Minimum time for producing and perceiving pitch directions by tonal and non-tonal speakers

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Previous studies examined time needed to produce a rising or falling pitch direction. They demonstrated that non-tonal speakers are faster in producing pitch directions than tonal speakers, despite the latter group's linguistic experience with local pitch changes. The study is the first to compare production and perception of pitch directions between the two groups. We created continua of fundamental frequency on different vowels and with different duration, based on estimation of parameters from a Mandarin corpus. Fifteen native Mandarin speakers and fifteen native English speakers were recruited from the Hong Kong Polytechnic University and the University of Florida. Within each duration, we recorded the estimated semitone where the identification rate is 0.5, assuming that the cut-off semitone values are the smallest which a rising or falling pitch direction can be perceived as different from a level tone. Formulas were proposed for perception time needed for effectively pitch directions on low and high vowels by tonal and non-tonal listeners. Non-tonal listeners need longer time to perceive a rising pitch direction less than 10 semitones and a falling pitch direction less than 12 semitones than tonal listeners, but they need less time otherwise. Vowel quality also affects duration needed for effectively perceiving rising and falling pitch directions.