh], whereas the [focus] component of T, stranded after overt checking of [tense], is invisible for computation, and the wh-phrase cannot check its [focus] feature. Accordingly, all the wh-phrases must move to SPEC-TP overtly, to check their [focus] feature. Strong [wh] features on C determine further movement of the wh-phrase to SPEC-CP. Hence, the strength of [tense] and [wh] features in (13b), which force overt wh-movement to SPEC-CP through SPEC-TP, correctly predict the following properties of Romanian interrogatives:

A. ungrammaticality of fronting to focus in wh-interrogatives, as in (14a), where the focused DP blocks SPEC-TP as a transition site for wh-phrases:

(14) a. *Când MAŞINA a cumpărat Paul?
   when car has bought Paul

b. banning of wh in situ (14b), since [focus] on T in this context is computed only overtly:

(14) b. *A plecat unde?
   has left where

c. V2 effects in embedded interrogatives (14c), which preserve the structure in (13b). Equidistance of two A'-SPEC-TP to the head T induces MLC (Minimal Link Condition) violations when the constituent in SPEC-TP for focus must cross the higher SPEC-TP to move to SPEC-CP. Hence, the derivation in (14c) converges only if the subject remains in situ in SPEC-VP.

(14) c. Nu ştiam unde (*Ion) a plecat (Ion).
   not knew where John has left John
D. multiple wh-movement, as in (31d), since the [focus] feature of wh-phrases can be checked only overtly against T.6

(14) d. Cine unde a plecat?
   who where has left
   'Who left where?'

The set of properties illustrated in (14) have the opposite value in English, where wh-phrases are not attracted by a double set of strong features. Thus, English allows for wh-phrases in situ, disallows multiple wh-movement, and does not display V2 in embedded interrogatives.

6. CONCLUSIONS

In the framework of the Minimalist Program, this paper argues that [focus] features access the grammar only in conjunction with two related features, [wh] and [tense], which have a categorial status. Crosslinguistic variation arises from the parametric setting for the host formal feature [focus/wh] or [focus/tense]. This hypothesis is tested on English and Romanian, with systematic contrasts in preverbal focus constructions, which can be reduced to parameter settings, opposing the [focus/wh] option in English to the [focus/tense] option in Romanian. Subsequent application of the parametrized preverbal focus analysis leads to a uniform account for crosslinguistic variation in a variety of structures involving wh-movement. It appears that preverbal focus constructions in English and Romanian rely on similar syntactic structures with multiple Specifiers, as in (9) and (10), needed for checking on heads with a double feature. Variation occurs in the distribution of the double feature, specified on C in English and on T in Romanian. This follows from language internal properties, in particular, the properties of scope positions and of A'-chains in the two languages.

Since fronting to focus is a form of wh-movement, the multiple Specifier structures in (9) and (10) have consequences for interrogative clauses. Wh-phrases undergo overt movement to SPEC-CP in one step in English, as in (13a), but in two steps in Romanian, where they transit through SPEC-TP to check the [focus] feature (13b). Important crosslinguistic

---

6 It is presumed at this point that languages with multiple wh-movement present further variation, depending on the strength of [wh] on C: strong [wh] attracts obligatory movement to SPEC-CP, as in Romanian and Bulgarian (Motapanyane 1997), whereas weak [wh] allows the wh-phrase to stop in SPEC-TP before Spell-out, as seems to be the case in Hungarian (Horvath 1986).
variation follows from different checking procedures on wh-phrases: wh in situ, V2 effects in embedded interrogatives, and multiple wh-movement yield contrastive results in the two languages.

While arguing for opposite parameter settings in preverbal focus constructions, this analysis leaves room for internal variation: both parametric options may occur in a language, according to the structural context. Topicalization illustrates this possibility for English, since SELECT and MERGE of [focus/tense] leads to successful derivations in restricted contexts, as in (11/12), which replicates the Romanian structure in (9). However, interacting constraints prompt the [focus/wh] option as the most productive in this language. The empirical data analyzed in this paper supports the hypothesis that [focus] features become syntactic elements only in conjunction with [wh] or [tense] features, and confirms the theoretical assumptions of the Minimalist Program, which restrict syntactic relevance to formal features.

REFERENCES


1998. De-supines and object-to-subject raising. Presented at the 28th Linguistic Symposium on Romance Languages, State College, PA.


RUDIN, CATHERINE. 1993. On focus position and focus marking in Bulgarian questions. Presented at Formal Linguistic Society of Mid-America IV, University of Iowa.