

Mergers in Production and Perception

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Big huge thank you to:

- Our collaborators: Paul Warren, Bryn Thomas, and Rebecca Clifford

Mergers-in-progress

- Production vs. Identification vs. Discrimination
 - a glimpse into how sounds are stored and accessed in the mind
- Social information
 - its role in production and perception
 - priming with the concept of social information (e.g., concept of a region)
- Word-based variation
 - lexical diffusion
 - real vs. nonsense words
- Phonological context
 - conditionally merged

The NEAR-SQUARE merger in NZE

- Merger on [iə]
- Most evidence suggests that this is a female-led merger
- Led by members of lower socioeconomic groups
- The merger is still in progress: older NZers are more likely to maintain the distinction than younger NZers

NEAR/SQUARE Experiments

Hay et al. (2010)

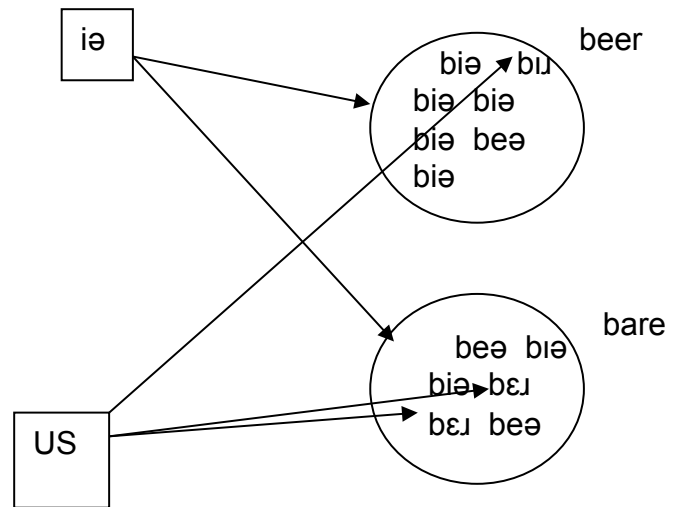
- Identification: played distinct tokens one at a time - participants identified which word they heard in a binary, forced-choice task
 - US & NZ experimenter
- Production: read words in minimal pairs
 - US & NZ experimenter
- Odd One Out task: beer bear bare
 - auditory instructions (UK & NZ)
 - written task (US & NZ)

Summary of results

- In production, participants who met with the US experimenter were more likely to maintain a distinction than those who met with the NZ experimenter (Hay et al. 2009).
- In identification, experimenter identity matters (Hay et al. 2006)
 - merged participants make more errors if they met with the US experimenter
 - but participants who met with the US experimenter were more likely to report that the word pairs were distinct.
- Exposure to instructions/pre-task (Hay et al. 2010)
 - distinct participants were more accurate when exposed to UK instructions/US task
 - merged participants were more accurate when exposed to NZ instructions/NZ task

Our interpretation

- Levels of representation that we assume:
 - phonetically-detailed words/utterances
 - phonological abstraction
 - lexical abstraction
- All levels are indexed to every other level.
- The phonetically-rich level is indexed to social information.
- The other levels are indexed to social information when the relationship is above the level of consciousness.
- Different tasks cause individuals to activate different levels of representation



Sketch of exemplar model with word-level distributions of remembered exemplars, and labeling for phonemic category and dialect area, for someone who is merged on NEAR. (Hay et al 2010: 465)

Resonance

(see Johnson 2006: 495)

	Merged	Distinct
Phoneme level	One distribution.	Two distributions.
	'Distinct' speech/concept introduces noise → makes distributions overlap even more	'Distinct' speech/concept increases distinction between distributions
Phonetically-detailed word level	Two distributions.	Two distributions.
	'Distinct' speech/concept makes more distinct.	'Distinct' speech/concept makes more distinct.

(adapted from Hay et al. 2010: 467)

Testing our interpretation: real vs. nonsense words

- In exemplar theory, real words would have representations that are phonetically detailed, while nonsense words would not because they have not previously been encountered.
- This means that individuals rely on word-based exemplars for real words but must rely on phoneme-based representations for nonsense words.

For conditional mergers, this means that:

- In production
 - subjects will be more merged when producing real words because they are relying on phonetically-detailed word-based representations
 - subjects will be less merged when producing nonsense words because they are relying on phoneme-based representations and the merger is only in some phonological contexts
- In perception
 - provided that there are some people in the community who maintain a distinction in all contexts, subjects should be more accurate when identifying real words because they have stored representations of them

The Ellen/Allan merger in NZE

- Prelateral merger of DRESS and TRAP
 - shell/shall
 - celery/salary
 - melody/malady
- Conditioned merger, nearly complete.
- Vowels are merged near the non-prelateral TRAP token

Ellen/Allan Experiment

(Thomas 2004; Thomas & Hay 2005)

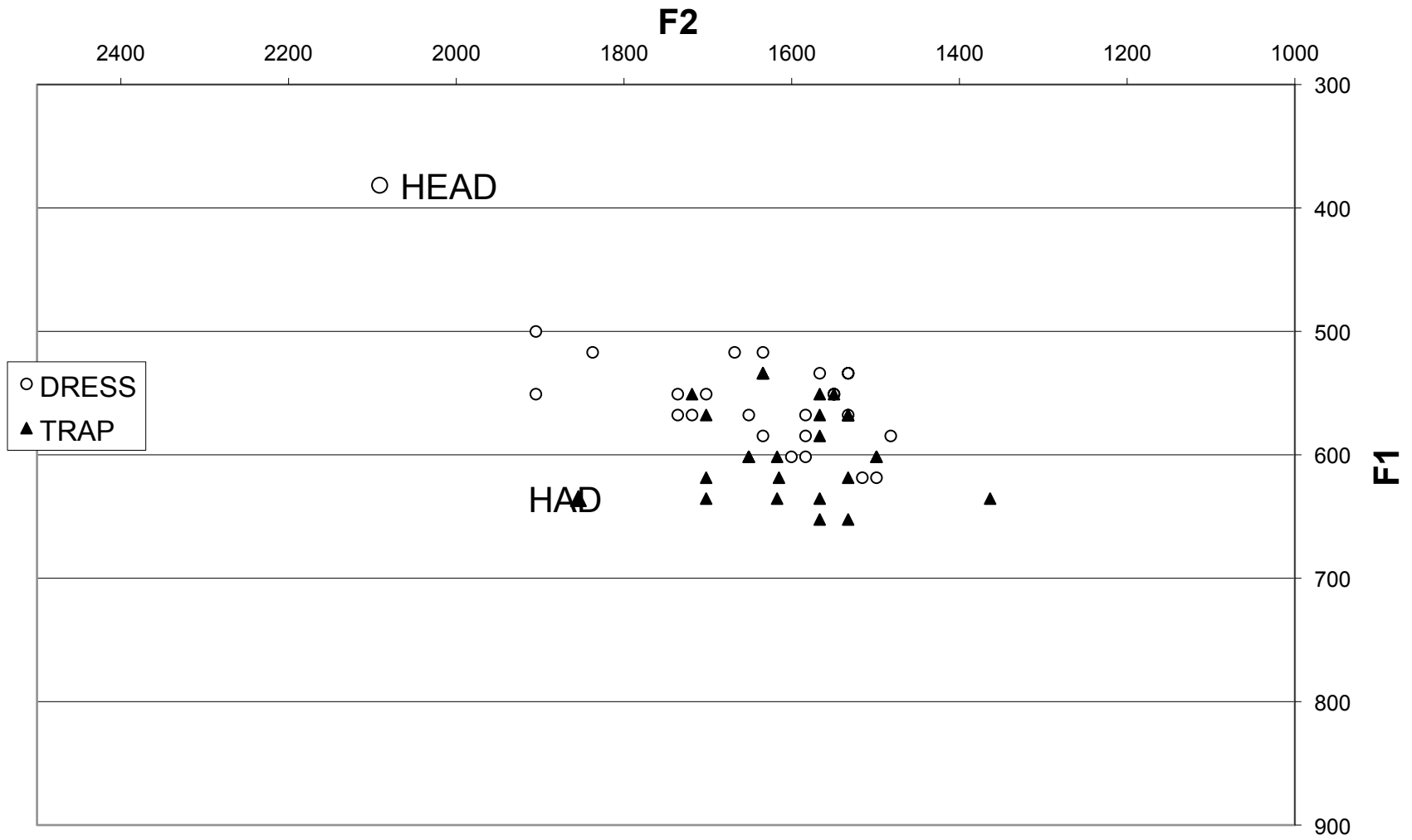
16 Participants:

- 1) real word production
- 2) nonce word production
- 3) real word perception
- 4) nonce word perception

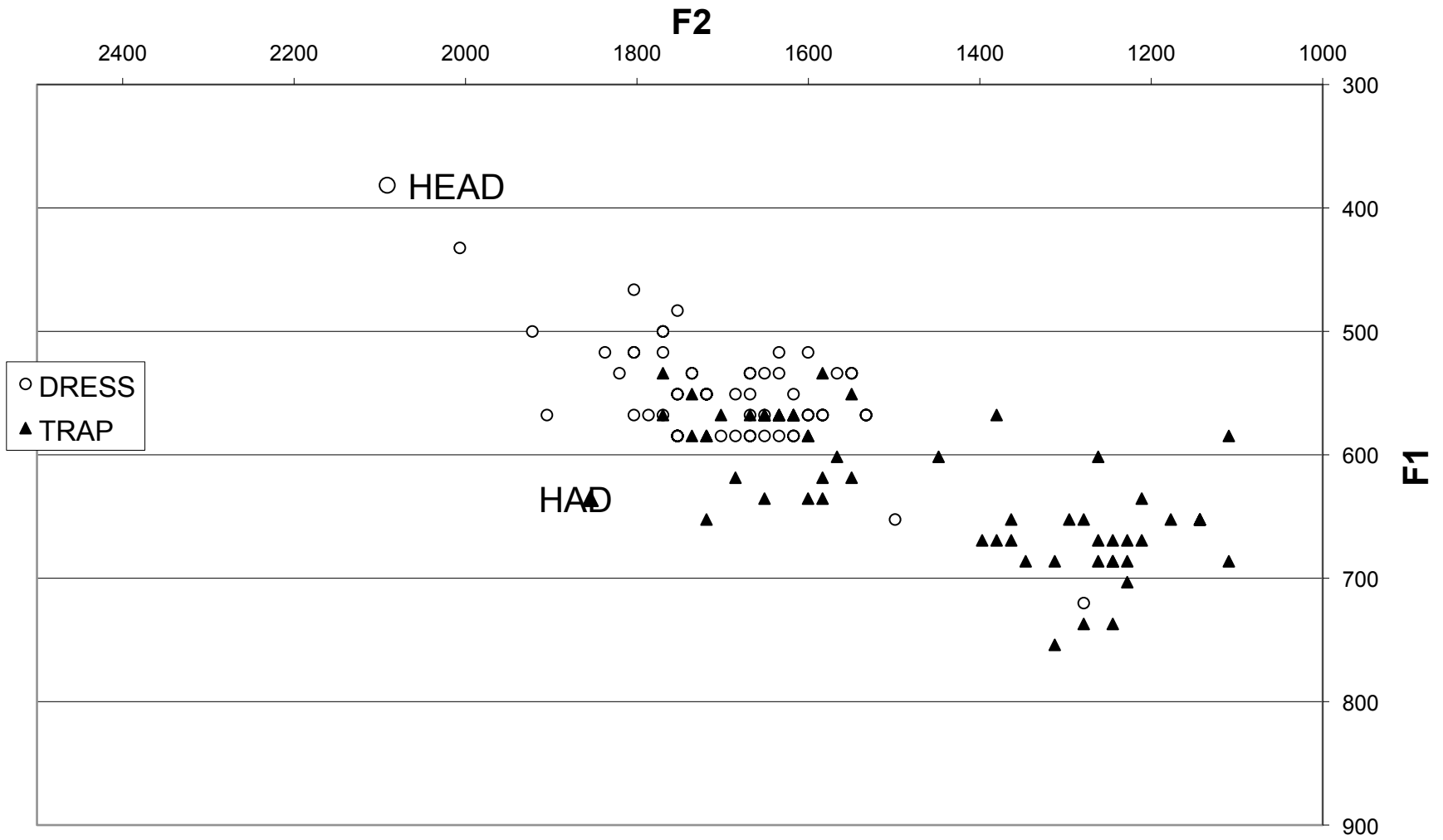
Results

- In production, many speakers maintained more separation between the vowels when producing *nonsense words*

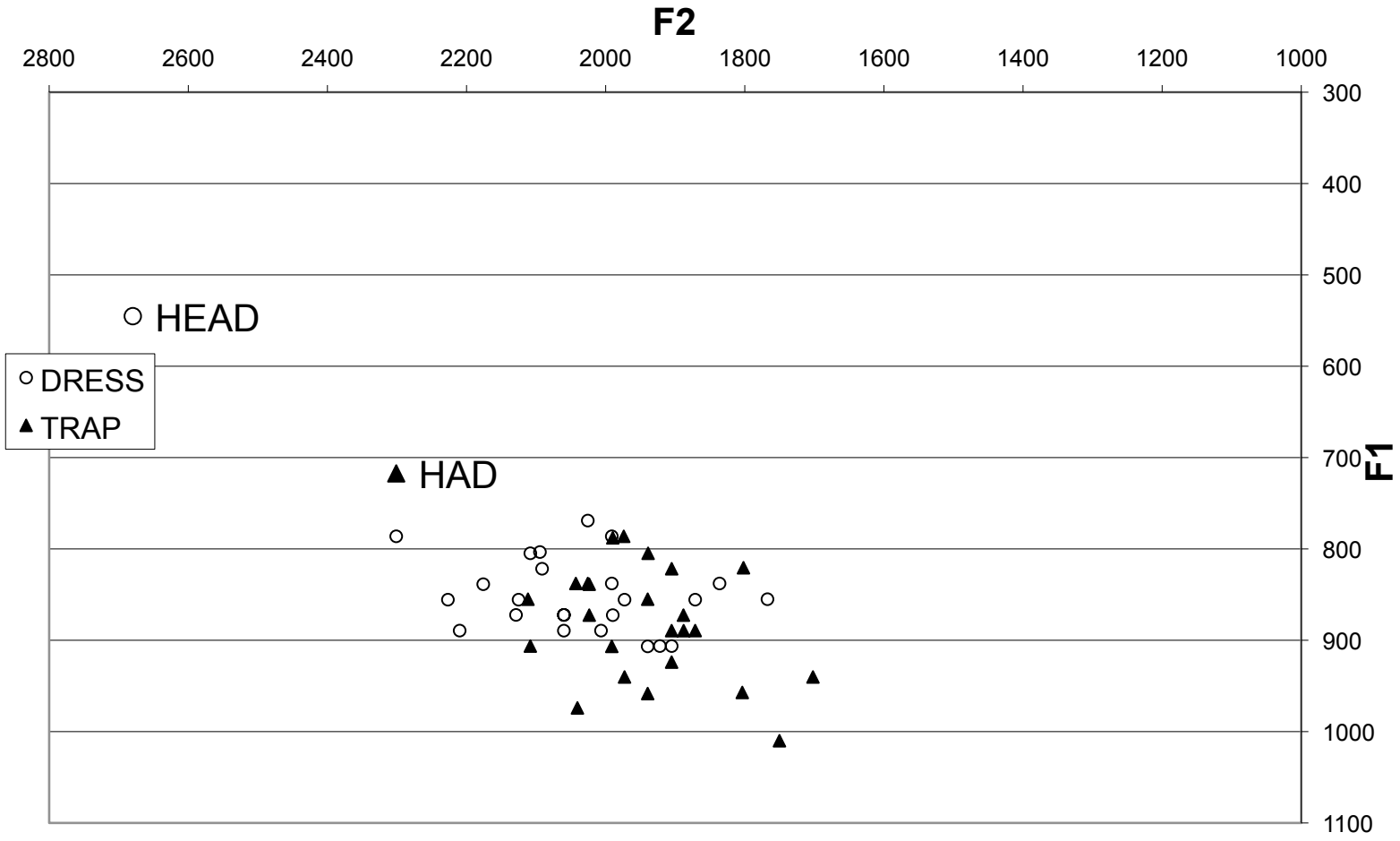
MALE 7: REAL WORDS



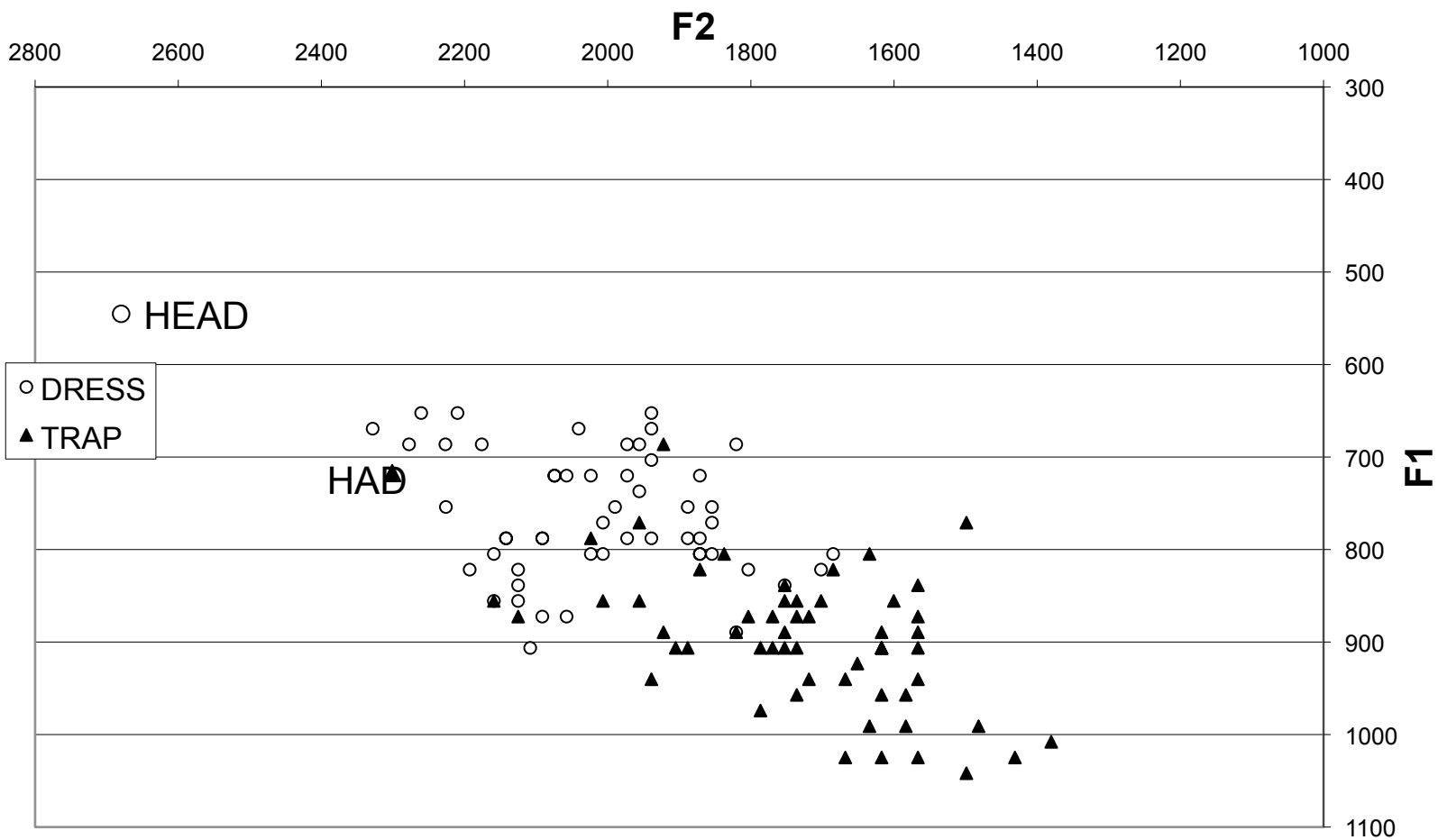
MALE 7: NONSENSE WORDS



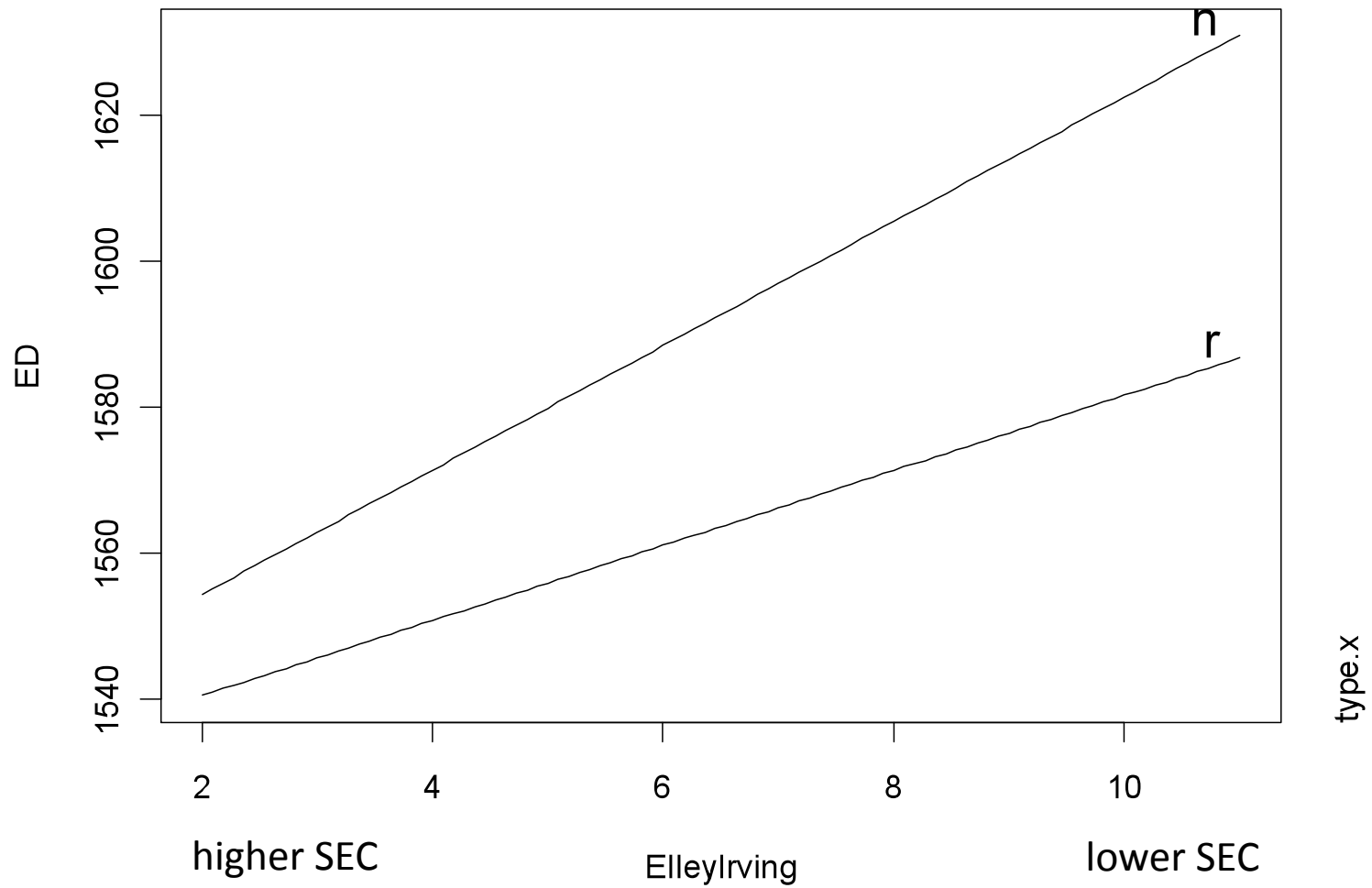
FEMALE 8: REAL WORDS



FEMALE 8: NONSENSE WORDS



This interacts with social class



In Perception

- Some listeners were more accurate at identifying vowels in real words than nonsense words.

Summary of results

- Some NZers were more accurate with real words than nonsense words in perception...
- But they maintained a greater distinction with nonsense words than real words in production.

Interpretation

- In production, speakers must rely on phoneme-level productions for nonsense words.
- Phonemic representations also contain the non-prelateral (non-merged) tokens, which pulls the distributions apart.
- In perception, the real word exemplars include *some* distinct tokens, which help in identification (even though the listeners feel they are guessing)

Cot/Caught Experiment

(Drager et al. in progress)

- Same experiment design but with the *cot-caught* merger

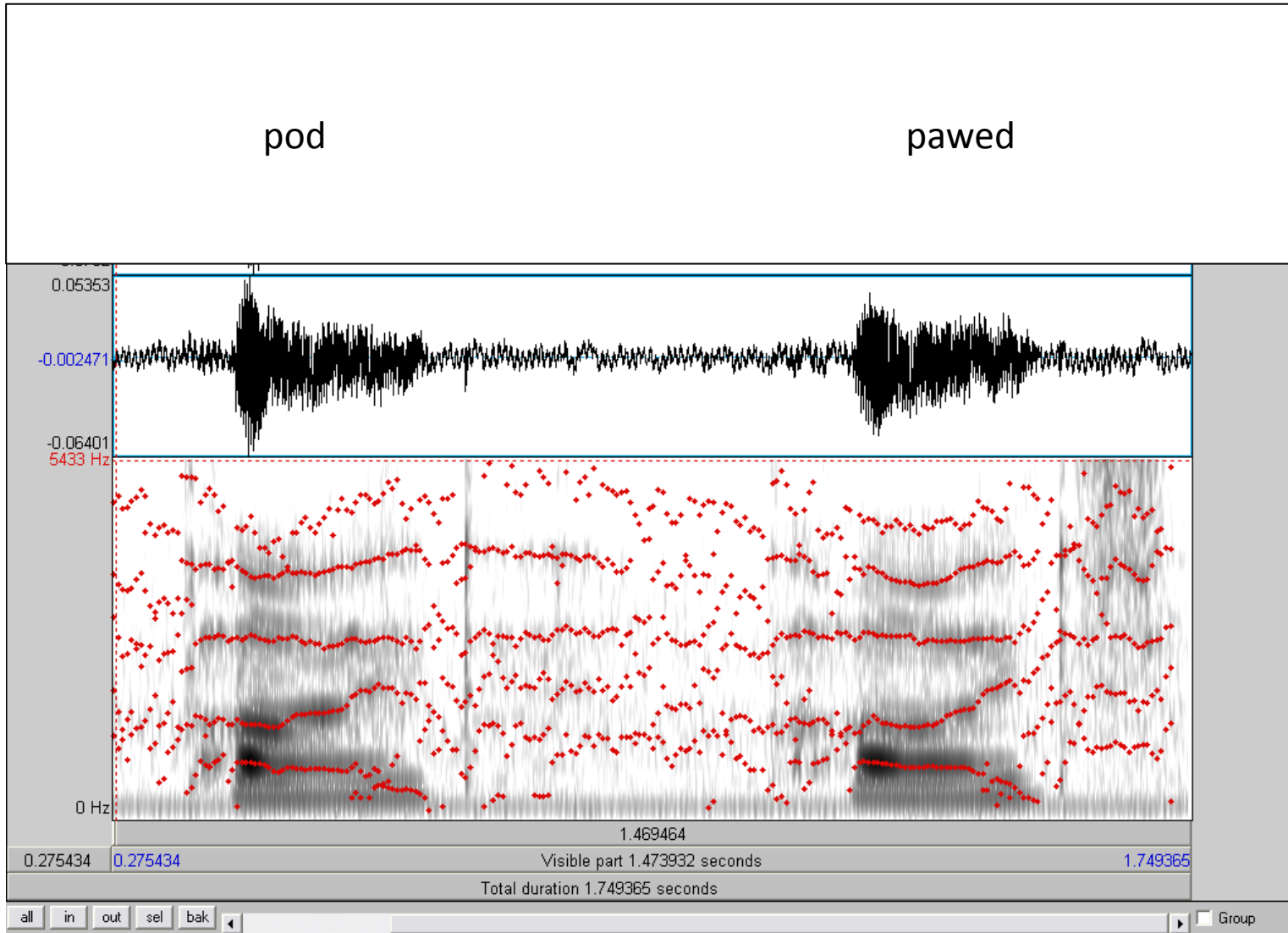
- hock hawk 🔊 🔊
- pod pawed 🔊 🔊
- dodd dawd 🔊 🔊

- Participants from Hawai‘i and western states in the continental US
 - regions where we would expect the merger in at least some phonological contexts (Labov et al.)

- All participants were merged to at least some degree, especially before /n/.
- Participants merged to varying degrees in other phonological contexts: some merged entirely on LOT whereas others produced the “correct” vowel in over 65% of tokens.

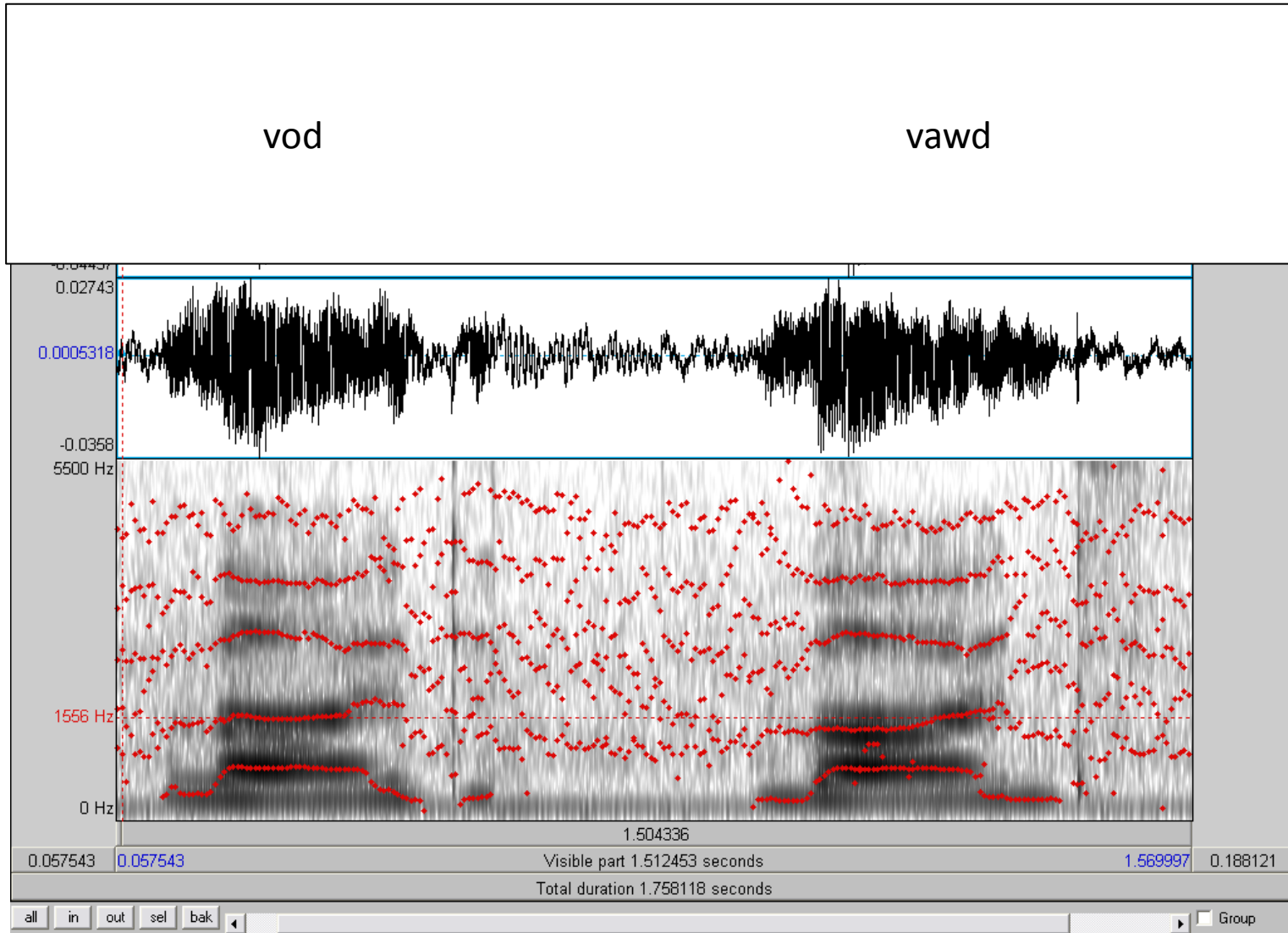


Example of a “nearly merged” participant





Example of a “nearly merged” participant



Summary of results (so far)

- Those who maintain some distinction were more accurate at identifying real words than nonsense words in perception ($p < 0.05$). In production, these participants were more likely to maintain a distinction in nonsense words than in real words ($p < 0.01$).
- Those who were fully merged were more accurate at identifying nonsense words than real words in perception ($p < 0.05$). They did not produce a distinction in real or nonsense words (though this is based on auditory analysis – acoustic analysis is in progress).

Summary of production and perception

sound	task	effect for fully merged	effect for conditional/nearly merged
Ellen/Allan	Identification	n/a	slightly less accurate with nonse words
	Production	n/a	greater distinction with nonse words
cot/caught	Identification	more accurate with nonse words	less accurate with nonse words
	Production	merged in both	greater distinction with nonse words

In production...

- Speakers produce the merger because they are accessing phonetically-rich representations of the words.
- Except when they are producing novel words (i.e., when they don't have phonetically-rich lexical/utterance-level representations to rely on). Then, speakers with some degree of distinction in some real words/phonological contexts are biased by those distinct distributions and are more likely to produce a distinction.

In an identification task...

- Individuals access phonetically-rich lexical information, enabling their high accuracy rates despite their feeling that they are guessing.
 - Feel like the words are “the same” because they are linked to the same phonemic label, but
 - The word-level distributions are not completely overlapping in their representations, so they perform above chance during identification.
- Participants who are fully merged may be more accurate with nonsense words because:
 - they have adopted a spelling-based strategy; participants tune in to some meaningless-to-them phonetic difference and assign a spelling to it, or
 - there may be a greater phonetic distinction in the *cot-caught* nonsense stimuli than the real words
 - more analysis and more data are required

In sum

- There are different levels of mental representations.
- Different tasks (e.g., real vs. nonsense words, production and perception tasks) focus on different levels of representation.
- Mergers-in-progress are the ideal medium in which to explore these questions precisely because their mental representations differ across the different levels.

References

- Drager, Katie, Jen Hay, & Rebecca Clifford (in progress –author order?) The perception and production of *caught* and *cot*: evidence from real and nonsense words.
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