



HAL
open science

CBF-PeriDB: A Dataset of Chinese Bamboo Flute Playing Techniques with Periodic Modulations

Changhong Wang, Emmanouil Benetos, Elaine Chew

► **To cite this version:**

Changhong Wang, Emmanouil Benetos, Elaine Chew. CBF-PeriDB: A Dataset of Chinese Bamboo Flute Playing Techniques with Periodic Modulations. 20th International Society for Music Information Retrieval Conference, Nov 2019, Delft, Netherlands. <hal-03277914>

HAL Id: hal-03277914

<https://hal.science/hal-03277914v1>

Submitted on 5 Jul 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

CBF-PERIDB: A DATASET OF CHINESE BAMBOO FLUTE PLAYING TECHNIQUES WITH PERIODIC MODULATIONS

Changhong Wang¹, Emmanouil Benetos¹, Elaine Chew²

¹Centre for Digital Music, Queen Mary University of London, UK

²CNRS-UMR9912/STMS (IRCAM), Paris, France

{changhong.wang, emmanouil.benetos}@qmul.ac.uk; elaine.chew@ircam.fr

EXTENDED ABSTRACT

We present *CBF-periDB*, a dataset of Chinese bamboo flute performances **employing playing techniques** with periodic modulations **in situ to facilitate** ecologically valid analysis of playing techniques in context. The dataset contains monophonic recordings of four types of isolated playing techniques and twenty expert **full-length** performances of classic Chinese bamboo flute pieces. Four types of playing techniques—vibrato, tremolo, trill, and flutter-tongue—are thoroughly annotated by the players themselves. These techniques are also referred to as periodic modulations due to their periodic patterns in the time-frequency domain. All recordings and annotations can be downloaded from c4dm.eecs.qmul.ac.uk/CBFdataset.html.

Playing techniques are important elements of expressive music performance, which **are present regardless** [EC: It is not independent of genre as, say, Chinese music might use different techniques from Iranian music] of genre, instrument type, and absolute pitch. **The pervasiveness of playing techniques makes their** analysis an attractive task in music information retrieval. **The results of such analysis will inform research on** automatic ornamentation transcription, realistic music generation, computer-aided music pedagogy, instrument classification, and performance analysis.

Previously published datasets for playing technique or vocal techniques analysis focus primarily on techniques recorded in isolation [1, 4], such as playing techniques on each note of the musical scale. Recent findings **show** that playing techniques exhibit considerable variations during live performance **in contrast to when they are** played in isolation [3]. The rarity of a specific playing technique in one piece and the requirement of annotating expertise hinder the collection of data in real-world performances. In current research on playing techniques, the focus **has mostly been on** Western instruments. The more evident inter-performer variability in folk music **has not been** widely explored.

The Chinese bamboo flute (also known as the *dizi* or *zhudi*, thereafter abbreviated as CBF), is one of the world’s most ancient instruments with a large repertoire of playing techniques. Based on consultation with professional CBF players, educators, and researchers, we create *CBFdataset*: a dataset of Chinese bamboo flute performances. The dataset comprises **of** monophonic recordings of representative CBF playing techniques and **of** classic CBF pieces **representing diverse** players, flute types, pieces, styles, and conservatories.

CBF-periDB, released as CBFdataset V1.0, is a subset of the CBFdataset, specifically created to facilitate research on periodic modulations [2]. This dataset is recorded by ten professional CBF players from the China Conservatory of Music. All data is recorded in a professional recording studio using a Zoom H6 recorder at 44.1kHz/24-bits. Each player performs both isolated periodic modulations covering all notes on the CBF and two full-length pieces **from the list**: *Busy Delivering Harvest* «扬鞭催马运粮忙», *Jolly Meeting* «喜相逢», *Morning* «早晨», and *Flying Partridge* «鸪飞». Players are grouped by flute type—C and G, the most representative types for Southern and Northern styles, respectively—and each uses their own flute.

The periodic modulations in CBF-periDB are **carefully** annotated by the players themselves. Annotations of each playing technique **in the recordings** include both the onset-offset information and the playing technique label. For modulations with relatively long duration, such as vibratos, tremolos, and trills, the **annotations**



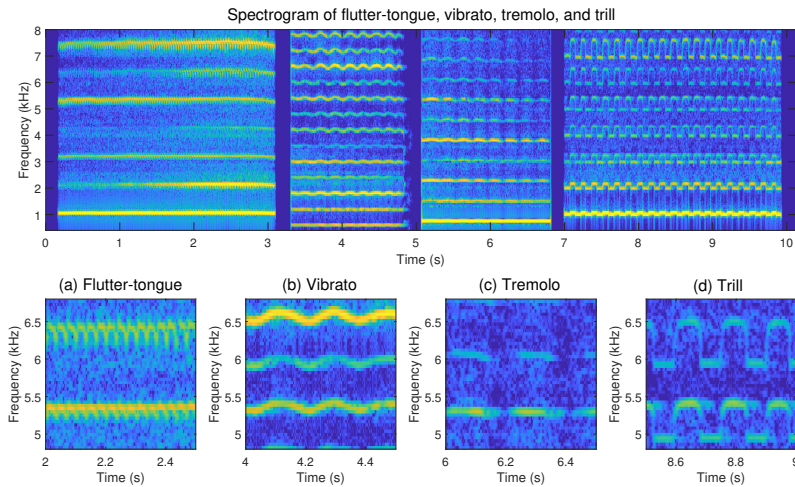


Figure 1. Spectrograms of periodic modulations.

follow the convention that each playing technique segment must contain at least three modulation units. The modulation unit refers to the basic unit pattern that repeats periodically within the modulation [2]. For overlapped playing techniques, each playing technique is annotated separately. Details of recording length and the total duration of all periodic modulations in each piece are shown in minutes in Table 1.

Type	Isolated	Performed			
	Total length	Piece	#	Modulation length	Total length
Flutter-tongue	4.9	<i>Morning</i>	3	4.0	16.0
Vibrato	7.3	<i>Busy Delivering Harvest</i>	7	6.4	28.0
Tremolo	/	<i>Jolly Meeting</i>	4	2.8	12.4
Trill	12.3	<i>Flying Partridge</i>	6	11.7	51.9

Table 1. Length of recordings and total duration of periodic modulations in each piece in the CBF-periDB.

Besides CBF-periDB, there are two other subsets in the CBFdataset: CBF-evolDB and CBF-extendDB, which cover other CBF playing techniques and a large number of full-length pieces. These subsets are being prepared for public release. We will continuously release all data in the CBFdataset as they become ready, to facilitate computational research on music playing techniques.

ACKNOWLEDGMENTS

CW is funded by the China Scholarship Council (CSC). EB is supported by a UK RAEng Research Fellowship (RF/128). EC is supported by the European Research Council (ERC) under the EU’s Horizon 2020 Research and Innovation programme (Grant agreement No.788960).

REFERENCES

- [1] V. Lostanlen, J. Andén, and M. Lagrange. Extended playing techniques: the next milestone in musical instrument recognition. In *5th International Conference on Digital Libraries for Musicology*, 2018.
- [2] C. Wang, E. Benetos, V. Lostanlen, and E. Chew. Adaptive Time–frequency Scattering for Periodic Modulation Recognition in Music Signals. In *ISMIR*, November 2019.
- [3] C. Wang, E. Benetos, X. Meng, and E. Chew. HMM-based glissando detection for recordings of Chinese bamboo flute. In *SMC*, May 2019.
- [4] J. Wilkins, P. Seetharaman, A. Wahl, and B. Pardo. Vocalset: A singing voice dataset. In *Proc. 19th Conf. Int. Society for Music Information Retrieval (ISMIR)*, pages 468–474, 2018.