

## Why Daniel Jones was better than Praat: A reassessment of *Intonation Curves* (1909)

Michael Ashby

Speech Hearing and Phonetic Sciences, University College London

m.ashby@ucl.ac.uk

In 1909 Daniel Jones (DJ) published *Intonation curves*, which was based on the auditory analysis of eight commercially available gramophone records covering English, French and German. The method of analysis was to listen repeatedly to the records, lifting the needle at successive points and noting the 'the impression of the sound heard at the instant when the needle is lifted'. The resulting estimates of pitch movement were notated as curved lines on a musical stave, aligned with a phonetic transcription of the text.

It has been possible to locate copies of most of the gramophone records used in the study, and to digitize them for acoustic analysis. The two sets of results can be comparatively evaluated in a number of ways, but one of the most illuminating is to plot the modern determinations automatically on a stave in the same way as DJ's (as in Figure 1). The findings reveal that DJ's  $f_0$  representations are of astonishing accuracy. So precise and consistent are his judgments that it is even possible to quantify the small differences among the rotation rates which DJ selected for particular records on his clockwork gramophone. The research demonstrates that although *Intonation Curves* is now largely neglected, it deserves recognition as one of DJ's most remarkable achievements.

In a final section of the paper, consideration is given to the somewhat divergent results obtained when the comparison is made using a range of different pitch-tracking algorithms. DJ matches the performance of the most sophisticated present-day examples, such as RAPT (Talkin 1995), and appears to outperform the default provision in Praat.



**Figure 1:** Top: automatically plotted intonation curve for a randomly-selected representative fragment of the English conversation record (male speaker); below: DJ's 1909 version. The text is *posting letters, cashing money orders*.

### References

- Jones, Daniel. 1909. *Intonation curves. A collection of phonetic texts, in which intonation is marked throughout by means of curved lines on a musical stave*. Leipzig; Berlin: B. G. Teubner.
- Talkin, David. 1995. A robust algorithm for pitch tracking (RAPT). In W. Bastiaan Kleijn & Kuldip K. Paliwal (eds.), *Speech coding and synthesis*, 495–518. New York: Elsevier.