University of Pennsylvania Working Papers in Linguistics

Volume 24
Issue 2 *Selected Papers from New Ways of Analyzing Variation (NWAV 46)*

Article 15

10-15-2018

Attentional Load and Style Control

Devyani Sharma
Queen Mary, University of London

Kathleen McCarthy
Queen Mary, University of London

Attentional Load and Style Control

Abstract
Labov's (1966) attention-to-speech model suggested both social and cognitive elements in style-shifting: social awareness of prestige norms and cognitive defaulting to an easier style when attention is diverted. A focus on social motivations in later work has left the cognitive dimension under-explored. As the contexts elicited in sociolinguistic interviews vary in both attention and register, new methods are needed to tease these apart. In this study, we investigate the cognitive prediction: Does an increase in attentional load cause individuals to struggle to maintain a later-learned style? The novel experimental design eliminates contextual differences by requiring a formal news report style throughout. Twelve speakers of vernacular British English completed two speech production tasks (reading and recall), each with varying attentional load conditions. Higher load conditions included a cross-modal distractor task requiring simultaneous arithmetical calculations. Both of the variables examined—glottal replacement of /t/ and th-fronting—exhibited a consistent but mild trend towards an increase in vernacular forms under higher load. Speakers seem slightly less able to maintain a formal style when their attention is diverted, as suggested in Labov's original description of the vernacular as a default. However, the low level of the effect also suggests that sharp formality shifts cannot be purely due to a reduction in monitoring, but must also involve social awareness of the stylistic norms of a given register. Processing and cognitive ease should therefore be factored in alongside social motivations in the study of style variation.

Attentional Load and Style Control

Devyani Sharma and Kathleen McCarthy*

1 Introduction

1.1 Attention in the Study of Style

One of the earliest characterizations of style-shifting—how people vary their way of speaking from moment to moment—was in terms of attention paid to speech in a given moment. This view asserted that reduced attention to speech often corresponded to the use of a less self-conscious, less prestige-oriented, vernacular style (Labov 1966). Later approaches included a wider range of interpersonal social dynamics and identity projection (e.g., Bell 1984, Coupland 1985, Schilling-Estes 2002, Eckert 2008), and these models are now seen by some as having 'very largely supplanted the attention to speech explanation' (Coupland 2007:54).

However, this interest in social motivations of style-shifting has left a basic question about its cognitive status unaddressed: Are attentional effects in style-shifting the result of processing difficulty due to higher attentional load, leading speakers to unconsciously default to an 'easier' style? Or are they due to social prestige associations of different speech registers? What is the balance between attentional load (processing) and prestige associations (register) in style-shifting?

Labov's original attention-to-speech model invoked both prestige and the cognitive primacy of vernacular ('a form of language first-learned, most perfectly acquired, which we use automatically and unthinkingly in conversation with family and intimate friends', Labov 2013:3). The classic sociolinguistic interview is beautifully designed to sample individual style range but is not ideal for distinguishing between the two explanations of cognitive load and social prestige. This is because the different speech modes gathered (casual, formal, reading passages, wordlists) differ *both* in attentional focus and in register or prestige associations, leaving it unclear whether observed shifts are due to social sensitivity to prestige, a cognitively 'easier' default, or both.

In this study, we specifically target the effect of attention on style control: Does an increase in attentional load cause individuals to struggle to maintain a later-learned style? Results suggest a low-level but pervasive pressure of cognitive load on style control, while also suggesting that larger style-shifts might be more confidently ascribed a social rather than cognitive basis. Results are preliminary but point to new methodological and theoretical directions in the study of style.

1.2 Attentional Load in Speech Production

Attention is a limited capacity resource (Kahneman 1973, Allport et al. 1994), and divided attention is well known to disrupt monolingual speech production in many ways — recall, conceptualization, grammatical encoding, and articulation (e.g., Jou and Harris 1992, Lively et al. 1993, Fernandes and Moscovitch 2000, Christodoulides 2016; see Roelofs and Piai 2011 for an overview). In the case of bilinguals, the degree of disruption to speech production under high attentional load is sensitive to L2 proficiency level (de Bot 1992, Sorace 2006). For this reason, acquisitional dominance is a key analytic component in the study of bilingual speech.

We should anticipate these effects in monolingual style variation too. Competing attentional demands are pervasive in natural interaction, and given the robust evidence of attentional load effects in speech production generally, it is very likely that higher attentional load (divided attention or attentional multi-tasking in interaction) affects style-shifting in a similar way, particularly the control and execution of later- or less fully-learned styles. If some individuals are slightly more dominant in one style, i.e., if they have a default vernacular, this may compromise their ability to control or maintain other styles, with some of their shifts deriving more from cognitive load than identity (Sharma 2018). Understanding the role of such effects has implications for our overall interpretations of style-shifting in interaction. Although issues of competence and control in native speaker style repertoires is of increasing interest (e.g., Schilling-Estes 2004, Kendall 2009, Babel

*We are grateful to members of the audience at NWAV 46 for useful feedback on an earlier version of this work.

2016, Abel and Babel 2017, Sharma 2018), our understanding of the cognitive dimension of style variation is still limited. What proportion of the consistent stratification of style-shifting across interview tasks—seen over decades of variationist research—is due to more cognitively-based effects, as opposed to more socially based prestige or register sensitivity?

The study first outlines the novel experimental design used to isolate attentional load effects and verifies the efficacy of this design in generating differing load conditions. It then examines the effect of attentional load on the use of two vernacular variables—glottal replacement of /t/ and th-fronting—in the speech of urban London English speakers.

2 Methodology

2.1 New Methods for the Study of Style

As noted above, although the traditional design of the sociolinguistic interview is excellent for sampling a range of speech styles, it does not adequately disentangle two different types of attentional effects: a shift to a cognitively 'easier' default due to processing pressure and a shift due to social prestige associations of the speech activity in question. In order to evaluate these, we need supplementary methods for the study of style-shifting.

One approach is to examine naturally occurring moments of divided attention in interaction. Sharma (2018) takes this approach. The advantage of examining attentional shifts during real-time interaction is that we study the type of speech data that we wish to explain, namely naturally occurring, not experimentally elicited, data. However, such data are inevitably less controlled for confounding factors (e.g., topic, audience, multitasking, unknown speaker intentions), and so any effects of divided attention must be indirectly inferred.

Another approach is to sacrifice the naturalness of the situation, but more fully control any changes in social prestige or register association of the different contexts being studied, to isolate cognitive load effects. Using a controlled interactive task, Abel and Babel (2017) showed that, as the difficulty of a collaborative task increased, dyads accommodated less to each other's speech, pointing to an effect of attentional demand on speech accommodation. The present study similarly constrains the experimental context to a single task while varying conditions of attentional demand to look at individual style control. This approach allows us to examine whether attentional load alone affects an individual's ability to produce a formal style (a later-learned and less vernacular or 'native' style in their repertoire). The hypothesis to be tested is that participants will be less able to maintain a formal style under different degrees of cognitive load or diverted attention.

2.2 Participants and Experimental Design

As this experiment aims to test participants' ability to maintain a formal style, ideally one acquired slightly later, used less, and not the speakers' 'default' or most familiar style, we recruited participants who speak a vernacular variety but who also have some style range in their daily lives. Our sample of participants were all currently studying at a university in East London, they all grew up in East or North London and had not spent a significant portion of that time elsewhere, and all had local vernacular features in their conversational speech. This preliminary study included data from 12 participants, 3 male and 9 female, with an age range of 18–23 (mean age 19.5).

The experimental design involves two main tasks, with two cognitive load conditions each. One task involves read speech and one involves recalled speech. As there is almost no previous experimental research on style-shifting and cognitive load, it was unclear whether attentional effects on style would be easy to access using experimental methods, and so we chose to explore both read speech and recalled speech, the latter more closely modelling the challenges of natural speech production with ongoing attentional distractors during social interaction.

The experimental tasks were followed by a relaxed conversation with participants, primarily to gather a baseline of more casual speech but also to check participants' subjective responses to the tasks, their biographical information, accent repertoires, and attitudes.

In order to address the problem of differing speech tasks in classic sociolinguistic interview data, a single activity was maintained throughout all four conditions. In all experimental conditions, participants were asked to speak as if they were broadcasting a BBC news report on national

radio, using the style they might use in a formal presentation. All participants were given a practice news report to read aloud to begin with, to allow them to establish their newsreader register.

Task 1 (Read Speech) involved reading a news report aloud. The task involved two conditions. Condition A (lower attentional load) simply required participants to read a text aloud. Condition B (higher attentional load) used a cross-modal dual task design, requiring participants to read aloud while also attending to an audio stream of numbers (inter-stimulus interval [ISI] 2 seconds). They were asked to add up the numbers as they heard them and to be ready to report the total after giving their news report (cf. Yin, Ruiz, Chen, and Khawaja 2007 for use of this design). Participants were incentivized to attend to the distractor task with the offer of a £1 bonus for the right answer.

Task 2 (Recall Speech) involved reading a news report, setting it aside, and then giving the report from memory. Once again, this task involved two conditions. Condition A (lower attentional load) simply required participants to read, set aside, and then recall a text aloud. Condition B (higher attentional load) again used a cross-modal dual task design, requiring participants to read, set aside, and recall a text while also attending to an audio stream of numbers (ISI 2 seconds). They were asked to be ready to report the first five numbers they had heard in order after giving their news report (cf. Christodoulides 2016 for use of this design). Participants were again incentivized with the offer of a £1 bonus for the right answer.

The analysis compares participants' production of formal variants under low and high attentional load in read speech and also in recall speech, in order to establish whether cognitive load interacts with their ability to produce formal style in either of the tasks.

A number of task designs and load conditions were tested in piloting. Pilot testing led to specific decisions, including the ISI of 2 seconds, the use of integers between 1–9, and the use of distinct distractor tasks for the reading and recall tasks. We found that participants could produce read speech while executing parallel tasks quite easily, and so had to make the distractor task for read speech more difficult. We found that recall speech is much more demanding in terms of working memory and so simultaneous arithmetical computations were too difficult; we therefore needed to resort to an easier distractor task for recall speech. Both distractor tasks are designed to require the participant to continue attending to the dual task throughout the time that they were speaking. Out of 12 participants, only one was awarded the £1 prize in each of the two higher load tasks, which reflected the approximate difficulty level we were aiming for.

A synthesized female text-to-speech voice in Standard British English was used for the audio stream of numbers. To check for a confounding effect on formality over the course of the whole experiment, the order of the two main tasks was counter-balanced across two subject blocks. To check for a confounding effect of load order within a given task, the order of load conditions within each task was also counter-balanced across the two subject blocks.

The casual speech recorded in conversation at the end of the tasks is taken as a baseline reference level of vernacular and standard forms for each individual. This speech was more formal than participants' speech to their friends before and after the experiment, but it nevertheless serves the simple purpose of validating our assumption that certain variables occur in their relaxed speech.

2.3 Scripts and Variables

The scripts used for the reading and recall tasks were edited for equivalence in structure and content within tasks and also for presence of an exploratory set of London vernacular variables, two of which are examined in this paper.

The reading scripts were both on a science news topic, and the practice script at the start of the experiment was also on science news. This helped to target a formal style but avoid political content that might trigger more personal alignment and affect. Both read scripts had 80 words, with the text displayed in four sentences on separate lines. An example is provided in (1).

(1) At the Royal Society today, astronomers reported discovering a record eight planets orbiting a single star, all much like the Earth in size. The researchers told the audience that each planet is able to support liquid water, so they think that each planet may be able to support life too. This is more true for three of the planets than the others. The compact system of planets orbits Trappist-1, a low-mass cool star located forty light years away from Earth.

The recall scripts were also news reports; participants read these closely and then set them aside before giving their report from memory. In pilot testing we found that a narrative structure was easier for participants to store and recall, so in order to generate longer speech production in the recall task, we used news reports that had similarly structured narratives with a clear start and end point. Both stories had positive outcomes, with a mild surprise twist at the end to facilitate recall, but with formal lexicon and avoiding controversial, humorous, or depressing content. Both news stories were set in the UK with a young female protagonist. The stories had a comparable word count (119 and 138), with text displayed in 11 sentences on separate lines.

The texts were edited to incorporate tokens for seven variables of potential interest (PRICE vowel, GOAT vowel, FACE vowel, t-glottaling, l-vocalization, th-fronting, *-in/-ing*), with attention to ensuring comparable phonetic contexts, clausal contexts, and lexical frequency. Table 1 illustrates the variables. The four texts have low numbers of tokens per variable, but this is compensated for by the fact that, in read speech, all participants produced an identical set of tokens, and in recall speech, the narratives contained key terms that were produced by all participants.

	Read text 1	Read text 2	Recall text 1	Recall text 2
word-final non-cluster /t/	9	3	13	16
inter-vocalic word-medial /t/	3	3	6	6
th-fronting	4	5	1	4
TH-fronting	1	1	0	1
PRICE vowel	5	4	6	5
GOAT vowel	4	6	7	13
FACE vowel	6	5	12	7
word-final non-cluster /l/	6	6	6	8
pre-consonantal coda /l/	1	0	5	7
verbal suffix *-ing*	2	1	2	4

Table 1: Variables incorporated into texts.

A large number of variables were initially included because of the exploratory nature of the study. The effect of cognitive load on style-shifting has not been examined in an experimental setting, and it was not apparent at the outset which variables would or would not exhibit shifting or load effects. In addition, there are many established sub-distinctions among London accents and so we could not guarantee that all participants would have all variables as part of their vernacular. Our initial intention was to focus on classic features of Multicultural London English (Cheshire et al. 2011). However, even for this narrow sample of young adults from North and East London, accent repertoires varied considerably. This pilot analysis therefore examines only the first two main variables in Table 1, shared by many or all participants: glottal replacement of /t/ and th-fronting.

Both variables were coded auditorily, with blind second coding of 20% of /t/ tokens (95.3% agreement, Kappa = .904) and 40% of /θ/ tokens (96% agreement, Kappa = .813) for inter-rater reliability. Coding for glottal replacement followed common practice in previous studies (Fabricius 2002, Hughes, Trudgill, and Watt 2012, Straw and Patrick 2007, Schleef 2013). For word-final non-cluster /t/, a distinction was initially made between pre-consonantal, pre-pausal, and pre-vocalic, but glottaling rates were comparable. Given small N values and parallel texts, these were collapsed into a single category: word-final non-cluster /t/. As expected, the behavior of word-medial inter-vocalic /t/ and word-final /t/ differed, and the two are presented separately in the analysis. Tokens that were difficult to hear or that had inter-vocalic tapping were omitted, the latter because the social-indexical value of a tapped /t/ in British English is ambiguous: it can signal a relaxed, Americanized style but can also occurs in fairly standard and formal speech. Oral and elided stops were included and grouped with glottal stops. Token types were capped at 10.

The coding of th-fronting also followed previous work (Kerswill 2002, Clark and Trousdale 2009, Schleef and Ramsammy 2013). Both voiceless and voiced inter-dental fricatives were examined but the N values of the latter were too low, so only voiceless tokens are reported here. Both coda and onset tokens were included and tokens with following homorganic stops were excluded.

3 Efficacy of Design

Before turning to the results, it is important to examine the data for independent evidence that the cognitive load manipulations did in fact increase cognitive load for participants. We briefly present three types of evidence here, based on the prior literature on effects of cognitive load on speech production: increased reading time in reading tasks, a range of markers of heightened load in the recall tasks, and subjective reports of increased load.

Figure 1 presents each participant's reading time for each text as a proportion of their overall time spent reading the two texts in the reading task. Recall that the both texts had 80 words and so were very similar in length. We can observe that all the individuals who read Text 1 under the dual task condition spent a greater proportion of their overall reading time on Text 1, whereas all the individuals who experienced the dual task condition while reading Text 2 spent a greater proportion of their time reading Text 2. This clearly indicates an effect of cognitive load on reading time, rather than individual or text effects. Notice in passing that Figure 2 also potentially indicates subtler individual differences in ability to cope with increased cognitive load.

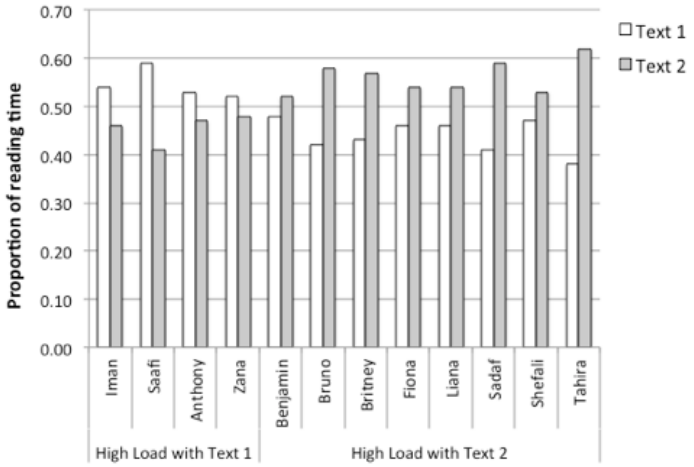

Figure 1: Reading time per text as a proportion of overall reading time.

We see a clear effect of the cognitive load manipulation in the recall tasks as well. Table 2 outlines four different speech production measures that have been associated with increased cognitive load (Christodoulides 2016). These indicators showed consistent differences between the low and high load conditions. In Table 2, we see the data for one individual from each of the two subject blocks, i.e., individuals who experienced higher cognitive load with different texts. We can see that, regardless of text, these individuals experienced the following effects of higher cognitive load: more unfilled pauses, more repetition, more words to complete the news story, and longer duration.[1]

Speaker	Recall Task	Unfilled pauses (> 250ms)	Repetitions (incl. filled pauses)	Words (excluding repetitions)	Duration
Britney	low load (text 1)	16.83	5	90	43.30
	high load (text 2)	19.41	14	113	52.82
Anthony	low load (text 2)	15.92	20	86	47.38
	high load (text 1)	16.02	40	111	61.70

Table 2: Indicators of cognitive load effects in recall task.

[1]We also investigated speech rate as a potential indicator of heightened load. Although speech rate also varied with task load, individuals could adopt different strategies, e.g., short, fast bursts of speech with long pauses or an overall slowing down of speech. This measure of cognitive load would therefore require a more complex metric of increased variability in articulation rate (Christodoulides 2016).

Finally, we also have consistent evidence from subjective self-reporting that the dual task conditions increased stress for participants. The informal conversation at the end of each participants' experiment started with a brief discussion of how easy or difficult they found the tasks and whether they felt they maintained a similar reporter style throughout. Participants unanimously reported maximum stress and difficulty in the dual task recall condition. The three examples in (2) illustrate some of these subjective experiences.

(2) a. Tahira: "It kinda felt like a interview. Kind of, because when I'm in an interview I have like a conscious thought in my mind like 'oh no, you need to sound formal make sure you don't mispronounce the t's."
b. Fiona: *[Did the numbers distract you?]* "Oh yeah definitely because it affected the way I was telling the story. I found myself going from reporter to like me talking to my friends. I was like yeah like like um yeah kind of thing, you know, using those kind of colloquialisms."
c. Anthony: *[Did you feel like you were being quite formal relative to your range?]* "Mostly. I think I was probably most formal in the last one [reading task, low load]. Because, I don't know, I think I was more relaxed. It was quite stressful there, just before that [reading task, high load]."

The quote from Tahira in (2a) reflects participants' general reporting of their style during the experiment as being formal, as was requested. Interestingly, Tahira chooses to describe this in terms of one of the variables examined. Fiona and Anthony, in (2b) and (2c), both report a subjective sense of shifting away from formal style under higher load conditions.

4 Results

Figure 2 presents the proportion of glottal replacement of /t/ according to task type and load condition. For each condition, the bar on the left indicates word-final contexts and on the right intervocalic word-medial contexts. Only one of the contrasts in cognitive load shows a statistically significant effect: word-final glottal replacement of /t/ is significantly greater when cognitive load is increased during reading. However, given low N values and small participant numbers in this pilot study, it is worth noting that all other contrasts show the same direction of trend, with an increase in attentional load corresponding to a slight increase in the use of the vernacular form.

In addition to this main result, we can observe a greater degree of inhibition of word-medial intervocalic glottaling across all the formal speech contexts, as compared to glottaling in word-final contexts. This is not surprising, given the higher degree of stigma associated with the former. A slightly more surprising finding is the lack of a greater load effect in the recall task, even though participants subjectively reported the greatest stress in this condition. This suggests that participants may experience of stress but still have a high ability to inhibit certain stylistic forms.

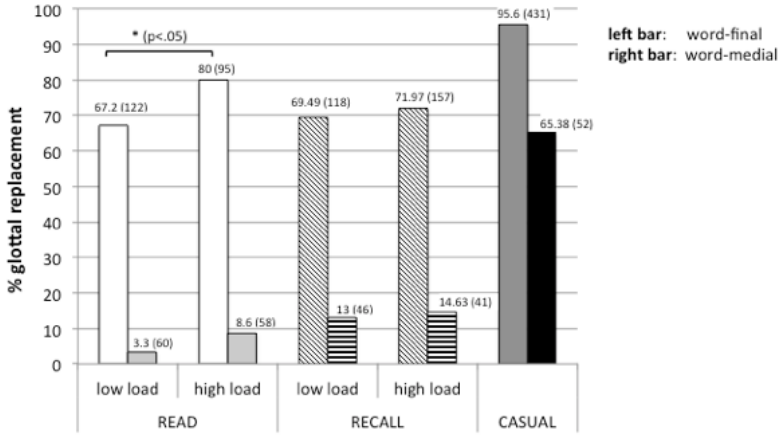

Figure 2: Percentage rates of glottal replacement according to task.

These results are suggestive but are just a preliminary indication of how cognitive load might interact with style control, and how such experiments might be designed. We note a few shortcomings of the present design here, to help refine the design of future experiments. Recall that two subject blocks were used in order to rule out an effect of ordering of tasks or loads. In both subject blocks, the first task that was run (Reading for Block 1 and Recall for Block 2) showed a load effect, confirming that the pattern was not due to task ordering. However, in both blocks, the second task we ran showed less of a difference in load (Recall for Block 1 and Reading for Block 2). In particular, the final condition for Block 2 was the easiest one overall—read speech with low load—but showed a level of glottal replacement similar to their casual speech. It is hard to interpret this detail in the data as the tokens are very few (Block 2 had only 4 participants and Text 2 had only 3 word-final /t/ tokens), but it may indicate that an experiment eliciting formal style should be limited to 2-3 conditions, to avoid late tasks with low load relaxing towards casual style.

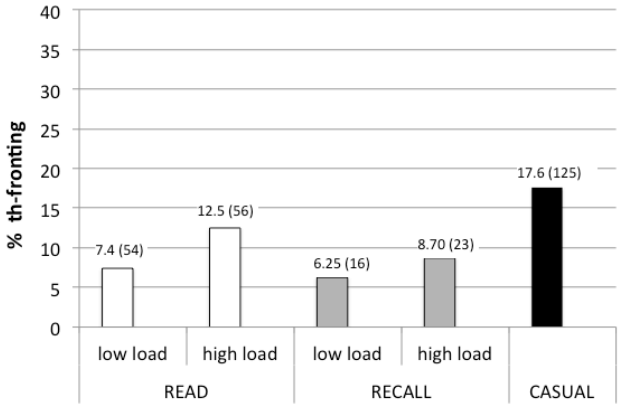

Figure 3: Percentage rates of th-fronting according to task.

Figure 3 presents the results for th-fronting. N values are low, but recall that texts and tokens are identical or closely parallel across speakers. As with the majority of the glottal replacement results, the data in Figure 3 only show trends, not statistically significant differences; N values may be too low to reach significance. As with Figure 2, there is a slightly surprising absence of a greater load effect in the recall task, given the subjective reports of difficulty maintaining formal style in the higher load condition of this task. Although not the focus of this study, the data also show an effect of syllable position, with significantly more th-fronting in coda position as opposed to onset, as found in several previous studies (Clark and Trousedale 2009, Schleef and Ramsammy 2013).

	READING			RECALL				CASUAL
	low load		*high load*	*low load*		*high load*		
Tahira	n	<	n	n	<	n	<	n
Anthony	n	<	n	n	<	n	<	n
Benjamin	n	<	n	–	<	n	<	n
Bruno	n	<	n	–	<	n	<	**y**
Shefali	n	<	n	–	<	n	<	**y**
Fiona	n	<	n	n	<	n	<	**y**
Iman	n	<	n	n	<	–	<	**y**
Zana	n	<	n	n	<	–	<	**y**
Liana	**y**	<	n	n	<	n	<	**y**
Sadaf	n	<	n	n	<	**y**	<	**y**
Saafi	n	<	**y**	y	<	–	<	**y**
Britney	**y**	<	**y**	n	<	**y**	<	**y**

Table 3: Implicational ordering of th-fronting across experimental conditions.

As N values are very low, Table 3 provides a simple implicational scaling of presence or absence of th-fronting by context. If we set aside cases where no context was available (marked with '–'), we can see that 35/36 (97.2%) of the contexts conform to an implicational ordering.

5 Discussion

The results point to some preliminary indications of how cognitive load interacts with style control and suggest further directions in methodology and theory.

Although the trend only reached significance for one context, word-final glottal replacement of /t/, the results showed the same direction of shift accompanying increases in cognitive load, towards the participant's vernacular variety. With task type and speaking situation fully controlled, speakers appear slightly less able to maintain their formal style (perhaps any later-learned style) under higher attentional load or divided attention. This suggests an element of cognitive primacy or 'default' cognitive ease of the vernacular in some speakers. The Labovian 'attention-to-speech' model may in part relate narrowly to attentional load, not exclusively attention in the sense of orientation to prestige associations in the speech community. This also suggests that, as is done in bilingualism research, sociolinguists should always consider style dominance and attention alongside social motivations for style-shifting.

On the other hand, the observed attentional load effects are quite subtle. We do not yet see dramatic shifts with increases in load. It may be the case that the effect of load on style is very small at the level of individual variables, but across dozens of variables leads to a subtle global shift. If so, data that show sharp stratification of style by context (casual, formal, reading passages, word lists) cannot be *entirely* due to subtle attentional load effects and very likely involve social and register awareness of which variants are most appropriate in different speaking styles.

From a methodological point of view, the study confirms the potential for using reading and recall tasks with a set of distractor tasks for investigating cognitive load and style control. The data are of course very preliminary, and an increase in sample size of participants might confirm the observed trends more strongly. While increasing participant numbers is straightforward, it is slightly more difficult to increase token numbers in each condition. This is because the dual task requires participants to remain actively engaged with a distractor task, and beyond a certain point, participants will find it difficult to maintain this dual focus and disengage from the task. The present texts incorporated many variables as a first exploration of load effects on style, but a follow-up design might pack more tokens for fewer focal variables into texts that are not significantly longer, in order to increase token numbers.

In closing, we comment on a few further details in the data that emerged in our exploratory inclusion of many variables, and that we will pursue in later work. One intriguing observation, not part of the original goal of the project, is that the group exhibited different procedures for 'turning on' a variable when they shifted out of formal speech into casual speech. We observed that word-medial inter-vocalic glottal stops started to appear immediately upon completing the experiment and shifting to casual speech, as if a switch had been turned on. This can be seen in the dramatic difference in rates in Figure 2. By contrast, th-fronting did not immediately get turned on; it showed a gradual and mild increase, more like a 'leak' than a 'switch'. In contrast to recent work suggesting that th-fronting may now be destigmatized (Levon and Fox 2014, Schleef and Ramsammy 2013), this points to the interesting possibility that people have different styles of inhibiting a variable. The data suggest greater monitoring among participants of their use of /th/-fronting than glottal replacement of /t/ (cf. Fabricius 2002; Kerswill 2002).[2] These subtler degrees of inhibition resonate with arguments for the social sensitivity of automated processes and graded automaticity (Garrod and Pickering 2007, Babel 2010).

A few further observations are worth noting. The average age of these individuals was 19, so they had only recently completed school and may still be developing their formal range. It is conceivable that older speakers' performance (e.g., after entering the workforce) on these tasks might show a different behavior, as repertoires and social associations are linked to life stage. We have

[2]The age range of Schleef and Ramsammy's (2013) participants was 14–18, so it is possible that they had not yet fully acquired prestige norms for th-fronting in the wider speech community.

also only looked at two variables, and these distributions may be specific to those variables. Impressionistically speaking, these individuals seem to focus their stylistic control and inhibition on different sets of features, e.g., ethnically-indexical variables may be eliminated from formal speech more by one person than another. It is also possible that individuals differ in their overall ability to shift and multitask between styles, effectively to code-switch, due to cultural background, exposure, or aptitude. Finally, this work is very exploratory, and it remains to be established how much we can really infer about the management of attentional loads in natural interaction (Sharma 2018) from what we observe under experimental conditions.

6 Conclusion

This study set out to isolate the effect of attentional load alone on style-shifting, in order to evaluate the relative role of cognitive processing and of social awareness underpinning classic attention-to-speech patterns of style-shifting. The adoption of experimental designs from the literature on cognitive load seems feasible and a promising avenue for a more precise understanding of how and why we style-shift. Controlling the speaking situation and only manipulating cognitive load, the study found a mild effect of higher attentional load on speakers' ability to maintain a formal style. This was combined with a strong subjective experience of difficulty controlling production under higher load, suggesting that individuals do struggle to control their style in such situations but also often have the capacity to succeed in this goal. The findings indicate the possibility of a pervasive but low-level influence of cognitive load on style production. Although very preliminary, the small size of this effect compared to the sometimes-large formality effects in the variationist literature suggests that a substantial component of those shifts involves not just attention being diverted from controlling style but social attention to the prestige demands of the register. Secondary observations in the findings, such as different patterns of emergence of vernacular variables during casual speech, point to graded automaticity and fine-tuned selectivity, or bricolage, in the degree of inhibition of variables with different social indexical values. In sum, the study argues not only for a recognition and investigation of pure processing factors in style-shifting, but also the possibility that their effect is subtle, and cannot account for many of the substantial shifts we observe in interaction.

References

Abel, Jennifer, and Molly Babel. 2017. Cognitive load reduces perceived linguistic convergence between dyads. *Language and Speech* 20:479–502.

Allport Alan, Elizabeth. A. Styles, Shulan Hsieh. 1994. Shifting intentional set: Exploring the dynamic control of tasks. In *Attention and performance XV*. eds. C. Umilta and M. Moscovitch, 421–452. Cambridge, MA: MIT Press.

Babel, Anna (ed.). 2016. *Awareness and Control in Sociolinguistic Research*. Cambridge: Cambridge University Press.

Babel, Molly. 2010. Dialect divergence and convergence in New Zealand English. *Language in Society* 39:437–456.

Bell, Allan. 1984. Language style as audience design. *Language in Society* 13:145–204.

Cheshire, Jenny, Paul Kerswill, Susan Fox, and Eivind Torgersen. 2011. Contact, the feature pool and the speech community: The emergence of Multicultural London English. *Journal of Sociolinguistics* 15:151–196

Christodoulides, George. 2016. Effects of Cognitive Load on Speech Production and Perception. Doctoral dissertation, Université catholique de Louvain.

Clark, Lynn, and Graeme Trousdale. 2009. Exploring the role of token frequency in phonological change: Evidence from TH-Fronting in east-central Scotland. *English Language and Linguistics* 13:33–55.

Coupland, Nikolas. 1985. 'Hark, hark, the lark': Social motivations for phonological style-shifting. *Language and Communication* 5:153–71.

Coupland, Nikolas. 2007. *Style: Language Variation and Identity*. Cambridge: Cambridge University Press.

de Bot, Kees. 1992. A bilingual production model: Levelt's 'speaking' model adapted. *Applied Linguistics* 13:1–24.

Eckert, Penelope. 2008. Variation and the indexical field. *Journal of Sociolinguistics* 12:453–476.

Fabricius, Anne. 2002. Ongoing change in modern RP English: Evidence for the disappearing stigma of t-glottaling. *English World-Wide* 23:115–136.
Fernandes, Myra A., and Morris Moscovitch. 2000. Divided attention and memory: Evidence of substantial interference effects at retrieval and encoding. *Journal of Experimental Psychology: General* 129:155–76.
Hughes, Arthur, Peter Trudgill and Dominic J. L. Watt. 2012. *English Accents and Dialects: An Introduction to Social and Regional Varieties of English in the British Isles*, 5th ed. London: Hodder Education.
Jou, Jerwen, and Richard Jackson Harris. 1992. The effect of divided attention on speech production. *Bulletin of the Psychonomic Society* 30:301–304.
Kahneman, Daniel. 1973. *Attention and Effort.* Englewood Cliffs, NJ: Prentice-Hall.
Kendall, Tyler. 2009. Speech Rate, Pause, and Linguistic Variation: An Examination through the Sociolinguistic Archive and Analysis Project. Doctoral dissertation, Duke University.
Kerswill. Paul. 2002. Models of linguistic change and diffusion: New evidence from dialect levelling in British English. *Reading Working Papers in Linguistics* 6, 187–216.
Labov, William. 1966. *The Social Stratification of English in New York City.* Cambridge: Cambridge University Press.
Labov, William. 2013. *The Language of Life and Death: The Transformation of Experience in Oral Narrative.* Cambridge: Cambridge University Press.
Levon, Erez, and Susan Fox. 2014. Social salience and the sociolinguistic monitor: A case study of ING and TH-fronting in Britain. *Journal of English Linguistics* 42:185–217.
Lively, Scott. E., David B. Pisoni, W. van Summers, and Robert H. Bernacki. 1993. Effects of cognitive workload on speech production: Acoustic analyses and perceptual consequences. *Journal of the Acoustical Society of America* 93:2962–2973.
Pickering, Martin J., and Simon Garrod. 2004. Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences* 27:169–226.
Roelofs, Ardi, and Vitoria Piai. 2011. Attention demands of spoken word planning: A review. *Frontiers in psychology* 2:1–14.
Schilling-Estes, Natalie. 2002. Investigating stylistic variation. In *The Handbook of Language Variation and Change,* eds. J. K. Chambers, P. Trudgill and N. Schilling-Estes, 375–401. Oxford: Blackwell.
Schilling-Estes, Natalie. 2004. Constructing ethnicity in interaction. *Journal of Sociolinguistics* 8:163-195.
Schleef, Erik. 2013. Glottal replacement of /t/ in two British capitals: Effects of word frequency and morphological compositionality. *Language Variation and Change* 25:201–23.
Schleef, Erik, and Michael Ramsammy. 2013. Labiodental fronting of /θ/ in London and Edinburgh: a cross-dialectal study. *English Language and Linguistics* 17:25–54.
Sharma, Devyani. 2018. Style dominance: Attention, audience, and the 'real me'. *Language in Society* 47:1–33.
Sorace, Antonella. 2006. Possible manifestations of shallow processing in advanced second language speakers. *Applied Psycholinguistics* 27:88–91.
Straw, Michelle and Peter L. Patrick. 2007. Dialect acquisition of glottal variation in /t/: Barbadians in Ipswich. *Language Sciences* 29:385–407.
Yin, Bo, Natalie Ruiz, Fang Chen, and M. Asif Khawaja. 2007. Automatic cognitive load detection from speech features. In *Proceedings of OzCHI 2007*.

Department of Linguistics
Queen Mary, University of London
Mile End Road
London E1 4NS
United Kingdom
d.sharma@qmul.ac.uk
k.mccarthy@qmul.ac.uk