This study examined the effects of language experience and consonantal context on the production of Parisian French (PF) vowels by American English (AE) learners of French. A repetition task was performed, involving French vowels /y-i-a-u/ uttered by a native speaker of Parisian French (PF) in bilabial /bVp/ and alveolar /dVt/ contexts embedded in the nonsense word/phrase /raCVCa/. Three groups of native AE speakers participated: speakers without French experience (NoExp), speakers with formal French experience (ModExp), and speakers with formal and extensive immersion experience (HiExp). Production accuracy was assessed by native PF listeners’ judgments and by acoustic analysis. Native PF listeners identified second-language (L2) learners’ productions more accurately as a function of speakers’ increased language experience, although /u/, /y/ and /œ/, even produced by the HiExp group, were frequently misidentified. A consonantal context effect was revealed, including /u/ being misidentified more often in alveolar context than in bilabial context by all three groups. Overall, all groups distinguished front rounded /y/ from /u/ in production, but often in a non-native manner, e.g., producing /y/ as /ju/. Individual differences, interactions between consonantal context and vowels, as well as implications for the perception-production link in L2 learning, are discussed.