Issues in unifying nasal vowel markedness 12th Old World Conference in Phonology

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Outline				



- 2 Issues in vowel quality
- Issues in nasality quantification
- 4 Sketching an analysis
- **6** Conclusion

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• Phonetic motivation of nasal vowel phenomena in phonology

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 - OR: "High nasal vowels are marked because they are harder to nasalize."

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 - OR: "High nasal vowels are marked because they are harder to nasalize."
 - [NB: discredited explanation]

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- High level of idiosyncrasy in nasal vowel behavior (even just on surface)

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Recent issue	es (phonetics)			

• Recent instrumental/experimental findings cast even further doubt:

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 - **Imaging:** Significant mismatch among transcribed vowel, acoustic output, and (re)configuration of oral articulators (esp. tongue).

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• Attempts to establish a unified phonological theory of nasal vowels must first address these phonetic discrepancies (esp. within a modular approach)

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• Problematize nasal vowels in phonology (in light of some phonetics-based issues):

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- Problematize nasal vowels in phonology (in light of some phonetics-based issues):
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 - ② Distinguishing oral from nasal vowels when nasal coupling is incomplete

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- Problematize nasal vowels in phonology (in light of some phonetics-based issues):
 - Recovering underlying representations from conflicting surface evidence
 - Obstinguishing oral from nasal vowels when nasal coupling is incomplete
- Sketch a preliminary solution as an example of a possible response & evaluate predictions made by its implementation in a stringent framework

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- Centralization effect: low vowel F1 lowered (raising perceived), high vowel F1 raised (lowering perceived).

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- Centralization effect: low vowel F1 lowered (raising perceived), high vowel F1 raised (lowering perceived).
- Unclear global F2 effects, but F2 lowering may increase perception of nasality (Delvaux 2009)
- Oral articulators can be (and are) reconfigured to shift the acoustic output

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3–way mismatch among: articulatory configuration, acoustic output, and traditional transcription

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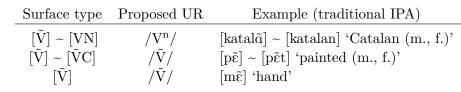
3–way mismatch among: articulatory configuration, acoustic output, and traditional transcription

(1) Transcription of French nasal vowels (minor diacritics removed)

		Acoustic	Articulatory
Example	Traditional	$(Carignan \ 2014)$	$(Delvaux \ 2012)$
paon 'peacock'	[ã]	[õ]	[ã]
pain 'bread'	$[\tilde{\epsilon}]$	$[\tilde{\mathbf{e}}]$	$[ilde{ extbf{a}}]$
pont 'bridge'	[õ]	$[\tilde{o}]$	[õ]
brun 'brown'	$[\tilde{\mathbf{e}}]$		$[ilde{\mathbf{E}}]$

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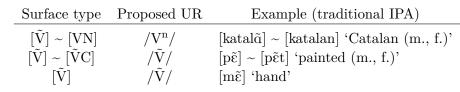
(2) Nasal vowel surface patterns & UR types in French



• NB: further evidence for such input types found in "disjointed" alternations; recall [fɛ̃] ~ [fin] 'fine (m., f.)'.

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(2) Nasal vowel surface patterns & UR types in French



- NB: further evidence for such input types found in "disjointed" alternations; recall [fɛ̃] ~ [fin] 'fine (m., f.)'.
- No (major) quality difference in quality between input types for identical surface vowels; only association of [+nasal] (e.g., $/\epsilon^n$, $\tilde{\epsilon}/$)

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Reanalysis?				

(3) Scale and consequences of reanalysis (example: *pain*-type)

Type	$\mathrm{UR}(\mathrm{s})$	Phono. output
a.	$/\epsilon^{n}, \tilde{\epsilon}/$	[ẽ]
b.	$/\epsilon^{n}, \tilde{\epsilon}/$	$[\tilde{\mathbf{e}}]$
c.	$/\epsilon^{\rm n}, \tilde{ m e}/$	$[ilde{f g}]$
d.	/e ⁿ (?), ẽ /	$[\tilde{\mathbf{e}}]$

- Traditional, "good faith" analysis (a.): alternations provide evidence for more abstract output. "Analogy" links non-alternating identical surface forms and articulatory & acoustic shifts are purely phonetic.
- Middle-of-the-road (b.): no reanalysis of input types, but lowering and centralization occur within phonology.

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с.	$/\epsilon^{ m n}, { m \widetilde{e}}/$	$[\tilde{\mathbf{s}}]$
d.	$/ \mathrm{e}^\mathrm{n}(?), \mathrm{ ilde{e}}$ /	$[\tilde{\mathbf{g}}]$

- Partial reanalysis (c.): same output (necessarily reflective of phonetic shift) belongs to input vowels of different qualities, in addition to feature association; lowering occurs in /εⁿ/ within phonology.
- Total reanalysis (d.): all surface forms come from vowel of same quality (association unclear); either raising occurs in feminine forms ([ɛn]) or funky allomorphy/suppletion comes into play.

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• But *which* shifted vowel (between acoustic & articulatory)? Trends between form and function:

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 - Contrastive nasality: increased acoustic salience in vowel space differences heightened between nasal and oral vowels (e.g. Hindi, French; Shosted et al. 2011, Carignan 2014) → acoustic and/or articulatory identity?

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- Targeting of an articulatory configuration (over its acoustic result)?

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 - Alternation such as [fē] ~ [fin] requires some (potentially dubious) extra legwork, e.g., intermediate representations, 3-to-1 correspondence, and/or "superlowering."

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 - The listener must be able to unpack minor phonetic shifts into internalized abstractions everything falls apart otherwise.
- In the absence of alternations or in the case of underdescribed languages, recovering phonemes from finer and finer phonetic description will require specific conventions.

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 - **Nasometric:** nasalance at any given point (ratio of nasal to total energy)
 - Aerodynamic: ratio of nasal to total airflow

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- Binary classification requires another threshold (e.g. "vowel x is nasal if it has a global score of 50% or more").
- Potential shortcoming: not all vowel qualities may have the same threshold for classification
- Two claims with reversed scales in each claim:
 - Articulatory preference: high vowels may require only a very low threshold (vs. a high one for low vowels)
 - Inherent length: low vowels preferred; high rates on high vowels may be accidental

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Height &	nasal coupling	>		

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 - Nasal airflow "creeps in" on oral low vowels (e.g., Ohala 1975).
 - Extremely little velic movement necessary for nasality on high vowels, both in aerodynamic terms (e.g., Bell-Berti 1993) and for perception as nasal (House & Stevens 1956, Maeda 1982).

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- Compare nasalization measurements on contrastive nasal vowels: often incomplete or surprisingly low (e.g., Delvaux et al. 2008, Dow 2014)
- French dialects with multi-phased nasal vowels (e.g., Delvaux 2006, Clairet 2008)
- If complete (or even near-complete) nasalization not necessary, realization of/change to [+nasal] may be reflected in phonetics by different (minimal) scores, according to height



• Preference of nasality on long vowels, both in diachronic change (e.g. Hajek 1992, 1997) and perceptual effects (e.g., Whalen & Beddor 1989)

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- Evidence for inherent length, where low > mid > high \rightarrow length parameter favoring nasalization on low vowels (Hajek & Maeda 2000)
- Velum as a "sluggish" articulator (Bell-Berti 1993) with diminished control (Shelton et al. 1970) and minimal time to lower (224 to 280 ms (Bell-Berti 1980, Bell-Berti & Krakow 1991, Dalston & Seaver 1990))



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Length issu	ıes			

 Minimal transition period + inherently short length of high vowels → high percentages of nasalization may merely be indicative of phonetic, not phonological nasalization

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- In other words: x% on vowel A not necessarily = x% on vowel B, as a function of duration

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- Durational information may be worked into measurements...

Introduction	Vowel quality	$\begin{array}{c} \text{Quantification} \\ \text{ooooooo} \bullet \end{array}$	Analysis	Conclusion
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Summary				

- Phonological representations: in communication with phonetics but based on phonological evidence; can be abstract & substantially transformed by *phonetic* rules
- **Oral or nasal?** Further work on thresholds and duration needed, especially for contextually nasalized vowels.

Introduction	Vowel quality	$\begin{array}{c} \text{Quantification} \\ \text{00000000} \end{array}$	Analysis	Conclusion
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Outline				

1 Introduction

- 2 Issues in vowel quality
- 3 Issues in nasality quantification
- 4 Sketching an analysis

5 Conclusion

Introduction	Vowel quality	Quantification	Analysis	Conclusion
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Considerat	ions			

• 3 major aspects: terms, directionality and members

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Considerat	ions			

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 → high > low (i.e., low is never more marked than anything else): no inventory (allophonic & contrastive) in Ruhlen's (1975) survey excludes low nasal vowels; singleton low nasal vowel inventory possible
- Members: what distinctions are expected?
 → front vs. back distinction in peripheral (non-low?)

vowels: motivated by data in Dow (2014) but findings in Parker (2002) may provide less ad hoc support

	Vowel quality	Quantification	Analysis	Conclusion
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(5) Nasal Vowel Markedness Hierarchy

High central	>	Mid central	>	High back	>	High front	>	Mid back	>	Mid front	>	Low
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An example of each category is given. 'x > y' = y' is never more marked than x.'

Predictions in stringency (e.g., de Lacy 2006):

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Predictions in stringency (e.g., de Lacy 2006):

- Impossibility of language without low nasal vowel
- Absence of true raising processes in prosodically prominent positions: troublesome (e.g., Beddor 1982), but requires trustworthy data and analysis
- What to do with minor height shifts (e.g., $/\tilde{e}/ \rightarrow [\tilde{\epsilon}])$?

Introduction	Vowel quality	Quantification	Analysis	$ \begin{array}{c} \text{Conclusion} \\ \bullet \\ 0 \\ \end{array} $
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Introduction	Vowel quality	Quantification	Analysis	$ \begin{array}{c} \text{Conclusion} \\ \circ \bullet \circ \end{array} $
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Conclusion				

- Much remains to be done before a unified theory of nasal vowel markedness is feasible
- Issues in nasal vowel classification (stemming from quantification) seem to be most daunting, but parallels may exist in variable or incomplete phonetic indices of other phonological properties (e.g. [voice])
- Though the phonetic aspects of nasal vowels remain complicated, establishing a reliable empirical basis *with phonology in mind* is key

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Acknowled	gments			

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