Investigating phonotactic illusions with an auditory lexical decision task

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Listeners repair phonotactically illicit input to conform to the grammar of their language, but past work does not show that English listeners use a unique repair for illicit *[dl, tl]: changing the liquid from [l] to [ɹ] [6, 8], epenthesizing a schwa between the stop and the liquid [8] or before the stop [7], changing the stop place feature from coronal to velar [7, 5, 2] have all been reported.

Research Question Do English listeners actually use all these repairs, or is their variety an artifact of choices offered in this previous work?

Methods Monolingual American English speakers recruited from Prolific [9] (N = 26) to participate in an auditory lexical decision task [4, 3] created in PCIbex [11]. Participants heard each stimulus in the frame "Is _____ a word?". RTs were measured from stimulus onset and the trial ended when the participant responded. The next trial began 500msec after the response was made. Trials with RTs less than 1000msec or greater than 5000msec were excluded.

Items were fully randomized for each participant; each participant heard each item once. In the test items, the critical word began with [dl] or [tl] and created a word via exactly one of the following repairs:

1. Prothesis: [tl]anta → /ətl/anta "Atlanta"
2. Stop deletion: [dl]abeling → /l/ableing "labeling"
3. Stop place feature change: [tl]eveland → /kl/eveland "Cleveland"
4. Epenthesis: [tl]edo → /təl/edo "Toledo"
5. Liquid change: [dl]amatization → /dr/amatization "dramatization"

This design addresses the uncertainty about what repair is applied: for example, if English listeners apply both epenthesis and stop place change consistently, but no other repairs, there will be more "Yes" responses in these two conditions than in the others.

There were also control items beginning with [gl] and [kl] which created a word via the same repairs as above (e.g. epenthesis: [kl]ect → /kəl/ect "collect"). There were approximately 60 items per test condition and 30 items per control condition, equally split by stop voicing. Stimuli were produced by a bilingual Hebrew-English speaker, who had experience producing licit [dl,tl] onsets in Hebrew, and produced the stimuli with an English accent to avoid any confounds stemming from nonnative phonetics.

Results Results were analyzed in R [10] with the *lme4* package [1]. Results are shown in Figure 1 and Table 1. Compared to the nonword control baseline, participants give more "Yes" responses to the stop place feature change condition, as shown by the higher blue bar and the positive coefficient in the Stop condition. Participants give more "No" responses to all of the other test conditions, as shown by the smaller blue bars and the negative coefficients.

Conclusion This work shows that stop place feature change is the preferred repair for English listeners when faced with illicit *[dl,tl] onsets. The other kinds of repairs were not applied consistently by English speakers. These results suggest that listeners are not applying multiple repairs in parallel (for example, applying both epenthesis and stop place feature change to the same stimulus independently). This suggests that the large variety of kinds of repairs shown in previous work [7, 6, 8, 2, 5] may result from the specific phonetics of the stimuli used or the particulars of the experimental task. Previous work using a Hebrew speaker to produce the stimuli [2, 5] also found that English speakers applied the stop place feature change repair.

	Estimate	Std. Error	z value	Pr($> |z|$)	
Intercept	-1.2612	0.2792	-4.517	6.26e-06	***
Prothesis	-5.2142	1.2838	-4.061	4.88e-05	***
Deletion	-0.9912	0.4320	-2.294	0.021780	*
Stop	1.6371	0.3141	5.212	1.87e-07	***
Epenthesis	-1.6213	0.5089	-3.186	0.001442	**
Liquid	-2.6353	0.4079	-6.460	1.05e-10	***
No Repair	-4.6282	1.2027	-3.848	0.000119	***
Word Control	2.2034	0.3515	6.269	3.64e-10	***

Table 1: Fixed effects results of a logit model evaluating responses to phonotactically illicit test conditions and word controls, compared to the baseline nonword controls.
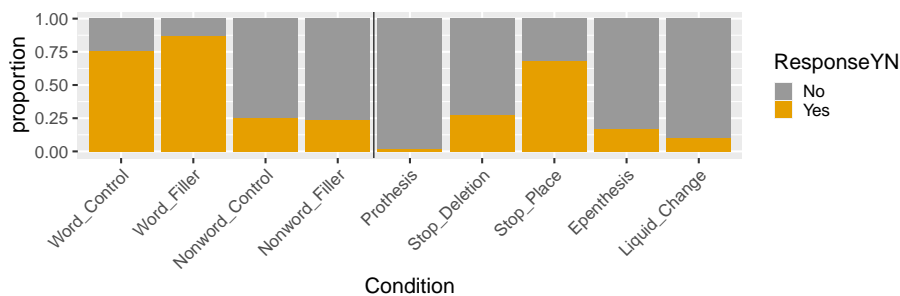

Figure 1: Proportion of 'Yes' and 'No' responses by condition.

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