Speech genre and context effects in sentence processing
What do you expect when you’re expecting pop songs?

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Less familiar grammatical structures cause processing difficulty

- People quickly learn to comprehend novel grammatical forms and may even be able to generalize to different forms
  - Kaschak & Glenberg 2004; Kaschak 2006

- Alternatively, maybe people just learn to tolerate previously bad-seeming structures
  - Luka & Barsalou 2005; Francom 2009; Luka & Choi 2012; Boland et al. 2015
Social information and sentence processing

- Social cues influence syntactic and semantic processing
  - talker specificity
    - Kamide 2012; Squires 2014b*; Yildirim et al. 2016
  - age+sex
    - van Berkum et al. 2008; Tesink et al. 2009
  - race/ethnicity
    - Staum Casasanto 2009*; Seifeldin et al. 2015*
  - native/nonnativeness
    - Hanulíková et al. 2012

*investigate “canonical” sociolinguistic variation/variants
Grammatical variability and social information in sentence processing

- Seifeldin et al. 2015: Processing variable copula deletion (feature of African American English)
  - ERP during listening task
  - Grammatical manipulation:
    - standard: ...he’s going...
    - absent copula: ... he going...
  - Speaker race/ethnicity manipulation:
    - White, African American, Indian
  - P600 (syntactic anomaly) effect for copula-absent sentences for White speaker condition, but not African American or Indian
Social information as “expectation-loosener”

- Social information can facilitate processing less-familiar structures (mitigate processing costs)
  - “...listeners found copula deletion ungrammatical when listening to a Standard speaker, but not when listening to a speaker of a non-standard variety of English, regardless of whether the specific variety they hear is characterized by rules allowing for this construction. ... listeners do not apply dialect-specific knowledge on-line when processing the syntax of a non-standard variety of their native language; rather, listeners loosen their expectations for standard syntax.” (Seifeldin et al. 2015; see also Hanulíková et al. 2012)

- Grammatical expectation is manipulable via contextual cues
  - The relevant contextual cues should be known to bear some experiential relationship to grammatical structures
    - though this may be fairly abstract and nonspecific knowledge
      - on prediction / expectation in language processing: Kuperberg & Jaeger 2016 (Language, Cognition, & Neuroscience 31(1) special issue)
What social factors cause expectations of grammatical form to shift?

What is the relationship between linguistic and social factors on expectations of grammatical form?
“Where can I find (lots of) real sentences containing nonstandard grammatical features? that a researcher didn’t invent? and that have other properties useful for experimental endeavors?”
- Corpora document more formal registers where nonstandard variants are infrequent
- Grammatical variables are typically less frequent than phonological ones anyway

Song lyrics
- a speech genre in which nonstandard grammatical variants occur frequently and may even enjoy a kind of covert prestige
  - Eberhardt & Freeman 2015; Beal 2009; Trudgill 1983
Song lyrics as speech genre

In Anglophone popular (commercial) music, part of the context-form link constituting the genre is the licensing of nonstandard phonological and (morpho)syntactic variants.

Pop music is a circumscribed speech genre treated “specially” in terms of standard language ideologies.

- Even “super standard” English speakers often listen to, tolerate, and even sing along with song lyrics containing nonstandard grammar.
- One might argue that nonstandard features are *enregistered* as part of the genre.
  - e.g., Dr. Squires’ Double Negation Medley.

Speech genre as social information that could shift grammatical expectation

- If people have knowledge that nonstandard grammar is part of the genre, then expecting song lyrics should “loosen” the expectation for standardness.
Experiment design

- Target structure: NPSG+*don’t* (invariant *don’t*)
  - Common across dialects of English worldwide; common in song lyrics
  - For “standard” speakers, has processing cost and triggers evaluation of lower social status (Squires 2013, 2014a, 2014b, 2014c, forthcoming)

- Self-paced reading (moving window)
  - Participant presses a button when ready for the next word
  - Paradigm software; Dell computers; Cedrus response pads; English Linguistics Lab

- 152 sentences total
  - 40 target – 20 nonstandard (NPSG+*don’t*)
  - 8 practice, 104 filler – 32 nonstandard fillers across 8 nonstandardisms

- 40 comprehension questions following filler sentences
  - “Which of these words did NOT appear in the previous sentence?”
    [word1] [word2]
Experiment design

- **Within-subjects manipulation:** *Standardness*
  - **standard:** NPSG+doesn’t
  - **nonstandard:** NPSG+don’t

- **Between-subjects manipulation:** *Context*
  - **Context** participants told that sentences come from song lyrics
  - **NoContext** participants told nothing about the sentences
In this experiment, you will be silently reading a series of sentences. The sentences come from song lyrics from a number of genres. These genres include pop, country, rap, rock, folk, hip-hop, alternative, and R and B.

Each sentence will appear one word at a time. You will use the middle green button on the response pad to advance through the lyrics. Once a word appears, read it as quickly as possible, then press the green button to move on to the next word.

As you go through the experiment, you will be asked questions about some of the sentences. Use the red (left) and blue (right) buttons on response pad to answer the questions. Be sure to pay attention to the words in the lyrics!

The following sentences are for practice. They do not come from song lyrics.
Hypotheses

1. Standardness effect: slower reading times for don’t than doesn’t
   - nonstandard slower than standard

2. Context effect: effect of standardness smaller for Context than NoContext participants
   - context facilitates expectation shift away from “standard” grammar
Song lyrics as stimuli: special considerations

- **Content**
  - Avoided extremely well-known, iconic lyrics; tried to take lines from verses rather than choruses; tried to use older songs from older artists
  - Tried to avoid explicit references that could be generic giveaways
    - whiskey, guns, trucks, dance clubs, drugs, sex, music, heartbreak...

- **Form**
  - Target sentences always “DET N don’t/doesn’t V/ADV...”
  - Edited for length (4-9 words)
  - Edited to remove other nonstandardisms
  - Edited for conciseness
  - Nonstandardism in filler sentences varied across word position
## Stimuli: examples

<table>
<thead>
<tr>
<th>TARGETS</th>
<th>nonstandard</th>
<th>standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The boss don't care about the dress code</td>
<td>This industry doesn't come with benefits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FILLERS</th>
<th>gonna</th>
<th>tryna</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>too much coffee's gonna shatter my nerves</td>
<td>They're tryna break the marriage up</td>
</tr>
<tr>
<td></td>
<td>I wanna find that perfect moment</td>
<td>This has gotta be the good life</td>
</tr>
<tr>
<td></td>
<td>First you was in the sky</td>
<td>Them kind of monkeys can't swing</td>
</tr>
<tr>
<td></td>
<td>This is the one they was waiting on</td>
<td>There's too many rivers to cross</td>
</tr>
<tr>
<td></td>
<td>The ferris wheel carried me away</td>
<td></td>
</tr>
</tbody>
</table>

- gotta
- wanna
- you was
- they was
- demonstrative them
- there's+PL
- no nonstandardism

- nonstandardism

**TARGETS**

- nonstandard
- standard

**FILLERS**

- gonna
- tryna
- gotta
- wanna
- you was
- they was
- demonstrative them
- there’s+PL
- no nonstandardism

**Stimuli**

- The boss don't care about the dress code
- This industry doesn't come with benefits
- Too much coffee's gonna shatter my nerves
- They're tryna break the marriage up
- This has gotta be the good life
- I wanna find that perfect moment
- First you was in the sky
- This is the one they was waiting on
- Them kind of monkeys can't swing
- There's too many rivers to cross
- The ferris wheel carried me away
Participants

- Linguistics subject pool
- Extra credit for English classes

97 total
- 48 NoContext
- 49 Context
Analysis

- Practice trials removed

- Outliers removed: under 100 or over 2000 ms
  - <.25% of observations

- Residual reading times
  - create linear regression model for raw RT, including all target and filler sentences
    - fixed effects of word length in characters and word position in sentence
    - random intercept term for subject
  - use residuals of that model as dependent variable (Jaeger 2008)

- Mixed-effects linear regression with lmer() for each word region
  - random intercept terms for subjects and items
  - stepwise analysis for fixed effects of trial order, standardness, context, and their interactions
Targets
Standardness

Target Sentences: Residual Reading Times by Standardness

Residual Reading Time (ms)

Word in Sentence

Grammarcond

- nonstandard
- standard

\(don't/doesn't\)
Targets

Trial Order: Standardness

Target Sentences: Residual Reading Times by Trial Order and Standardness
## Targets

### Word-by-Word Results

<table>
<thead>
<tr>
<th>Word Region</th>
<th>Significant Fixed Effects</th>
<th>Estimate</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>word 2</td>
<td>trial order</td>
<td>-0.69003</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>word 3 (don’t/doesn’t)</td>
<td>trial order</td>
<td>-0.80372</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>standardness</td>
<td>-27.81207</td>
<td>&lt;.1</td>
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<tr>
<td></td>
<td>standardness : context</td>
<td>45.13892</td>
<td>&lt;.01</td>
</tr>
<tr>
<td></td>
<td>trial order : standardness : context</td>
<td>-0.36425</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>word 4</td>
<td>trial order</td>
<td>-0.83046</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>context</td>
<td>16.59428</td>
<td>&lt;.05</td>
</tr>
<tr>
<td></td>
<td>trial order : context</td>
<td>-0.17022</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>word 5</td>
<td>trial order</td>
<td>-0.77095</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>word 6</td>
<td>trial order</td>
<td>-0.91390</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

- Fixed-effect factors retained from stepwise analysis
- All models include random intercept terms for subjects and items
don’t/doesn’t

- **Trial Order** (<.001)
  - Later trials faster (<.001)

- **Standardness** (<.1)
  - Standard *doesn’t* faster than nonstandard *don’t*

- **Standardness : Context** (<.01)
  - Standardness effect larger for Context group than NoContext group
Targets
Standardness : Context

Target Sentences: Residual Reading Times by Standardness and Context Group

Residual Reading Time (ms)

Word in Sentence

1 2 3 4 5 6 7 8 9

context

nocontext

grammarcond
nonstandard
standard
- **Trial Order** (<.001)
  - Later trials faster (<.001)

- **Standardness** (<.1)
  - Standard *doesn’t* faster than nonstandard *don’t*

- **Standardness : Context** (<.01)
  - Standardness effect larger for Context group than NoContext group

- **Standardness : Context : Trial Order** (<.05)
  - Standardness : Trial Order interaction only relevant for NoContext group
    - For NoContext group, standardness effect increases over course of experiment
**don’t/doesn’t**

**Trial Order : Standardness : Context**

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**DON’T/DOESN’T: Residual Reading Times by Trial Order and Standardness across Context Group**

- **context**
- **nocontext**

- **Residual Reading Time (ms)**
  - Experimental Trial
  - Grammarcond
    - nonstandard
    - standard

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**RESULTS**

- **Exper:**
  - **Trial:**
  - **Trial Order**
  - **Standardness**
  - **Context**
Discussion

- H1 confirmed (in interaction)
  - Nonstandard read more slowly than standard

- H2 not confirmed
  - Standardness effect larger for Context group than NoContext group
  - Three-way interaction: context, standardness, trial
    - For NoContext group, standardness effect shows up later
Expectation v. Attention v. Efficiency

- **Unexpected (!) findings**
  - Standardness effect greater for Context group
    - Maybe context information heightened attention—people paying more attention to individual words, therefore more noticing of nonstandardism
      - BUT: in raw RTs, Context group faster overall than NoContext group
      - AND: no difference in comprehension question accuracy
  - Standardness effect develops later for NoContext group
    - Maybe size effect is due to a *stability* effect: context information leads to more efficient/consistent processing behavior that makes the grammatical effect easier to detect
      - Additional trials at doing the task make both groups faster, but for those with no context going into it, additional trials also stabilize grammatical effect
Insight from post-experiment comments

“Did you notice anything interesting about the sentences you just read? Please describe.”

Representative comments: NO CONTEXT group

- There were grammatical mistakes in a lot of them that caught my eye. Also a lot of them sounded like quotes from something (i.e. song lyrics).

- Sometimes the grammar wasn't 100% correct (ex. using "them" instead of "the" as a definite article) and some of the sentences just didn't make much sense (like the one about the clown honking someone's nose or something? that was weird).

- They had no correlation, in my opinion, at first, though some of the sentences did go together. I also noticed the use of repetition of some words in the sentences. It also seemed as if a few went together, as they rhymed.

- They were grammatically incorrect. In my mind, I read them with a southern accent because the writing looked southern.
They weren't all syntactically well-formed. Some of them didn't make sense in terms of syntax. And some of them I knew which songs they were lyrics to.

I noticed that the sentences that I just read were possibly hip hop or country lyrics. They weren't what most people consider "proper English."

I thought I would recognize more of the lyrics but I really only recognized two of them.

The only thing that stood out to me was the word choice in the sentences. It is clear that there was some deviation from Standard American English. But that is to be expected in song lyrics.
Both groups noticed nonstandard grammar and thought the content was “odd”

- Some participants characterized *all the sentences* as having “bad grammar,” despite the fact that more than half of them were standard

- For many Context participants, the nonstandardness and content oddities were both anchored to *song lyrics as a speech genre*, or to specific sub-genres of music

- Several NoContext participants recognized lyrics

Both groups sought to make coherence out of the sentences

- NoContext participants tried to identify a genre

- Context participants tried to *recognize* familiar sentences from memory
Expectation: Form v. Content

- Context information did not shift expectation of grammar itself
  - although participants did articulate a link between the genre and the grammar

- Context information *did* shift expectations of:
  - what kind of content they might encounter
  - what the relationship between the sentences they would read should be
  - something about how to read the sentences

- Just as in social life, participants want to know “What’s going on here?”
  - With context information, participants had an idea right away, established a steady baseline—and read for *recognition of content*
  - Without context information, participants spent the first part of the experiment figuring it out—and read for *understanding the task*
want to thank you

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References


