LINGUISTIC DIVERSITY IN APPALACHIA: THE CASE OF NEGATIVE AUXILIARY INVERSION

FRANCES BLANCHETTE
Pennsylvania State University

PAUL E. REED
University of Alabama

ERIN FLANNERY
Pennsylvania State University

CARRIE N. JACKSON
Pennsylvania State University

ABSTRACT: This study investigates how American English speakers from within and outside the Appalachian region interpret negative auxiliary inversion (NAI). Previously observed in Appalachian and other English varieties, NAI has surface syntax similar to yes-no questions but receives a declarative interpretation (e.g., *Didn't everybody watch Superbowl 53*, meaning 'not everybody watched'). Previous work shows that NAI is associated with a reading in which some but not all people participated in an event, as opposed to one in which no one participated. Results from an interpretation task revealed that Appalachian participants tended to obtain the 'not all' and not the 'no one' reading for NAI. In contrast, non-Appalachian participants' interpretations exhibited greater inter- and intraspeaker variability. Appalachian participants with more 'not all' interpretations reported positive attitudes toward NAI use, and they also distinguished between attested and unattested syntactic subject types (e.g., *everybody, many people, *few people*) in a naturalness rating task. Appalachian participants with more 'no one' interpretations had more negative attitudes toward NAI use and made no distinction between subject types. These results highlight how individuals from Appalachia interpret NAI differently than individuals from outside the region and suggest that language attitudes may impact semantic interpretation within a nonmainstream speaker group.

KEYWORDS: interpretation, language attitudes, scope, syntax-semantics interface

IN ANY DISCUSSION OF APPALACHIA, one must begin with the quote from Michael Montgomery (2013, 25): "Appalachia is a place as well as places, people as well as peoples." The Appalachian Regional Commission recognizes a region that stretches from Mississippi to New York, but many U.S. residents consider the core of Appalachia to be a Southern subset of this region, including parts of Tennessee, Kentucky, North Carolina, Virginia, and the entire state of West Virginia (see figure 1). Montgomery's quote points to the diversity of this core area, which contains millions of people living in diverse urban, suburban, and rural settings, providing a rich context for exploring linguistic variation.

FIGURE 1

Appalachia as Defined by the Appalachian Regional Commission
and the Portion Widely Considered the "Core" of Appalachia

NOTE: The "core" of Appalachia depicted here is based on the 40% agreement line
as determined by Ulack and Raitz's (1981, 45) survey of 2,397 college students.

This article explores the nonstandard construction NEGATIVE AUXILIARY
INVERSION (NAI), found in Appalachia and other U.S. regions (e.g., Wolfram
and Christian 1976; Foreman 1999; Green 2014; Matyiku 2017; see Matyiku
2011 for a review). Given the vernacular, nonstandard status of NAI, it is
important to consider at the outset how attitudes might impact speakers'
behavior toward this construction type. Wolfram, Adger, and Christian (2014,
22) note, "Attitudes about language can trigger a whole set of stereotypes
and prejudices based on underlying social and ethnic differences." Work
by Preston (e.g., 1997, 1999) and Cramer (2018) has shown that people
have strong and often negative reactions toward Appalachian Englishes.
These reactions are not lost to native Appalachians. In Reed's (2016) study
of Appalachian East Tennessee, natives of this region acknowledged that
people might judge them negatively based on their speech patterns, and
in some cases they even adopted these negative attitudes toward their own
local variety. But Reed also found a diversity of attitudes toward Appalachian

speech within the region. Notably, speakers who had a strong sense of local attachment, what he termed ROOTEDNESS, straightforwardly rejected these negative attitudes and instead maintained positive attitudes toward the linguistic features associated with "home."

Reed (2016) also found that positive attitudes correlated with linguistic behaviors: more rooted speakers used more monophthongal productions of /aɪ/, a prototypical Appalachian feature, than less rooted speakers, when reading and in prevoiceless contexts (the most stigmatized context [Bernstein 2006]). These more rooted speakers also used more frequent rising pitch accents with a different phonetic realization than their less rooted counterparts. Note that unlike monophthongal /aɪ/, rising pitch accents are not the subject of overt stigma. The behaviors Reed uncovered therefore indicate that attitude may impact the use of variant phonological features beyond the level of immediate consciousness.

Reed's findings are part of a body of work that, since Labov's (1966) seminal study of /r/ pronunciation in New York City, has contributed important discoveries about phonological and morphosyntactic variation. Fewer studies have sought to examine variation at the syntax-semantics interface. Like the study of phonology, this endeavor can be complicated by the social stigma associated with many nonstandard forms. Consider, for example, NEGATIVE CONCORD, in which two (or more) syntactic negations contribute a single semantic negation (e.g., *I didn't eat nothing* is semantically equivalent to *I didn't eat anything* [Labov 1972]). In addition to the Negative Concord reading, sentences with two syntactic negations have an alternative interpretation, which is captured by the prescriptive rule that "[t]wo Negatives in English destroy one another, or are the equivalent to an Affirmative" (Lowth 1763, 139; see also Horn 2010) (e.g., *I didn't eat nothing* is equivalent to *I ate something*). Sentences with two syntactic negations are therefore ambiguous between a negative and a affirmative reading. However, to understand how speakers naturally vary between these two readings, it is necessary to control for the noise introduced by the heavy stigma associated with Negative Concord and the prescriptive correctness of the true "Double Negation" reading (see, e.g., Blanchette and Lukyanenko 2019).

Like Negative Concord, certain NAI sentences may also in principle be ambiguous between two readings, and as a nonstandard construction, NAI is also generally stigmatized. However, unlike with Negative Concord, naive speakers are generally unaware of the constraints on NAI meaning (described in detail below). The construction thus provides a useful vantage point for understanding variation at the syntax-semantic interface. Our study compares American English speakers who spent the majority of their lives in Appalachia with speakers who are not from this region in their interpretation of NAI. Extending previous work that has shown that demographically

similar speakers from core Appalachian regions may have divergent attitudes about language use and that these attitudes can impact language behaviors (Reed 2014, 2020), we explore whether this phenomenon also applies in behaviors tied to the interface between syntax and semantics. Using experimental methods, we investigated what speakers from within and outside of Appalachian core areas know about the semantic and structural properties of NAI and whether, within the core of Appalachia, speakers' attitudes toward this construction impact their interpretations. Though the study focuses on the Appalachian versus non-Appalachian distinction and exploring diversity within Appalachia, because NAI is attested in other nonstandard varieties, it also affords opportunities for connection to a broader set of linguistic communities across the United States.

WHAT IS NEGATIVE AUXILIARY INVERSION?

THE SURFACE PATTERN OF NAI. On the surface, NAI sentences may resemble yes-no questions such as the following:

1. Didn't everybody watch Super Bowl 53?

In example 1, an auxiliary verb (*didn't*) precedes the subject of the sentence (*everybody*), in the inverted pattern typical of English yes-no questions. The intended meaning of the sentence is interrogative: the speaker is asking whether everyone watched the Super Bowl.[1]

NAI constructions have identical surface syntax to negative yes-no questions, as in the following example:

2. Didn't everybody watch Super Bowl 53.
   'Not everybody watched Super Bowl 53'

Note that example 2 contains exactly the same elements in exactly the same order as the interrogative in example 1. Unlike example 1, however, example 2 is assigned declarative prosody and interpretation. This is the typical pattern of NAI: a negated auxiliary precedes the subject of a sentence or a clause, and the string is pronounced and interpreted as a declarative statement.

WHO USES NAI? NAI was first formally observed by Labov et al. (1968) in a study of African American and Puerto Rican New York City English. It has since been observed in White Alabama English (Feagin 1979), West Texas English (Foreman 1999, 2001; Matyiku 2017), Vernacular Texas English (Salmon 2018), African American English (Martin 1993; Weldon 1994; Sells, Rickford, and Wasow 1996; Parrott 2000; Green 2002, 2014), and Appalachian English (Wolfram and Christian 1976; Montgomery 2004;

Montgomery and Hall 2004; Tortora and den Dikken 2010). (See Matyiku 2011 for a comprehensive review of the literature and a nationwide survey of familiarity of NAI constructions with an overtly negative subject, which is the most common NAI subject type.) The structure is thus present in a range of nonstandard varieties, but our study focuses on one specific group: speakers from Southern Appalachia.

NAI AND SCOPE. To understand the importance of scope in characterizing speaker knowledge of NAI, let us consider first what happens in sentences with canonical English word order, where the subject precedes the auxiliary.[2] If we reverse the order of the subject and the auxiliary in the NAI sentence in example 2, so that it appears with canonical word order, we get the following sentence:

    3. Everybody didn't watch Super Bowl 53.

There are two possible interpretations for example 3. One interpretation is logically equivalent to saying 'nobody watched' and could be used in a context like the following:

    4. The Super Bowl was banned from TV this year, and zero fans attended. So, unlike any other year in Super Bowl history, everybody didn't watch Super Bowl 53—not even a single fan.

In this reading, we might say that the noun phrase *everybody* gets interpreted prior to the negation, and it impacts how the negation is interpreted: everybody is such that they did not watch. Another way of saying this is that the negation takes narrow scope relative to *everybody*. We henceforth call this the NARROW-SCOPE NEGATION READING.

    The other reading of example 3 is brought out by the following context:

    5. The Super Bowl was on at its usual time this year, but the season finale of *The Voice* was on at the same time, so everybody didn't watch Super Bowl 53—some people watched *The Voice* instead.

In the context in example 5, the *everybody* sentence can be paraphrased as 'not everybody watched'. In this context, the sentence takes on a different meaning from that of example 4: in example 5, at least some people watched the Super Bowl, while in example 4 no one did. Note that in the paraphrase 'not everybody watched', the negation appears before the noun phrase *everybody*, and its appearance there impacts the semantic contribution of the noun phrase. We can therefore say that in the context in example 5 the negation takes wide scope over *everybody*. We henceforth call this the WIDE-SCOPE NEGATION READING.

Note that the wide-scope negation reading in example 5 is possible despite the fact that *everybody*, and not the negation, occurs first in the sentence. This shows that scope bearing elements such as quantifier noun phrases and negation do not necessarily take scope in the order in which they occur on the surface. This fact reflects the broader phenomenon called quantifier scope ambiguity, first observed by May (1978; see also Pesetsky 1985). Formal models of this phenomenon have posited a level of syntactic structure beyond what is seen on the surface, and it is this syntactic structure that corresponds to sentence meaning. At this level of structure, quantifier noun phrases such as *everybody* and *many people* and quantificational elements such as negation undergo raising to higher, structurally peripheral positions. Quantifier scope ambiguity is derived when two (or more) quantificational elements are present in a clause, yielding two (or more) possible structures. For example, in a sentence with *everybody* and a negation, there is a structure corresponding to the wide-scope negation reading in which the negation sits in a position higher than *everybody* and a structure corresponding to the narrow-scope negation reading in which *everybody* is structurally higher than the negation.

Returning to NAI, Foreman (1999, 215) observed that despite the presence of two scope bearing elements, a negation and a quantificational subject, NAI constructions are actually not ambiguous and only the wide-scope negation reading is possible. (See also Matyiku 2017.) We see that this is true for example 2, repeated here, which has only the meaning in 6a and cannot have the meaning in 6b:

6. Didn't everybody watch Super Bowl 53.
    a. 'Not everybody watched Super Bowl 53' [wide-scope negation]
    b. ≠ 'Nobody watched Super Bowl 53' [narrow-scope negation]

There is therefore a sense in which NAI constructions wear their logical form on their sleeve: the negation appears first, and it must take wide-scope.

Formal models of NAI have different ways of deriving its surface structure and lack of scope ambiguity. Some propose that the negation raises over the subject to a higher position in the surface syntax, thus overtly marking its wide scope (Sells, Rickford, and Wasow 1996; Foreman 1999, 2001; Green 2014; Matyiku 2017), while others propose that the subject itself remains in a position lower than the auxiliary throughout the derivation (Parrott 2000; White-Sustaita 2010).[3] A recent proposal suggests that the negation originates in a position internal to the subject noun phrase and from there raises to its surface auxiliary-adjacent position (Blanchette and Collins 2018). While the details of these models are not relevant for the goals of the present study, it is relevant to note that the wide-scope negation reading of NAI played a central role in their development.

NAI AND SUBJECT TYPE. Previous observations suggest that the most common subject type in NAI appears as morphologically negative (Matyiku 2017), and some quantitative support for this is found in a corpus study of Southern Appalachian (Blanchette and Collins 2018, 18; the data are extracted from a subset of the corpus in Tortora et al., 2017). When the subject of NAI displays negative morphology, it acts in concord with the negated auxiliary to contribute a single semantic negation, resulting in Negative Concord. The following example and its prose translation illustrate:

> 7. Didn't nobody beat them. [AAPCAppE:ALC-EB-377-1.77][4]
>   'Nobody beat them'

As a preview to our methods, we note here that despite the frequency of NAI constructions (as in 7) with an overtly negative subject, we did not include them in our experiment. This is because, given that the subject and the auxiliary act in concord to contribute to the same semantic negation, the extent to which speakers access a wide-scope as opposed to a narrow-scope negation reading in these sentences is virtually impossible to detect in an experimental paradigm. In addition, we would expect the heavy social stigma associated with Negative Concord to interfere with speakers' judgments of NAI, thus confounding our results. We therefore focus instead on the infrequent but still attested subject type *everybody*, which, as discussed above and illustrated below in the methods section, provides two potentially ambiguous readings whose truth conditions are more readily illustrated within the context of an experiment.

    In addition to *nobody*, phrases like *everybody* and *many people* are possible as NAI subjects, as are Negative Polarity Item subjects such as *anybody* and other quantifier phrases such as *more than three people*. Phrase types that are not possible in NAI subject position include referential and definite noun phrases and phrases with the determiners *few* and *some*. Foreman (1999, 215) makes the important observation that phrases in subject position that can be preceded by *not* (e.g., *not everybody came*) can also appear as NAI subjects. Examples 8 and 9 illustrate some possible and impossible NAI subject types. (See also Matyiku 2017 for an extensive description of the subject restrictions in NAI.)[5]

> 8. Some possible NAI subject types:
>   a. Didn't everybody finish their homework. [Foreman 1999, 215, ex. 29d]
>   b. Didn't many people go to the party. [Foreman 1999, 215, ex. 29b]
>   c. Dudn't anybody seem to understand. [Feagin 1979, 235, ex. 73][6]
>   d. Didn't half the students do their homework. [Foreman 1999, 212, ex.15b]

9. Some impossible NAI subject types:
   a. *Didn't Jamie see the fight. [Matyiku 2017, 16, ex. 1.19]
   b. *Didn't the teachers go to the party. [Foreman 1999, 215, ex. 28c]
   c. *Didn't few people live there then. [Matyiku 2017, 75, ex. 3.5b]
   d. *Didn't some person come. [Matyiku 2017, 76, ex. 3.6b]

The class of possible NAI subjects has been characterized as QUANTIFICATIONAL (see, e.g., Green 2014), that is, as scope bearing elements that have the ability to interact with other scope bearing elements, with important implications for semantic interpretation. The notion of "scope" is thus essential to understanding what it means to have knowledge of NAI.

A BRIEF NOTE ON NAI AUXILIARIES. While the NAI examples provided above all include the auxiliary *didn't*, other (modal) auxiliaries such as *ain't, won't, couldn't*, and the like, are also possible. The general principle appears to be that if -*n't* can attach to an auxiliary, that auxiliary can appear in NAI (e.g., Parrott 2000). As another preview to our methods, we used only *didn't* in our experiment because it does not introduce modal semantics and, unlike some other auxiliaries, it is not subject to variation in morphological form (cf. *isn't* vs. *ain't*), thus allowing for the design of a more controlled set of stimuli.

METHODS

We designed an experiment to investigate whether Appalachian English speakers are distinct from other American English speaker groups in understanding the scope restrictions of NAI. To assess knowledge of NAI structures in American English speaker populations native to Appalachia as compared with that in people from outside the region, we distributed an internet-based survey.

THE INTERPRETATION TASK. The main experiment was limited to structures with *every* subjects, in order to evaluate participants' interpretation of scope. Sixteen NAI sentences were placed in ambiguous contexts that could support either a wide-scope or a narrow-scope negation interpretation (as in 10).

10. I was planning a class activity about Hogwarts yesterday. I was really surprised when my coworker told me it was a bad idea because didn't EVERY kid read *Harry Potter* in class last year.

The fact that NAI sentences are string-identical to yes-no questions presents a potential confound, so to address this we placed them in embedded clauses to elicit a declarative as opposed to an interrogative reading. The contexts and target sentences were accompanied by two images: one depicting a
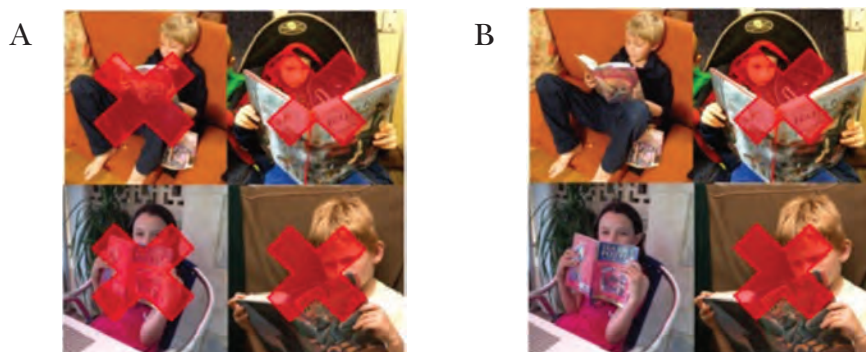
wide-scope negation interpretation of the sentence and the other depicting a narrow-scope negation interpretation. The visuals conveyed separate readings by placing a different distribution of red ✖ symbols over the same picture (see figure 2). In the *Harry Potter* example, two graphics of students in class would follow the sentence: one with some students crossed out for a wide-scope negation reading and the other with all students crossed out for a narrow-scope negation reading. Participants were then prompted to select the image, labeled as A or B, that best matched the meaning of the previous scenario. The wide-scope negation reading was presented as image A for half of the target items and as image B for the other half.

We anticipated a fair amount of noise in the interpretation data given the relative unnaturalness of the task—a written, online survey probing a subtle meaning distinction of a vernacular construction typically found in spoken conversation. Nevertheless, we expected to see some differences across groups. Based on previous literature, we predicted that Appalachian participants would select the wide-scope negation reading with a greater degree of reliability than participants from outside the region. Because both readings are, in principle, permissible outside of Appalachian populations, we further predicted both intra- and interspeaker variability within the non-Appalachian group, signaling inconsistent responses from individual participants and among the group as a whole.

FIGURE 2
Sample Stimulus Item from the Interpretation Task

I was planning a class activity about Hogwarts yesterday. I was really surprised when my coworker told me it was a bad idea because didn't every kid read *Harry Potter* in class last year.

A
B

Top left photo, © 2013, John Markos O'Neill (https://www.flickr.com/photos/nhoj/10507125196); top right photo, © 2017, Seamus McCauley (https://www.flickr.com/photos/62833283@N00/32290080463); bottom left photo, © 2016, Henry Burrows (https://www.flickr.com/photos/foilman/30785034134); bottom right photo, © 2016, Tim Sackton (https://www.flickr.com/photos/sackton/29319621130). All photos published with Creative Commons license CC BY-SA 2.0 (O'Neill, Burrows, Sackton) or CC BY 2.0 (McCauley).

In addition to the 16 target items, 32 filler items of three separate types were included within the main survey task. The filler items included visual images consistent with the target contexts and included one of the following: an ambiguous relative clause attachment (as in 11), a separate nonstandard form, such as the double modal *might could* (as in 12), or a spelling error (as in 13).

11. My husband told me that the coach of the football player WHO WAS STAND-ING on the sidelines got really upset about the call by the referee.
12. Number 815 is running so fast that he MIGHT COULD win the race.
13. The WRESLER in the middle won the gold medal.

The target and filler items were presented together in a randomized order.

THE NATURALNESS RATING TASK. After they finished the interpretation task, the Appalachian participants also completed a naturalness rating task for NAI structures including *every, many,* and *few* subjects. This task placed NAI sentences with different subject types in written linguistic contexts that were 1–3 sentences in length. Participants were prompted to select a naturalness rating from 1 to 7 (1 = completely unnatural; 7 = completely natural). It was explained that ratings were to target only the NAI sentence, which was isolated from the proceding context on a separate line of text. The task included eight *many* (as in 14) and eight *few* NAI subject contexts (as in 15).

14. The kennel was full of dogs who needed new homes. One family showed up last Friday afternoon to buy a puppy but for the most part didn't MANY parents want a dog for their kids.
15. I was arguing with Jen because she said she had blocked the most shots of any goalkeeper in the league. I had to break the news to her that didn't FEW goalies block shots like she did.

Sixteen *every* NAI subject-type contexts similar to those in the interpretation task (but without the images) were also included, eight of which were biased toward a wide-scope negation reading (as in 16), and eight of which were biased toward the narrow-scope negation reading (as in 17).

16. Last night my coworkers and I decided to go out for karaoke. All the girls had a great time, and even though my friends Tom and Chris did a duet, I noticed that didn't every guy sing a song.
17. Last night my coworkers and I decided to go out for karaoke. All the girls had a great time, but I thought the guys didn't want to be there because I noticed that didn't every guy sing a song.

There were two versions of the 16 *every* NAI sentences, but these were dis-tributed to two different lists so that each participant saw eight *every* NAI

sentences in a wide-scope negation context and eight *every* NAI sentences in a narrow-scope negation context, but only one version of any given item.

We expected that ratings would be low overall in the naturalness rating task, again given the relative unnaturalness of the task, but still we expected to find some differences. Based on previous work (e.g., Foreman 1999; Blanchette and Collins 2018), we predicted that the *many* subject constructions in general and the *every* subject constructions in wide-scope negation contexts would receive comparably higher ratings, while the *few* subject constructions in general and the *every* subject constructions biased toward narrow-scope negation readings would receive comparably lower ratings.

Thirty-two filler items were also included in the naturalness rating task. Eight filler items contained word order errors (as in 18), eight contained a different nonstandard form (as in 19), eight contained an ambiguous relative clause attachment (as in 20), while the other eight filler items contained no special features.

18. My wife and I went on a trip to the Grand Canyon last weekend. It was amazing, but I forgot to bring a camera us with.
19. Grace was talking to her friend about whether to volunteer at the animal shelter. She knew she'd be busy on Monday, but she said she might could go Tuesday.
20. The judge at the recent murder trial was trying really hard to maintain a fair and impartial atmosphere in the courtroom. At one point during the trial the judge was annoyed that the attorney of the defendant who mumbled was questioned about personal matters.

The 32 target and 32 filler items were presented together in a randomized order.

LANGUAGE BACKGROUND QUESTIONNAIRE. At the end of the study, all participants completed a language background questionnaire in which they self-reported demographic information, including their age, gender, educational background, and detailed information about the regions they had lived in. Additionally, participants answered questions concerning previous exposure to NAI constructions and their attitude toward NAI usage in formal and informal settings. Specifically, we asked participants to state whether, prior to the experiment, they had heard people using (1) NAI sentences with *every* subjects, such as *didn't everybody watch* to mean 'not everybody watched', and (2) NAI sentences with *many* subjects, such as *didn't many people watch* to mean 'not many people watched' in their everyday lives. We included both of these sentence types because the corpus study of Appalachian English in Blanchette and Collins (2018, 18) yielded zero tokens of NAI with *every* subjects, suggesting that this type is highly infrequent, while tokens with

many subjects were attested.[7] In addition to questions about exposure, we also asked participants to report their attitudes toward NAI sentences with *many* subjects—specifically, whether (1) they are acceptable in any context, (2) they are acceptable informally, (3) they are present in some varieties but should be avoided, or (4) they should be avoided in any context.

PARTICIPANTS AND PROCEDURES. The surveys were administered on Qualtrics (Qualtrics 2017). Twenty-six non-Appalachian participants were recruited via Amazon Mechanical Turk and paid $2.40 each. Two participants from Texas were excluded, since NAI is attested in various regions of that state (e.g., Foreman 1999; Matyiku 2017), such that the final number of non-Appalachian participants was 24. Figure 3 illustrates the regions where our non-Appalachian participants reported having spent the most significant portions of their lives. We note that none of these areas overlap with the commonly perceived core Appalachian boundaries (shown above in figure 1). The non-Appalachian survey took approximately 15 minutes to complete.

Twenty-two Appalachian speakers were recruited through author contacts. Figure 3 illustrates the primary regions of origin for these participants. All were from Southern Appalachia or had spent a significant portion of their lives in the region.[8] Each Appalachian participant was compensated with a $10 Amazon gift card. The Appalachian participant survey, which included both the interpretation and the naturalness rating tasks, took approximately 25 minutes to complete.

FIGURE 3
Locations of Study Participants
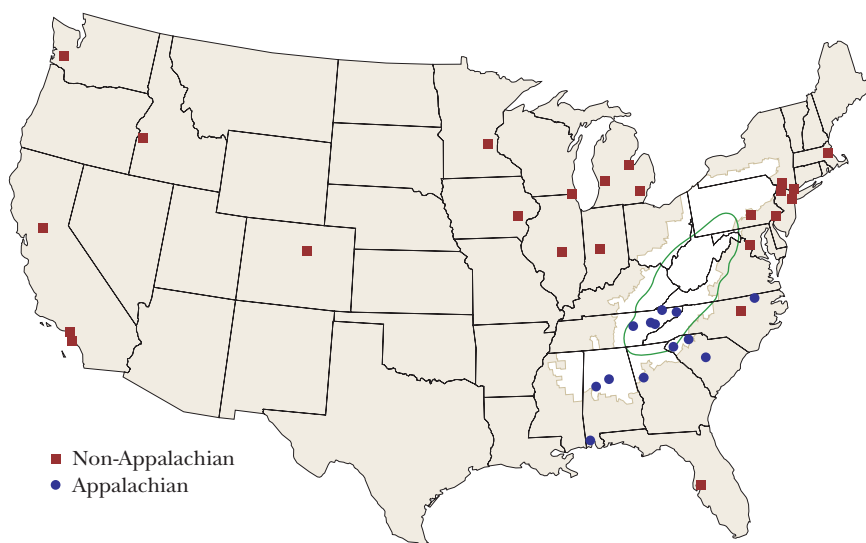
RESULTS

INTERPRETATION TASK RESULTS. The overall results of the interpretation task by group (Appalachian vs. non-Appalachian), displayed in figure 4, show that the Appalachian participants provided more target-like wide-scope negation responses overall (67%) than the non-Appalachian speakers (56%). To explore whether this difference was reliable, we fit a binomial generalized linear mixed effects model of verification question accuracy using the glmer() function of the lme4 package (Bates et al. 2015) in R (R Core Team 2017). The predictor variable, entered into the model using mean-centered effects coding, was the between-participants factor of speaker group (non-Appalachian speaker, contrast code: –0.50 vs. Appalachian Speaker, contrast code: 0.50). We included random intercepts for participants and items, and a random slope for speaker group and item.

Though the numeric difference between Appalachian and non-Appalachian speakers was in the predicted direction, with more target-like responses for the Appalachian speakers, statistical tests revealed that at the group level, the Appalachian speaker advantage was not significant (N_{trials} = 736, β = .809, SE = .809, z = 1.001, p = .317). This indicates that our Appalachian speakers as a group were not reliably distinct from the group of non-Appalachian speakers.

Despite this null effect, observations of individual participants' performance revealed key differences between the two speaker groups. Figure 5 contains histograms of participant performance by speaker group. Notably,

FIGURE 4
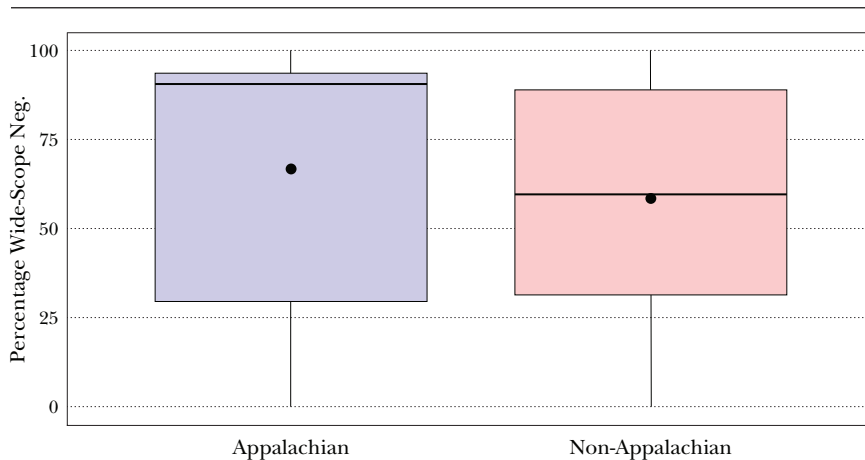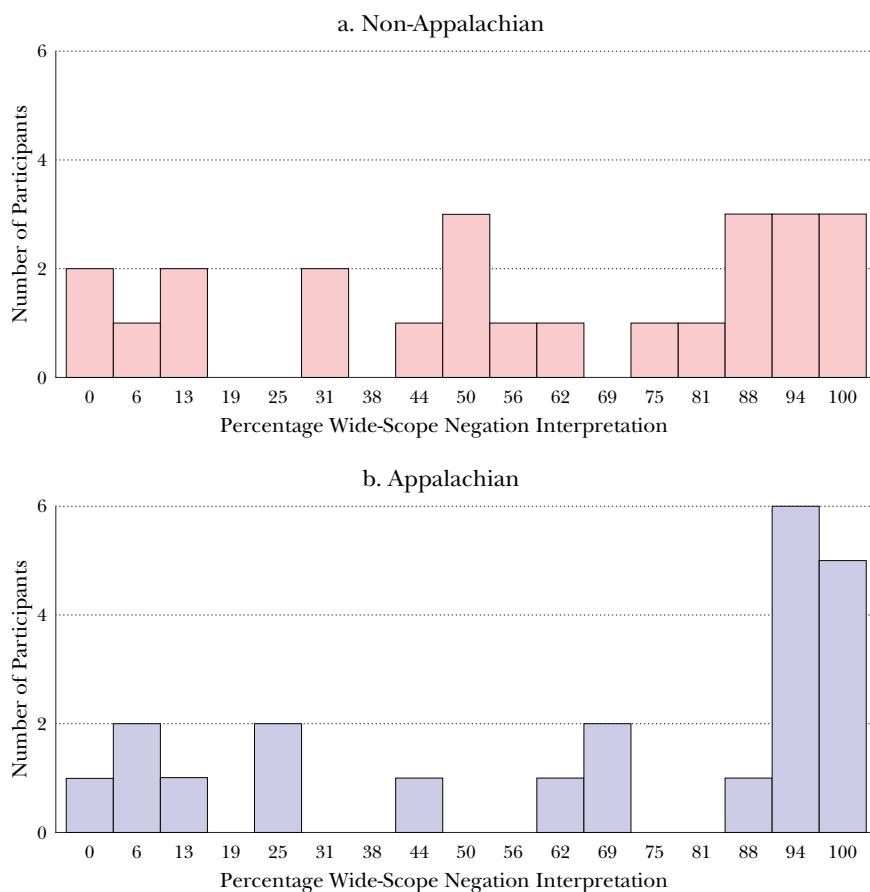Appalachian vs. Non-Appalachian Speaker Overall Performance
on the Interpretation Task

FIGURE 5
Distribution of Individual Non-Appalachian and Appalachian
Participant Responses on the Interpretation Task

a. Non-Appalachian

b. Appalachian

while the non-Appalachian speakers had high levels of individual variation, with a relatively steady distribution of accuracy levels across the entire range, the Appalachian speakers displayed a bimodal distribution, with more than half of the participants (12/22) performing at or close to 100% and a large proportion (6/22) with 25% or lower accuracy.

We take the relatively bimodal distribution of our Appalachian speakers as evidence that there exists variation within Appalachian English in the interpretation of NAI constructions. To better understand the nature of this variation, we looked to Appalachian participants' responses to the post-task background questionnaire. Table 1 illustrates individual Appalachian participants' responses to these questions. We include reported information

TABLE 1

Appalachian Participants' Responses to Language Background Questions

|	*Low (≤25%)*	*High (≥88%)*
n	6	12
Age	Mean 31.4	Mean 35.83
	Range 22–44	Range 19–59
Gender		
Female	67% (4)	75% (9)
Male	33% (2)	25% (3)
Education		
High school	16% (1)	16% (2)
Some college	16% (1)	8% (8)
College or University (B.A.)	16% (1)	14% (3)
Some graduate studies	0% (0)	16% (2)
MA or equivalent	50% (3)	16% (2)
PhD, MD, JD, or equivalent	0% (0)	16% (2)
Area of upbringing[a]		
Rural	33% (2)	16% (2)
Urban	50% (3)	33% (4)
Urban Cluster	16% (1)	50% (6)
Exposure to NAI with *every*	67% (4)	58% (7)
Exposure and use of NAI with *many*		
Never heard it	50% (3)	14% (3)
Hear occasionally but never say it	33% (2)	33% (4)
Hear regularly but never say it	16% (1)	33% (4)
Hear regularly say occasionally	0% (0)	8% (1)
Attitude toward NAI with *many*		
Should be avoided	67% (4)	16% (2)
Present in some dialects but should be avoided	16% (1)	8% (1)
Present in some dialects and okay to use informally	16% (1)	67% (8)
Present in some dialects and okay in any context	0% (0)	8% (1)
Completely acceptable English sentence	0% (0)	0% (0)

a. Area types were defined according to the U.S. Census determinations. A rural area is defined as having fewer than 2,500 people, Urban Clusters have 2,500–50,000 and urban areas have more than 50,000 people.

about age, gender, level of formal education, responses to questions about NAI exposure, as well as attitudes toward the NAI construction. The table contains two groups of participants: a high accuracy group of 12 who scored 88% or above, meaning they chose the target wide-scope negation interpretation for at least 14 of the 16 target items, and a low accuracy group of 6 who scored 25% or below, meaning they chose the target wide-scope negation

interpretation for four or fewer of the target 16 items. The remaining 4 participants were excluded from this analysis.[9] As table 1 shows, the two groups were largely similar in terms of age, gender, area of upbringing, and exposure to NAI with *every* and *many*. The most striking difference across groups is in their attitudes toward NAI constructions with *many*: in the group with 25% accuracy or less, 83% (5/6) said this construction should be avoided, but in the group with 88% accuracy or above, 75% (9/12) said that the construction is acceptable in usage. Though the groups are relatively small, especially the ≤25% group, this result suggests that language attitudes played a role in participants' offline interpretations of NAI. More specifically, it suggests that the speakers with a more positive attitude toward the construction tended to interpret NAI constructions in the manner expected according to previous work on this construction, that is, with a wide-scope negation reading (Foreman 1999), whereas the speakers with a negative attitude toward the construction tended to provide the narrow-scope interpretation.

NATURALNESS RATING TASK RESULTS. To further support the hypothesis that attitudes impacted interpretation in the main task, we looked to the results of the naturalness rating task. We separated the naturalness rating results based on the two groups outlined above: a low accuracy group who scored 25% or less on the interpretation task and a high accuracy group who scored 88% or higher on the interpretation task. Figure 6 shows the results of the naturalness ratings for NAI sentences with *every* in wide-scope and narrow-scope negation contexts, as well as NAI sentences with *few* and *many* subjects, for the high and low accuracy groups.

FIGURE 6
Appalachian Participants' Naturalness Ratings of NAI Constructions
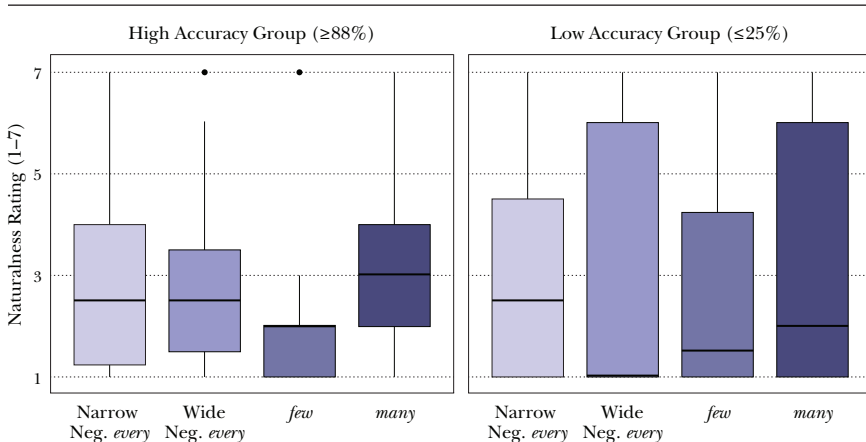
As figure 6 shows, median judgments were lower overall in the low accuracy group than in the high accuracy group.[10] Again, though the numbers are small, this shows that speakers who gave more narrow-scope negation answers in the interpretation task also tended to rate NAI sentences as slightly less natural than the group who gave primarily wide-scope negation answers, regardless of the linguistic context or subject type. This trend is in line with the observation that the low accuracy group tended to have more negative attitudes toward NAI in general, given that negative attitudes should also predict overall lower ratings (Preston 2013).

The clearest difference between the high and low accuracy groups emerges in their ratings of NAI sentences with *few* subjects versus those with *many* subjects. Recall that previous work has shown that *few* is an unnatural and unattested NAI subject type, whereas *many* is both natural and attested (e.g. Foreman 1999; Matyiku 2017). Observing figure 6, we see that the high accuracy group makes a clear distinction between *few* and *many* subjects, with higher ratings for *many* than for *few*, and no overlap in the quartiles. The low accuracy group, on the other hand, gave relatively similar ratings for both *many* and *few* sentence types. Thus, only the high accuracy group's naturalness ratings reflect a clear distinction between unnatural, unattested *few* and natural, attested *many* subjects.

DISCUSSION AND CONCLUSIONS

The meaning properties of the NAI construction, a nonstandard sentence type with an obligatory wide-scope negation interpretation, make it a useful tool for exploring linguistic variation at the syntax-semantics interface. In designing our experiment, we expected that Appalachian speakers, whose use of this construction type is well documented (e.g., Wolfram and Christian 1976), would display knowledge of the wide-scope negation property of NAI in a way that speakers from outside the region would not. This expectation was borne out numerically, but not statistically, in the overall results. However, when we looked to the Appalachian participant data, we found a much richer and more complex picture of how Appalachian speakers understand this construction. Specifically, participants who gave narrow-scope negation responses near categorically on the interpretation task tended to have negative attitudes toward NAI, while participants who gave wide-scope negation responses near categorically tended to have more positive attitudes toward the construction. We further found that the Appalachian speakers who gave wide-scope negation responses in the interpretation task gave higher ratings for NAI sentences overall in a naturalness rating task, and they also

attended to the relative naturalness of other NAI subject types, rating natural and attested *many* higher than unnatural and unattested *few*. On the other hand, speakers who gave narrow-scope negation responses tended to rate NAI sentences low overall, and they did not attend to the fine-grained syntactic properties of NAI, making little if any distinction between *many* and *few* subjects.[11] Given the relative smallness of our groups, we would expect a future study with a larger sample size to reveal reliable differences between the Appalachian and non-Appalachian group and potentially within the Appalachian subgroups as well.

Taken as a whole, our results suggest that speakers from Appalachia interpret scope in NAI differently and with more nuance than do speakers from outside of Appalachia, who exhibited significant inter- and intraspeaker variation. The documentation of this level of nuance in the interpretation of a nonmainstream construction parallels observations of, for example, the interpretation of habitual *be* and *steady* in African American communities (e.g., Green 2002) and multiple modals (e.g., *I might could do that*) in Appalachian communities (Mishoe and Montgomery 1994). Our data build on these observations by providing evidence that within a nonmainstream speech community, speakers with a more positive and accepting view of a particular structure may interpret that structure differently than speakers with negative attitudes toward the structure. Though the subgroups within the Appalachian speaker group are small in number, we argue that these results provide initial support for the hypothesis that, in addition to shaping the use of phonological variants (e.g., Reed 2016), language attitudes may impact semantic interpretation, and potentially other aspects of grammar. The connection between attitudes and judgments of acceptability or appropriateness has been previously demonstrated (Preston 2013), so the connection in our results between interpretation and naturalness ratings further supports this hypothesis.

Several possible explanations exist for the finding that attitudes relate to NAI interpretation within the Appalachian participant group. One is that the behaviors we found reflect a grammatical distinction, where NAI is grammatical for the speakers who selected the wide-scope negation reading but not for those who selected the narrow-scope negation reading. Under this explanation, people with negative attitudes may not acquire the syntactic and semantic properties of stigmatized structures such as NAI, despite the presence of this structure type in the input. It is interesting to note, however, that unlike the non-Appalachian participants, who displayed significant inter- and intra-speaker variability in interpretation, the Appalachian participants tended to interpret NAI categorically as either wide- or narrow-scope negation. This level of systematicity points toward some form of grammatical knowledge in the Appalachian group as a whole, even if the

manifestation of this knowledge during interpretation differs according to language attitudes. Another possible explanation is that for the group who selected the narrow-scope negation reading, some mechanism served to block the more natural interpretation of NAI. That is, speakers may have actually obtained the natural wide-scope negation interpretation online (i.e., in the moment of interpretation) but made an offline decision to select the unnatural, narrow-scope negation reading. Still a further possibility is that there is an additional factor, such as the nature of the input from the speakers' environment, that impacts behavior. This input—be it linguistic, attitudinal, or even both—may simultaneously impact both attitudes toward NAI and mental representations, thus leading to the link that we observed in our data. Selecting between these options would require additional and potentially more sensitive measures than the offline meaning judgment task employed here. However, as highlighted by the results presented above, the nature of the connection between attitudes and semantic interpretation is worthy of future research, and NAI serves as a useful starting point for this line of inquiry.

It is important to recall that the level of grammar involved in obtaining the wide-scope negation reading of an NAI construction is most likely below the level of speakers' immediate consciousness. This contrasts NAI with constructions such as Negative Concord, where speakers are explicitly taught what these sentences can and cannot mean from a prescriptive standpoint. Similarly, speakers are generally aware that nonstandard phonological features, like /aɪ/ monophthongization, carry a social stigma (Labov 1996; Preston 1997; Bernstein 2006). But we have seen that speakers' attitudes toward nonstandard varieties can subconsciously influence their use and perception of phonological features (Labov 1996), even those that are not overtly stigmatized (Reed 2016). Like /aɪ/ monopthongization, the NAI construction is stigmatized, but the constraints on its interpretation (i.e., its obligatory wide-scope negation) are not so straightforwardly stated. And, while the general use of NAI may be easily caricatured, it is safe to assume that there are no caricatures or explicit prohibitions that reference its obligatory wide-scope negation. Considering the covertness of this interpretative property of NAI, it is perhaps surprising that speakers' attitudes toward the use of NAI were connected to their convergence on the wide-scope (surface) or the narrow-scope negation interpretation. Yet in many ways this parallels Reed (2016), who found that attitudes toward Appalachia affected not only the socially stigmatized /aɪ/ monophthongization, but also the noticeable but less stigmatized phonological feature of rising pitch accents. As such, the present study—when viewed together with other recent research—highlights how speakers' attitudes toward nonstandard varieties may impact the use and interpretation of nonstandard forms, at all levels of the linguistic system.

NOTES

1. The presence of the negation triggers the assumption that the speaker thought everyone watched (e.g., Dayal 2016). This fact about negative yes-no questions is not relevant to NAI, which, as we will show, is semantically distinct from interrogatives.

2. We note that SVO word order is canonical in both standard and nonstandard varieties of American English, including Appalachian.

3. See Green (2014) for a proposal that negation raising in NAI has the semantic-pragmatic effect of domain widening.

4. The example is extracted from the Audio Aligned and Parsed Corpus of Appalachian English (Tortora et al. 2017). A token identifier (AAPCAppE: Subcollection Initials–Interviewee–Token Number) is provided.

5. The prohibition on referential (and definite) subjects is demonstrated experimentally in Blanchette and Collins (2018), but see Green (2014) and Salmon (2017) for possible counterexamples. We set this debate aside here, as it does not pertain to our experiment design and results.

6. We maintain Feagin's (1979) original spelling of the auxiliary, which reflects the vowel quality typically employed by the Alabama English speakers she surveyed.

7. We excluded overtly negative subjects, even though these are the most frequent type, because we wanted to be sure that speakers were providing information about their NAI use and exposure, as opposed to their Negative Concord use and exposure. See the above discussion of the confounds introduced by including Negative Concord.

8. Two of the dots on this map represent speakers from Mobile, Alabama, and Weldon, North Carolina. Though these regions are not within the core of Appalachia illustrated in figure 1, both speakers spent significant portions of their lives (ten or more years) living in the core county of Tuscaloosa, Alabama, hence our decision to include them as Appalachian speakers.

9. Two of these remaining four participants scored 69%, one scored 62%, and another scored 43%. Their responses on the language background questionnaire were distributed similarly to the results reported in table 1, with their responses to the question regarding attitudes toward NAI being somewhere between those of the high and low accuracy groups.

10. Because the groups were so small (and especially the low accuracy group), we do not expect mean ratings to be meaningful.

11. Both the high and low accuracy groups gave slightly higher naturalness ratings for sentences embedded in a narrow-scope negation context, which was not the predicted direction. The task instructions reminded participants to judge the naturalness of the last sentence, and unlike in the interpretation task, the items were not accompanied by images, so it is likely that this resulted from participants focusing on the NAI sentence and not attending carefully to the context.

REFERENCES

Adger, Carolyn Temple, Walt Wolfram, and Donna Christian. 2014. *Dialects in Schools and Communities*. 2nd ed. London: Routledge.

Bates, Douglas, Martin Mächler, Ben Bolker, and Steve Walker. 2015. lme4: Linear Mixed-Effects Models Using Eigen and S4 (software). R package. Version 1.1-10. Availabe as a supplement to "Fitting Linear Mixed-Effects Models Using lme4," *Journal of Statistical Software* 67, no. 1. http://doi.org/10.18637/jss.v067.i01.

Bernstein, Cynthia. 2006. "Drawing Out the /ai/: Dialect Boundaries and /ai/ Variation." In *Language Variation and Change in the American Midland: A New Look at 'Heartland' English*, edited by Thomas E. Murray and Beth Lee Simon, 209–32. Amsterdam: Benjamins.

Blanchette, Frances, and Chris Collins. 2018. "On the Subject of Negative Auxiliary Inversion." *Canadian Journal of Linguistics* 64, no. 1 (Mar.): 32–61. https://doi.org/10.1017/cnj.2018.22.

Blanchette, Frances, and Cynthia Lukyanenko. 2019. "Unacceptable Grammars? An Eye-Tracking Study of English Negative Concord." *Language and Cognition* 11: 1–40. https://doi.org/10.1017/langcog.2019.4.

Cramer, Jennifer. 2018. "Perceptions of Appalachian English in Kentucky." *Journal of Appalachian Studies* 24, no. 1 (Spring): 45–71. https://doi.org/10.5406/jappastud.24.1.0045.

Dayal, Veneeta. 2016. *Questions*. Oxford: Oxford University Press.

Feagin, Crawford. 1979. *Variation and Change in Alabama English: A Sociolinguistic Study of the White Community*. Washington, D.C.: Georgetown University Press.

Foreman, John. 1999. "Syntax of Negative Inversion in Non-standard English." In *WCCFL 17: The Proceedings of the Seventeenth West Coast Conference on Formal Linguistics*, edited by Kimary N. Shahin, Susan Blake, and Eun-Sook Kim, 205–19. Stanford, Calif.: Center for the Study of Language and Information.

———. 2001. "Negative Inversion in West Texas English." M.A.'s thesis, University of California, Los Angeles.

Green, Lisa J. 2002. *African American English: A linguistic Introduction*. Cambridge: Cambridge University Press.

———. 2014. "Force, Focus, and Negation in African American English." In *Microsyntactic Variation in North American English*, edited by Raffaella Zanuttini and Laurence R. Horn, 115–42. Oxford: Oxford University Press.

Horn, Laurence R. 2010. "Multiple Negation in English and Other Languages." In *The Expression of Negation*, edited by Laurence R. Horn, 111–48. Berlin: Walter de Gruyter.

Labov, William. 1966. *The Social Stratification of English in New York City*. Washington, D.C.: Center for Applied Linguistics.

———. 1972. "Negative Attraction and Negative Concord in English Grammar." *Language* 48, no. 4 (Dec.): 773–818. https://doi.org/10.2307/411989.

———. 1996. "When Intuitions Fail." In *Papers from the Parasession on Theory and Data in Linguistics: April 11–13, 1996*, edited by Lisa McNair, Kora Singer, Lise M. Dobrin, and Michelle M. Aucoin, 77–106. Chicago: Chicago Linguistics Society.

Labov, William, Paul Cohen, Clarence Robins, and John Lewis. 1968. *A Study of the Non-standard English of Negro and Puerto Rican Speakers in New York City*. Cooperative Research Project no. 3288. Office of Education, U.S. Dept. of Health, Education, and Welfare. New York: Columbia University.

Lowth, Robert. 1763. *A Short Introduction to English Grammar: With Critical Notes*. 2nd ed. London: Printed for A. Millar and R. and J. Dodsley.

Matyiku, Sabina. 2011. "Negative Inversion." Yale Grammatical Diversity Project: English in North America. http://ygdp.yale.edu/phenomena/negative-inversion. Updated by Tom McCoy, Aug. 22, 2015, and by Katie Martin, June 20, 2018.

———. 2017. "Semantic Effects of Head Movement: Evidence from Negative Auxiliary Inversion." Ph.D. diss., Yale University.

Martin, Stefan. 1993. "'Negative Inversion' Sentences in Southern White English Vernacular and Black English Vernacular." *University of Maryland Working Papers in Linguistics* 1: 49–56.

May, Robert. 1978. "The Grammar of Quantification." Ph.D. diss., Massachusetts Institute of Technology.

Mishoe, Margaret, and Michael Montgomery. 1994. "The Pragmatics of Multiple Modal Variation in North and South Carolina." *American Speech* 69, no. 1 (Spring): 3–29. https://doi.org/10.2307/455947.

Montgomery, Michael B. 2004. "Grammar of Appalachian English." In *A Handbook of Varieties of English*, vol. 2, *Morphology and Syntax*, edited by Bernd Kortmann, Kate Burridge, Rajend Mesthrie, Edgar W. Schneider, and Clive Upton, 245–80. Berlin: Mouton de Gruyter.

———. 2013. "The Historical Background and Nature of the Englishes of Appalachia." In *Talking Appalachian: Voice, Identity, and Community*, edited by Amy D. Clark and Nancy M. Hayward, 25–53. Lexington: University Press of Kentucky.

Montgomery, Michael B., and Joseph S. Hall. 2004. *Dictionary of Smoky Mountain English*. Knoxville: University of Tennessee Press.

Parrott, Jeffrey. 2000. "Negative Inversion in African American Vernacular English: A Case of Optional Movement?" In *Proceedings of the Twenty-Eighth Western Conference on Linguistics (WECOL 99)*, edited by Nancy Mae Antrim, Grant Goodall, Martha Schulte-Nafeh, and Vida Samiian, 414–27. Fresno: Dept. of Linguistics, California State University.

Pesetsky, David. 1985. "Morphology and Logical Form." *Linguistic Inquiry* 16, no. 2 (Spring): 193–246. https://www.jstor.org/stable/4178430.

Preston, Dennis R. 1997. "The South: The Touchstone." In *Language Variety in the South Revisited*, edited by Cynthia Bernstein, Thomas Nunnally, and Robin Sabino, 311–51. Tuscaloosa: University of Alabama Press.

———. 1999. "A Language Attitude Approach to the Perception of Regional Variety." In *Handbook of Perceptual Dialectology*, vol. 1, edited by Dennis R. Preston, 359–73. Amsterdam: Benjamins.

———. 2013. "Language with an Attitude." In *The Handbook of Language Variation and Change*, 2nd ed., edited by J. K. Chambers and Natalie Schilling, 157–82. Hoboken, N.J.: Wiley-Blackwell.

Qualtrics. 2017. Qualtrics. Version: June 2017. http://www.qualtrics.com.

R Core Team. 2017. R: A Language and Environment for Statistical Computing. Version 3.3.3. R Foundation for Statistical Computing. Vienna, Austria. http://www.R-project.org.

Reed, Paul E. 2014. "Inter- and Intra-generational /aɪ/ Monophthongization, Indexicality, and Southern Appalachian Identity." *Southern Journal of Linguistics* 38, no. 1: 159–94.

———. 2016. "Sounding Appalachian: /aɪ/ Monophthongization, Rising Pitch Accents, and Rootedness." Ph.D. diss., University of South Carolina.

———. 2020. "The Importance of Rootedness in the Study of Appalachian English: Case Study Evidence for a Proposed Rootedness Metric." *American Speech* 95.2 (May): 203–26. https://doi.org/10.1215/00031283-7706532.

Salmon, William. 2018. "Negative Auxiliaries and Absent Expletives in Texas Vernacular English." *Journal of Pragmatics* 130 (June): 51–66. https://doi.org/10.1016/j.pragma.2018.04.003.

Sells, Peter, John Rickford, and Thomas Wasow. 1996. "An Optimality Theoretic Approach to Variation in Negative Inversion in AAVE." *Natural Language and Linguistic Theory* 14, no. 3 (Aug.): 591–627. https://doi.org/10.1007/BF00133599.

Tortora, Christina, and Marcel den Dikken. 2010. "Subject Agreement Variation: Support for the Configurational Approach." In "Formalising Syntactic Variability," edited by Bill Haddican and Bernadette Plunkett. Special issue, *Lingua* 120, no. 5 (May): 1089–108. https://doi.org/10.1016/j.lingua.2009.04.004.

Tortora, Christina, Beatrice Santorini, Frances Blanchette, and C. E. A. Diertani. 2017. The Audio-Aligned and Parsed Corpus of Appalachian English (AAPCAppE). http://csivc.csi.cuny.edu/aapcappe/.

Ulack, Richard, and Karl Raitz. 1981. "Appalachia: A Comparison of the Cognitive and Appalachian Regional Commission Regions." *Southeastern Geographer* 21, no. 1 (May): 40–53. https://doi.org/10.1353/sgo.1981.0003.

Weldon, Tracey. 1994. "Variability in Negation in African American Vernacular English." *Language Variation and Change* 6, no. 3 (Oct.): 359–97. https://doi.org/10.1017/S0954394500001721.

White-Sustaita, Jessica. 2010. "Reconsidering the Syntax of Non-canonical Negative Inversion." *English Language and Linguistics* 14, no. 3 (Nov.): 429–55. https://doi.org/10.1017/S1360674310000146.

Wolfram, Walt, and Donna Christian. 1976. Appalachian Speech. Arlington, Va.: Center for Applied Linguistics.

FRANCES BLANCHETTE is assistant director of Pennsylvnia State University's Center for Language Science and assistant research professor in psychology. She has a Ph.D. in linguistics from the CUNY Graduate Center. Her research uses theoretical, experimental, and quantitative methods to document and understand relationships between structure and meaning, with a particular focus on vernacular features. More broadly, her research aims to contribute toward a better understanding of linguistic diversity in areas like Appalachia and Central Pennsylvania. Email: fkb1@psu.edu.

PAUL E. REED is assistant professor of phonology/phonetics in the Department of Communicative Disorders at the University of Alabama. His research interests center on sociophonetics—specifically how the way we talk signals aspects of who we are—and phonetics more broadly, particularly the phonetics/phonology interface. Much of his work focuses on English varieties in the American South, with a special focus on Appalachian English varieties and on how a speaker's relationship to place affects linguistic production. Email: pereed1@ua.edu.

ERIN FLANNERY is an undergraduate student at Pennsylvania State University studying Chinese and security risk analysis with a concentration in cyber and information security. She has been an undergraduate research assistant under Carrie Jackson for three years and has been involved with multiple projects concerning second-language acquisition. Email: ekf5119@psu.edu.

CARRIE N. JACKSON received her Ph.D. in Germanic linguistics from the University of Wisconsin–Madison in 2005. She is professor of German and linguistics at Pennsylvania State University. She uses psycholinguistic research methods to investigate how native and second-language speakers use and acquire lexical and grammatical information during real-time comprehension and production, with the goal of advancing our understanding of the linguistic and cognitive mechanisms that drive language acquisition and use. Email: cnj1@psu.edu.