I’m reporting today on a quantitative study of English auxiliary contraction, that is, the alternation between such forms as
Auxiliary contraction

John *is* ~ ‘s at home \hspace{1cm} I *will* ~ ‘ll be there

‘is’ and its contracted variant [z] and ‘will’ and its contracted variant [l]. Specifically, I’m examining the variable constraints on the alternation between full and contracted forms, with an eye to determining
where in the grammar this process must be situated.
There’s a lot of linguistic literature on contraction, but it hasn’t bridged the gap between formal and empirical work: the formal work hasn’t used data collected from natural speech, and the sociolinguistic work has focused almost exclusively on contraction of the copula, without getting into the broader questions raised by the contraction of other auxiliaries. So in my work, I’m uniting the formal and empirical camps by examining quantitative data for patterns that can help us determine what grammatical processes are involved in the contraction alternation, and where in the grammar they may be located.

I’m going to end up arguing today that the quantitative data on contraction lend themselves to

John *is* ~ *’s at home

I *will* ~ *’ll be there

What grammatical processes are involved?
Where in the grammar are they located?


a two-stage analysis of the phenomenon. My take on this variable is that previous analyses of contraction as an allomorphic alternation between two distinct underlying forms can be upheld, but my novel contribution is that this alternation is followed by subsequent low-level phonetic or phonological processes that also contribute to the surface realization of auxiliaries that is found in natural speech. But before I get to these results, I’m going to take a moment to situate my study among
1. Previous analyses

2. Auxiliary forms

3. Subject NP weight

4. Two stages of contraction

previous analyses of auxiliary contraction that have been put forward. I’ll then lay out the various forms auxiliaries are found to take in the corpus data I’ve collected, and provide an analysis of those forms which haven’t received attention in the literature before. Once we’ve got a working analysis of the various auxiliary realizations, I’ll present novel data demonstrating an effect of subject NP weight on auxiliary realization, and use these findings to support the analysis of contraction as a two-stage process that I just laid out. I’ll start with a little background on contraction in the linguistic literature.
Early work on contraction modeled full forms – such as have, is, or will, which I’ll be color-coding throughout this talk as green – as the sole underlying form of an auxiliary, regardless of its surface realization. Contraction was then attributed to the application of variable phonological processes on these full forms, outputting contracted variants, which I’ll be color-coding as pink.
But since Kaisse’s work in the 80s, formal work on contraction has mostly abandoned this analysis for one that treats full and contracted forms as distinct allomorphs underlyingly.
But an allomorphic analysis raises additional questions.
For instance, what conditions the insertion of these allomorphs? And are those conditioning factors the same for each full/contracted pair, or are they auxiliary-specific?
If all auxiliaries show the same conditioning factors on the full/contracted alternation, contraction could be a single process that applies regardless of auxiliary identity. This would echo the conclusions of Rickford et al. 1991, who found that the factors conditioning the contraction of ‘is’ and ‘are’ are similar enough that there may be a single process governing contraction of each.

Kaisse 1983 models contraction in this way, as a variable process of morphosyntactic adjunction that adjoins an auxiliary to its noun phrase host. This adjunction process subsequently conditions the insertion of a contracted allomorph; if adjunction hasn’t applied, a full form is inserted by default. Whatever factors condition the pan-auxiliary contraction rule will be reflected in the alternation of each auxiliary with its contracted form.
On the other hand, if we find that the conditions on contraction differ from auxiliary to auxiliary, contraction would instead be better represented as a number of fragmented, auxiliary-specific processes, each with its own variable conditions on application. Quantitative data, which will provide evidence of the factors conditioning this variation, is thus crucial for determining how the process of auxiliary contraction must be represented in the grammar. My bigger plan for this work is to examine both linguistic and social factors conditioning this variation, but today I’ll be focusing on the weight of the NP subject that the auxiliary contracts to. The auxiliaries I examine in today’s study, and the number of tokens of each that I coded, are given
My data come from the Switchboard corpus, a corpus of 2400 5-minute telephone conversations between strangers. The corpus is transcribed, but all my coding is based on the audio.

In coding the dependent variable of auxiliary realization, I adopted a tripartite coding scheme in order to accurately capture all realizations that I found in the data.

<table>
<thead>
<tr>
<th></th>
<th>has</th>
<th>have</th>
<th>is</th>
<th>will</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>590</td>
<td>646</td>
<td>572</td>
<td>690</td>
</tr>
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Full forms (in green, as before) were those that had an initial consonant and a vowel of any quality. So for ‘have,’ tokens coded as full were those pronounced [read forms…]. The exception to this is ‘is’, which has no initial consonant, in which case any form with an audible vowel was coded as full.

Contracted forms (in pink, as before) were those that had no initial consonant and no vowel, consisting of only a single consonant that formed a syllable with its host. So ‘have’ was coded as contracted in cases like monosyllabic “I’ve” or “we’ve.” “Will” was contracted in monosyllabic “you’ll” and “we’ll” and “has” and “is” were coded as contracted in cases like “it’s” or “Jimmy’s,” where they not only form a syllable with their host but also assimilate to it in voicing.

But in coding the data, I also found that there was a third form that was in between full and contracted,
which I’m calling intermediate and coloring yellow. These were forms in which the auxiliary had no initial consonant but still retained a vowel, forming a syllable distinct from its host. The intermediate form of ‘have’ is [əv], as in “most people əv been here for a few years”.

The IF of “will” is [əl], as in “it’ll be ready by five” or “Jimmy’ll be here at noon” and the IF of “has” is [əz], as in “Jimmy əz been waiting for a while”.

There was no intermediate form of ‘is’ separate from what I called the full form of ‘is,’ since that auxiliary has no initial consonant to lose.

What I’m calling intermediate forms have received surprisingly little attention in the literature on contraction. This is partly due to the fact that many researchers have restricted their work to the contraction of ‘is’, which doesn’t have intermediate forms. But even where auxiliaries other than ‘is’ have been examined, researchers have brushed intermediate forms to the side or omitted them entirely. But when you actually look at corpus data, IFs turn out to be well represented.
This graph shows the percentage of each of the three possible realizations, color-coded as before, for the four auxiliaries under study after full noun phrase subjects—so non-pronouns. You can see that intermediate forms are well-represented, meaning they can’t be ignored. Since my coding of them as intermediate is purely a description, not an analysis, the next step here is to identify what their source is. I’m going to walk through an explanation of these intermediate forms, and back up my analysis with findings from the subject weight study. I’ve identified two plausible sources of these intermediate forms. One possible source of IFs is that they are
underlyingly full forms that have undergone some phonological process that causes them to lose their initial consonant. Add to that a process of vowel reduction that is common among other function words, and you end up with a surface intermediate form. Now there is in fact an independently-attested low-level process of /h/-deletion in English, which deletes /h/ when it begins unstressed syllables. This affects pronouns and function words in English, for instance

\[
\begin{array}{ccc}
/hæv/ & /hæz/ & /wil/ \\
\downarrow & \downarrow & \downarrow \\
[əv] & [əz] & [əl]
\end{array}
\]
did he do it?
living by herself
let him out
This fast-speech h-deletion process could thus account for any intermediate forms of 'have' or 'has' we encounter in the data: the full form has becomes has via vowel reduction and then as via h-deletion. But I'm following previous work in assuming that there's no comparable process of fast-speech w-deletion: you don't hear deletion of /w/ in function words like 'was' and 'were' in the way you do for 'him' and 'her.' So when we see surface intermediate forms of 'have' and 'has', these are traceable to underlyingly full forms with initial consonant deletion, but intermediate forms of 'will' need another explanation.

Now, on the flip side, it's also plausible that surface IFs could derive from underlyingly contracted forms.
For instance, after the pronoun ‘it’, intermediate forms are in abundance. This plot shows the realization of the auxiliary ‘will’ after ‘it’ (on the left) vs. after other personal pronouns, all of which end in a vowel (he, she, I, etc.) Intermediate forms of ‘will’ are clearly incredibly frequent after ‘it’ in a way that they aren’t after other pronouns: people say ‘it all” all the time, but they never say “he all”. Conversely, the contracted allomorph never surfaces after ‘it’ – and that’s unsurprising, because a final [tl] sequence is phonotactically illicit in English. What this looks like is complementary distribution of intermediate and contracted forms, and we can explain it if we propose that the contracted /l/ allomorph is inserted at a high rate after all pronouns, but simply gains a schwa to allow it to syllabify where it wouldn’t otherwise be able to surface – like after a consonant.
So now we have another source of intermediate forms: they arise
when a contracted form is inserted, but fails to syllabify with its host. A schwa-insertion repair process enables the contracted form to be pronounced, causing it to surface as an intermediate form.

Now, in cases like “it’ll” and “Jim’ll,” contracted forms fail to syllabify with their host for phonotactic reasons: the resultant consonant cluster would be illicit. But even where phonotactics would allow it, some contractions just can’t attach to a noun phrase host. For instance, Sue can never surface with a contracted form of ‘will’ to give [sul], and a vowel-final noun like ‘three’ can never take a contracted form of ‘have’ to give threeve. The alternative to full forms for these auxiliaries after noun phrases is, again, intermediate forms. So once again, I’ve analyzed these as cases where a contracted allomorph is inserted, but fails to syllabify. I’m still working on the question of why syllabification fails, but because it clearly does, I’m analyzing these cases just like that of it’ll: a contracted form can be inserted, but can’t surface without a schwa.

\[
\begin{align*}
\text{it} + /l/ & \rightarrow *[\text{itl}] \rightarrow [\text{itl}] \\
\text{Jim} + /l/ & \rightarrow *[\text{d3ml}] \rightarrow [\text{d3ml}] \\
\text{Sue} + /l/ & \rightarrow *[\text{sul}] \\
\text{three} + /v/ & \rightarrow *[\emptyset \text{riv}] 
\end{align*}
\]
So we now have an additional, distinct source of intermediate forms: a process of schwa-insertion that applies when a contracted form is inserted but fails to syllabify with its host: for phonotactic or other reasons.
Here’s a recap of our two sources of intermediate forms. Under this analysis, we maintain a bipartite distinction between full and contracted underlyingly despite having a tripartite distinction on the surface. A side note here about color coding: intermediate forms that come from full-form bases are green & yellow, and intermediate forms from contracted-form bases are pink & yellow. So, here’s a summary of each auxiliary’s surface forms and their sources.
'is' has underlyingly full and contracted allomorphs which each surface as-is. It has no initial consonant to undergo deletion, and its contracted form can attach to its hosts without requiring schwa-insertion, so it has no intermediate form. 'has' can surface in its full form, in its contracted form, or in its intermediate form, which is the result of h-deletion applying on the full form. Schwa-insertion isn't needed as a repair mechanism for 'has,' which can attach to any host in its contracted form without problems. To be clear, in the case of 'is' and 'has,' I'm assuming that their contracted form never requires a schwa to adjoin to a host: where syllabification can occur, it does. 'will' can surface in its full form and in its contracted form, but this latter only after vowel-final pronouns. Elsewhere, contracted forms of 'will' surface as intermediate forms. Intermediate forms of will cannot come from full forms, as there is apparently no process of w-deletion. Finally, 'have' can surface as full and as contracted, but again, the contracted form can only surface after vowel-final pronouns. 'have' can also surface in its intermediate form, but its source is ambiguous: it could come from application of h-deletion on full forms, but also from application of schwa-insertion on contracted forms. For that reason, I've color-coded it as pink, yellow, AND green. After noun phrases,
‘will’ and ‘have’ can’t surface in their contracted form, but everything else remains the same.

Now, if contraction is the alternation between two allomorphs, any factors conditioning that alternation should govern the appearance of an auxiliary’s surface realizations of full and contracted forms.

In the case of ‘is’, an environment that disfavors contraction should show more of the full form and less of the contracted form.

In the case of ‘has’, an environment that disfavors contraction should show more full and intermediate forms – because those are both full underlyingly – and less of the contracted form.

In the case of ‘will’, an environment that disfavors contraction should show more of the full form and less of the intermediate form – which is contracted underlyingly. But in the case of ‘have,’ there’s no clear-cut way to divide up the surface realizations. All surface full forms are full underlyingly, but surface intermediate forms come from underlying full and contracted forms, under my analysis.

So this breaks down as three of the four auxiliaries having surface forms which cleanly reproduce the underlying full/contracted breakdown, but ‘have’ as the odd man out.

In order to test this analysis, I examined the conditioning factor of the weight of the noun phrase to which the auxiliary attaches. My hypothesis is that contraction – whatever its surface manifestation – will be disfavored with larger or longer subjects.
This hasn’t been explicitly examined before, but there are indications that subject weight influences contraction. Sells 1983 proposes that contraction is disfavored over large prosodic junctures, and that complex subjects, like fronted sentential clauses, are followed by insurmountably large junctures. As an example, he gives a sentence like “*Speaking for Jakobson’s Professor Chomsky” (like you’re introducing Chomsky as a substitute speaker at a conference) where contraction sounds pretty degraded with this preposed VP host. Another case where subject heaviness may be coming into play in the contraction alternation is in the radical difference in contraction rates between pronoun and noun phrase subjects:
compare contraction of ‘is’ after pronouns, on the left, where contraction is at 99%, to its contraction after noun phrases, where contraction is at only 25%: the fact that pronouns are lighter than NPs could be driving this effect. So, in light of all this, I investigated whether this subject weight effect extends to NP subjects of different sizes.

I coded all tokens of post-NP auxiliaries for the number of syllables, words, and major phrase boundaries in the subject. I’ll be reporting on only the number of syllable results here just to use the most granular measure, but each measure shows the same patterns.

If contraction is disfavored with larger or longer subjects, then an auxiliary’s surface manifestation of its underlying contracted form should be less commonly used with bigger subjects.
The data for ‘is’ conforms perfectly to this hypothesis. This graph has one dot per token, plotting whether a token was full or contracted by how many syllables long the subject was. As the number of syllables increases, the number of contracted forms observed with a subject of that length decreases, to the point that above an 8-syllable subject you have no contraction at all.

This is upheld for ‘has’ as well, where I’ve opposed contracted forms to full and intermediate forms (as intermediate forms are analyzed as being underlyingly full, having undergone h-deletion). Again, longer subjects are increasingly unlikely to show contraction.

And again with ‘will’, the same pattern is upheld. This time, the graph opposes intermediate forms of will to full forms, and again, intermediate forms of ‘will’ are less likely with longer subjects – as we’d expect if those intermediate forms are underlyingly contracted.

But the pattern shown by intermediate forms of ‘have,’ which are graphed here in opposition to full forms, is completely different from the others. And under my analysis of those forms, this makes sense. Intermediate forms of ‘have’ are a hybrid of underlyingly full and contracted forms. There’s no way to separate these forms of ambiguous origin on the surface. And when we oppose them to full forms, as I did here, there’s no indication that they show the same subject length effect.
These findings can be explained if we model contraction as a single pan-auxiliary process. Regardless of auxiliary identity, contraction shows a subject weight effect: it’s less likely to occur after a bigger subject. This means that contracted forms will show up less often after large subjects, regardless of whether they surface as-is (like ‘has’ and ‘is’), or as an intermediate form (like ‘will’). But where underlingly contracted forms aren’t separable from underlyingly full forms on the surface – namely, in the case of ‘have’ – the subject weight condition gets washed out. Considering quantitative data on contraction, then, has shed new light on this familiar variable.
I’ve documented and analyzed intermediate forms, which are extremely prevalent, but have been overlooked in the literature.

I’ve found evidence for an effect of subject weight on the alternation between full and contracted forms.

And I’ve argued that my findings are best analyzed by identifying two stages of processes that affect auxiliary realization: an allomorphic alternation between full and contracted forms, followed by subsequent phonological or phonetic processes that obscure the underlying identity of those forms.

And what I’ve hoped to communicate here is that what I call “variation above the phonology” – that is, variation that involves units larger than a phoneme, like an entire morpheme – is complex, precisely because it can implicate multiple levels of a derivation. So for that reason, it’s crucial that we consider all surface forms that are involved, and that we analyze this variation in light of patterns displayed by quantitative data.
Thank you!