Schematic and Veridical Information in the Detection of Wrong Notes in Melodies

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OVERVIEW
Both schematic and veridical knowledge must be involved in detecting wrong notes in familiar melodies. Dowling (1976) proposed that veridical knowledge of melodic content is essential for the schematic knowledge of the tonal scale (tonal hierarchy) in forming a memory representation which can serve in recognition or recall. With familiar melodies listeners also have veridical knowledge of the pitch pattern of the particular melody. There is considerable evidence that we can easily retrieve exact pitch intervals from well-known melodies; whereas we find it very difficult to generate a melody by stringing together arbitrarily collected pitch intervals (Attnewe & Olson, 1971). For example, in their first-year ear-training class, music students in college reproduce precise intervals by recalling familiar tunes ("Old MacDonald" descending perfect 4th, "Somewhere," ascending minor 7th). Supporting this view of familiar melody retrieval, our previous studies (APCAM, 2016) showed that scale membership has a stronger effect on wrong-note detection than does intervallic distance from the original pitch. When we looked at the degree of familiarity of the various familiar melodies in that experiment, however, we found indications that the pattern of responses to the most highly familiar 6 or 8 melodies was different from the pattern for moderately familiar melodies. That experiment was not designed in a way that we could test that possibility systematically. In the present experiment, we contrasted the 8 most familiar melodies with 24 less familiar melodies.

PARTICIPANTS
Familiar Melodies:
N = 96; age range = 18 to 35 years
N = 25; musical training = more than 5 years
N = 30; musical training = 1 to 5 years
N = 21; musical training = less than 1 year

Unfamiliar Melodies:
N = 56; age range = 18 to 37 years
N = 16; musical training = more than 5 years
N = 22; musical training = 1 to 5 years
N = 12; musical training = less than 1 year

STIMULI
Stimuli were generated on MATLAB 2009a:
(a) 8 "highly" familiar songs (familiarity ratings: 92% or higher)
(b) 24 "moderately" familiar songs (familiarity ratings: 44-91%)
(c) 32 unfamiliar folk songs (Bronson, 1976)

There were 64 trials and each melody was presented twice, with a 1000 ms gap between notes.

TASK
Participants heard 32 familiar and 32 unfamiliar melodies which were repeated twice. Each melody had one wrong note that was either in- or out-of-key, 1 or 2 semitones away, and up or down from the original note. Participants pressed the spacebar when they heard a wrong note.

RESULTS

DISCUSSION AND SUMMARY
Unfamiliar Melodies: Schematic information alone only leads to wrong-note detection that is barely better than chance. Response times are much faster with out-of-key wrong notes, the violation of tonal expectations makes the wrong note "pop out." Curiously, responses to 1 semitone deviations are faster than those to 2 semitone deviations. Perhaps the most puzzling result is the interaction between key membership and distance with hits: greater distance leads to faster response times. When a scale note moves just 1 semitone from the key, that must land on steps 3 and 4, or 7 and 1, which may involve more obvious changes in tonal tendencies than anywhere else in the scale. Also, musical training had no effect whatsoever on wrong-note detection with unfamiliar melodies. Whatever schematic knowledge is being used in this task, musicians have it roughly the same degree as those with some training.

Familiar Melodies: Both key membership and distance affected detection accuracy and response time. Key membership was especially important for detection accuracy with highly familiar melodies. It is possible that whereas for moderately familiar melodies the pitches tend to be represented in terms of the scale, for highly familiar melodies the scale may be represented in terms of the melody that is, these melodies in effect serve to define the scale. This fits with the practice of music students to rely on highly familiar melodies to ensure accuracy in the reproduction of scale intervals. The more highly trained listeners performed better than the less trained in both detection accuracy and response times. Taken together with the results with unfamiliar melodies, this suggests that the principal differences due to training (at least at the levels represented here) are not so much in more finely honed schematic knowledge developed by training, but rather in the better-trained listeners' knowledge of a greater range of actual melodies.

REFERENCES