The relation between production and perception during (the last phases of) a Parisian French vowel change: Evidence from a word identification test with young and middle-aged listeners

How are production and perception related during a sound change? Especially in the case of mergers, this research question has engendered contradictory answers. Does the ability of distinguishing disappear from a speaker’s perceptual device before he has lost it completely in his own production (Labov 1994:335), or is it the other way round, so that the perceptual distinction capability stay intact for some time after the speaker has himself lost the distinction in production (Janson 1983:25) (see also Ohala 2012)?

Ongoing sound changes in Parisian French offer a very interesting observatory for this kind of questioning. Among several reported mergers and other changes (synthesis in Hansen 2015 of Carton 2000, Dominicy 2000, Lyche 2010), the merger of /ə/ and /a/ (words like pâte /pa:t/ and patte /pat/ in the process of merging to [pat]) is particularly far advanced in the production of Parisian French speakers (Martinet 1969, Lennig 1978, Hansen & Juillard 2011; see Table 1 for young speakers in 1972-74 vs. in 2001-2004), and is thus an ideal object of study.

Based on detailed new knowledge (data from 2012) on how the two /A/-phonemes are realized in text-reading in three generations of Parisian speakers (25 speakers, Hansen in progress, see Tables 2a-2c), the present analysis seeks to understand how the perception of 18 Parisian listeners from different age groups (16-25; 42-62) is affected by the change. The main question is: How do young as opposed to middle-aged listeners react to a word identification test in which isolated words with /ə/ or a/ are read aloud by a senior (74) and a young (21) speaker respectively?

The identification test consists of as well dummy words (poulet, manger,...) as real test words with /A/ (pâte, patte, mâle, mal, hâler, allier etc). After 3 introductory words to assure comprehension of the test, a total of 26 words for each of the two selected readers were presented for written identification by the listeners. Analysis of the 990 responses \((3+2x26) = 55 \times 18 \) listeners shows that the comprehension of the test task was fine (only 15 of 990 possible responses were blank/missing, i.e. 1.5%)\(^1\). Introductory words and dummy words were well identified (91\% (49/54) and 99\% (178/179) correct respectively), but the real test words were difficult for the listeners, as expected: only 54\% (344/635) of these were correctly identified\(^2\). A few of the misidentifications were due to wrong perception of the consonants (a total of 16 cases, for instance “lær” identified as “masser”), so the score of correct identification of the /A/-phonemes in itself was a bit better: 57\% (360/635). The identification problems consisted almost solely of confusions between /ə/ and /a/ (96\% (265/275) of the errors were of the type “pâte” identified as “patte” or vice versa, whereas double answers, like “pâte” noted as “patte/pâte” accounted for 3\% (7/275)).

Table 3 displays how the correct identifications can be further analysed by phoneme, by reader (senior, young) and by listener age group (young vs. middle-aged):

- The receding phoneme, /ə/, provokes fewer correct identifications than the winning one, /a/ (51\% vs. 61\% correct)
- The /a/-phonemes produced by the senior reader (aged 74) are better identified on the whole than those of the young reader (aged 21) (61\% correct vs. 43\% correct).
- Young and middle-aged listeners react very differently to the /a/-phonemes of the senior reader: Whereas responses of middle-aged listeners show 72\% correct phoneme identifications, this score is only 53\% for the young listeners.
- Age of listener does not seem to affect recognition of phoneme in a significant way elsewhere in the test.

To sum up, the test shows that young listeners have difficulties in identifying words in the senior voice that include the receding phoneme, i.e. they have lost much of the ability of decoding phonetic nuances that (still) make sense for middle-aged listeners. Though this study is limited - further evidence will be drawn from a differentiation test, since identification tests include a risk of bias through relative frequency of tested words - it does seem that if listeners’ perception device stay intact for some time after they have themselves engaged in a process of losing a clear phoneme distinction in production, it weakens quickly, and lasts no more than a few generations.

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\(^1\) The missing answers are removed from the calculation basis of the following percentages.

\(^2\) In this calculation, all responses to grâce and grasse were first removed (because these word did not allow for any confusion on the /A/-phoneme), as well as all reactions to the word las in one of the readings (due to other problems).
Table 1. Progression of mergers in Parisian French (/E/: /e/-/ɛ/; /Ø/: /ø/-/œ/; /O/: /o/-/ɔ/; /A/: /α/-/a/) (Hansen & Juillard 2011, p. 323, table text translated into English here)

![Frequency of oppositions graph]

Table 2a. Realisation of /α/ and /a/ in text-reading in 2012 – seniors (aged 70+)  (Hansen in progress)*

Table 2b. Realisation of /α/ and /a/ in text-reading in 2012 – middle-aged (aged 40-55) (Hansen in progress)*

Table 2c. Realisation of /α/ and /a/ in text-reading in 2012 – young (aged 18-25) (Hansen in progress)*

*Note to Tables 2a-2c: Reference for traditional distribution of /A/-phonemes in French words: Fouché 1959 [1956]. For each phoneme, the percentage of different phonetic realizations used by the speakers is shown with a different color shade. E.g. Table 2a shows that for the seniors speakers (70+), the phoneme /a/ was in 3.4% of the cases pronounced as [æ] (a very fronted A-quality), 71.2% as [a], 11.9% as a very open front A-quality noted [aO], 10.2% as a slightly posteriorized A-quality noted [aP], 3.4% as [α] and none as [ɔ] – thus, the /a/ phoneme is mainly realized as a front A-sound. The /α/ phoneme, on the contrary, is mainly (but not exclusively) realized with a posterior vowel quality: 0% [æ], 25.7% [a], 4.6% [aO], 36.2% [aP], 31.6% [α], 2% [ɔ].
Table 3. Correct phoneme identification in the identification test on isolated words with /A/, shown by phoneme, by reader age and by listener age group.

<table>
<thead>
<tr>
<th>All 18 listeners</th>
<th>Reader (age)</th>
<th>All 18 listeners</th>
<th>Listeners by age group: 11 young (16-25 y), 7 middle-aged (42-62 y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/α/</td>
<td>51% (145/280) Senior (aged 74) /α/ 61% (85/140) Young 53% (46/86)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Middle-aged 72% (39/54)</td>
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<tr>
<td>/a/</td>
<td>59% (103/176) Young 57% (61/107)</td>
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<td></td>
<td></td>
<td></td>
<td>Middle-aged 61% (42/69)</td>
</tr>
<tr>
<td>/a/</td>
<td>61% (215/355) Young (aged 21) /α/ 43% (60/140) Young 46% (39/87)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Middle-aged 40% (21/53)</td>
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<tr>
<td>/a/</td>
<td>63% (112/179) Young 63% (69/110)</td>
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<td>Middle-aged 62% (43/69)</td>
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Selected references


