

Timbral Similarity

MUSIC 254/CS 275B



Schemes of salient factors

Notated music

- Harmony
- Melody
- Rhythm

Performed/recorded music

- **Timbre**
- **Tempo**
- **Dynamics**

Timbral similarity

Recent research

- “Mood” and timbre
- “Genre” and timbre
- Listeners and timbre

Mood can be related to such coincidences as of dynamics and melodic direction

Affective (acoustic) similarity:

Fr. Pachet, J.-J. Aucouturier (Sony Labs, Paris)

- 2002 to present
- **CUIDADO**: tool for generating playlists
- Select passages from a wide variety of genres incl. classical, jazz, popular

Affective – performance-based

CUIDADO: Some results

Piano music:

- "Classical" and "Contemporary": *Rachmaninov - Lugansky - Moment Musical opus 16 no 2, Gyorgy Ligeti - Concerto for Piano and Orchestra.*
- "Classical" and "Jazz": *Schumann - Horowitz - Kreisleriana, Op 16-5 (sehr langsam) and Bill Evans - I loves you Porgy*

Orchestral textures:

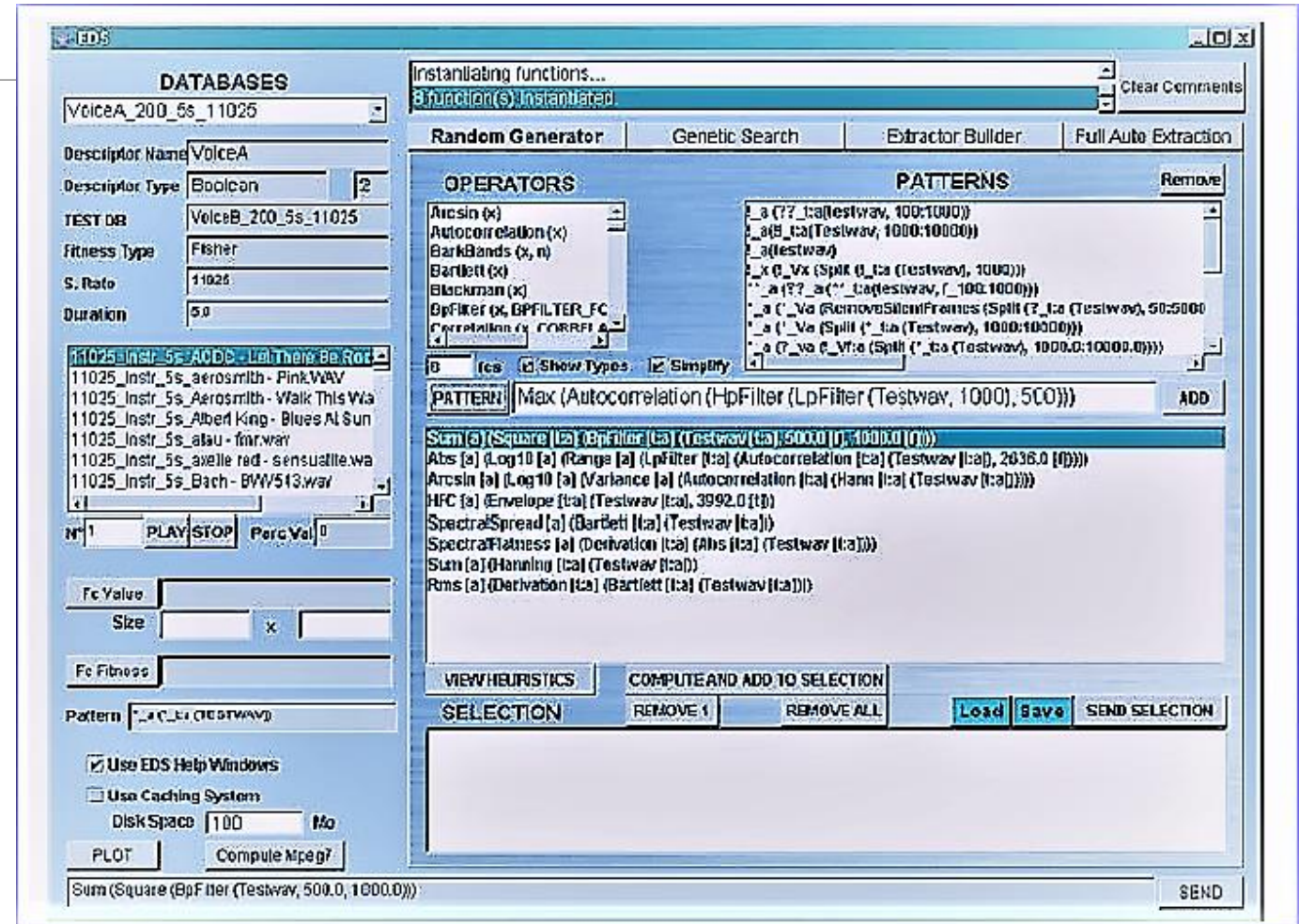
- "Jazz" and "Classical": *Orchestre Symphonique de Montreux - Porgy and Bess and Prokofiev - Celibidache - Symphonie no 5-1 opus 100.*
- "Classical" and "Pop": *Beethoven - Romanze fur Violine und Orchester Nr. 2 F-dur op.50 and Beatles - Eleanor Rigby*
- "Classical" and "Musicals": *Beethoven - Romanze fur Violine und Orchester Nr. 2 F-dur op.50 and Gene Kelly – Singin' in the rain*

CUIDADO: Components

- *Editorial tool*: artist, genre, language, voice types, instrument IDs
- *Quasi-linguistic associations* between artists (12,000+) and groups
- *Acoustical features* incl. variance of amplitude, spectral frequencies
- *Aim*: describe music titles by “global timbral quality” modeled on MFCCs (mel cepstrum co-efficients)
- *Segregate solos from groups*

CUIDADO Database

User interface



CUIDADO “predicates”

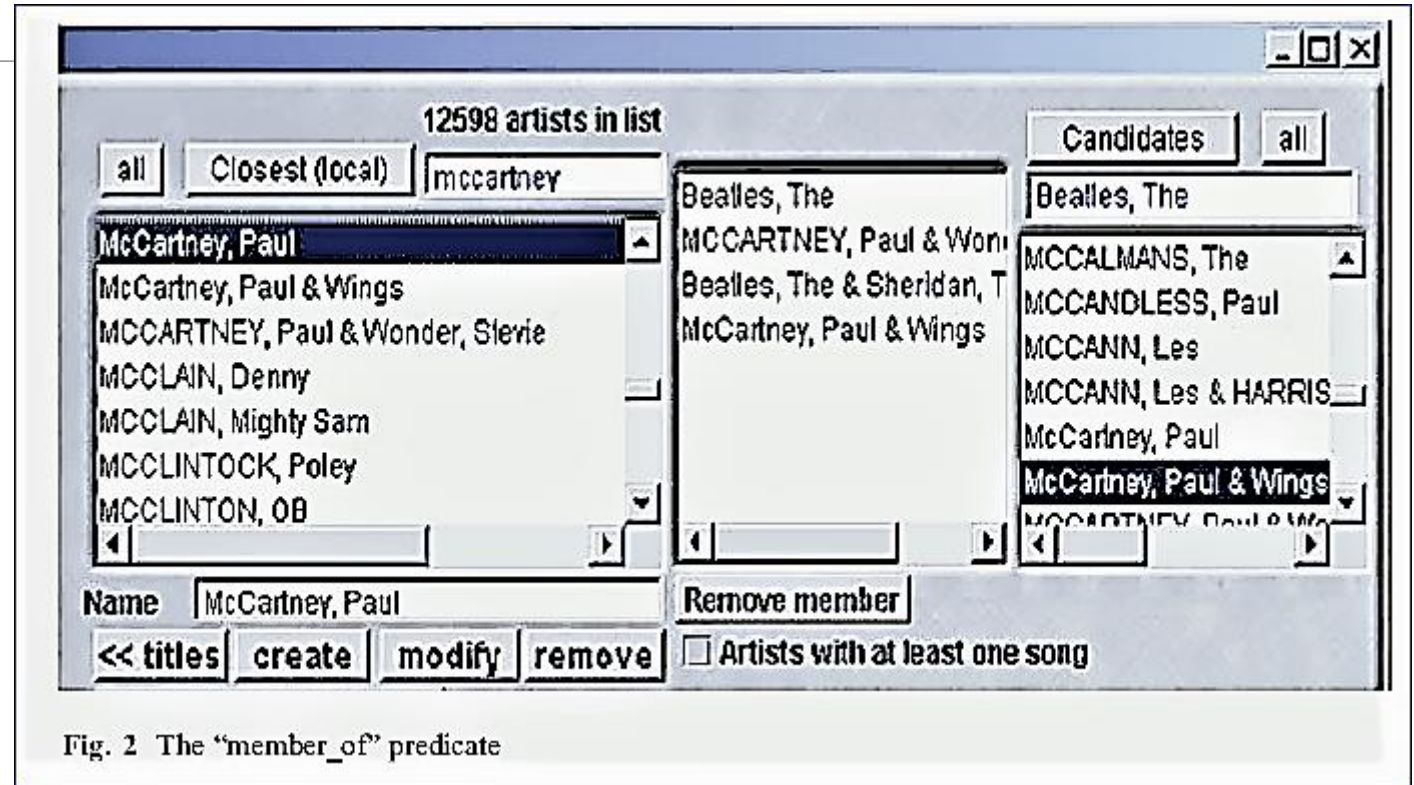


Fig. 2 The “member_of” predicate

General framework for extraction

- Stereotype avoidance (e.g. artist and interests)
- Want precision in extracted samples
- Features sought:
 - Perceptual energy
 - Separation of studio vs live recordings
 - Harmonicity
 - Percussivity

CUIDADO browser

Method:

- **System finds co-occurrences** and compiles lists
- User picks an example, **software finds “songs that sound the same”**
- Cultural similarity (passages in similar contexts)
- Web crawler looks for additional matches
- Recent frontier: *comparing diverse kinds of similarity*

CUIDADO “Similarity” Panel

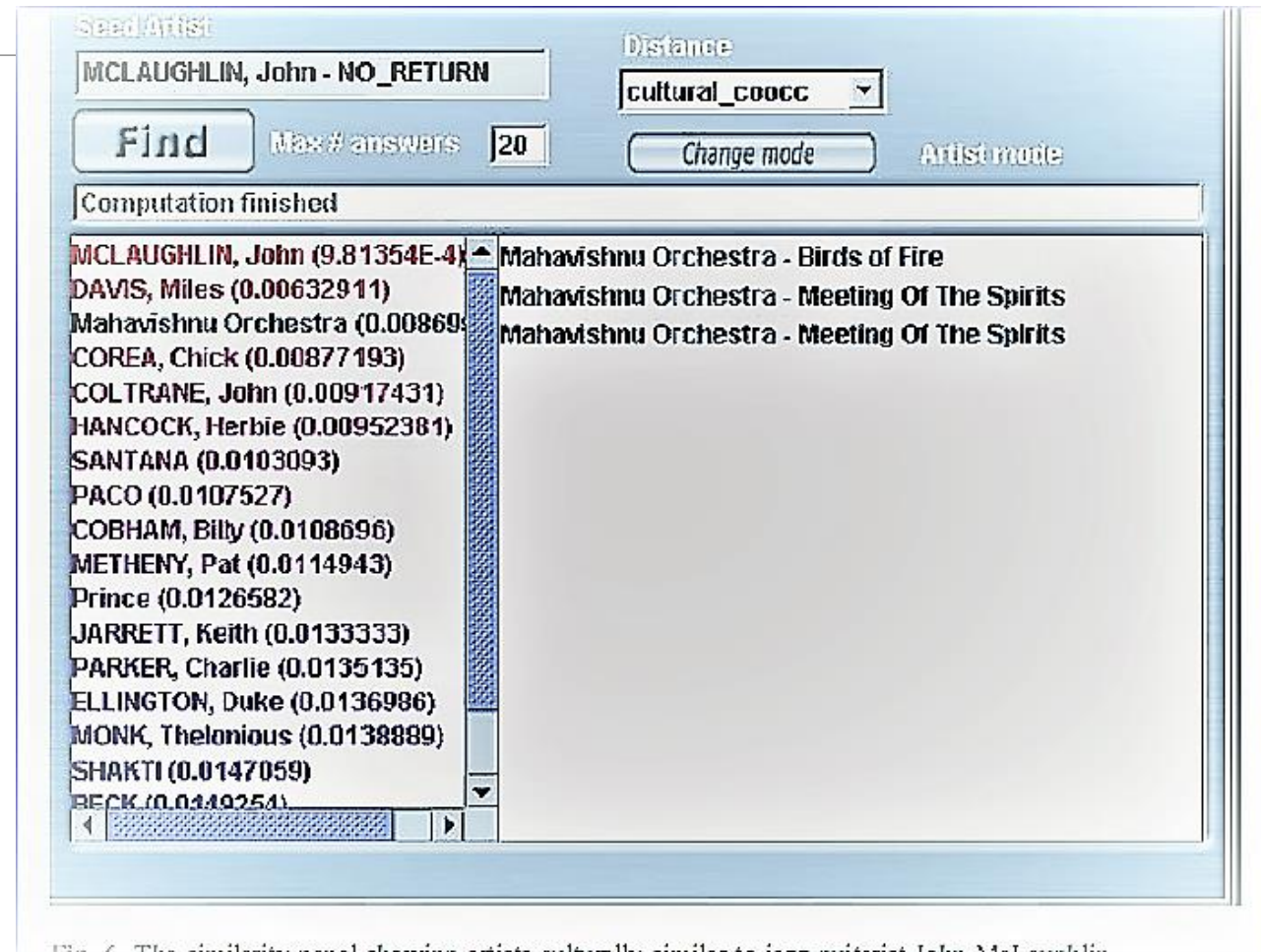


Fig. 6. The similarity panel showing artists culturally similar to jazz guitarist John McLaughlin.

CUIDADO: Overview of Music Browser

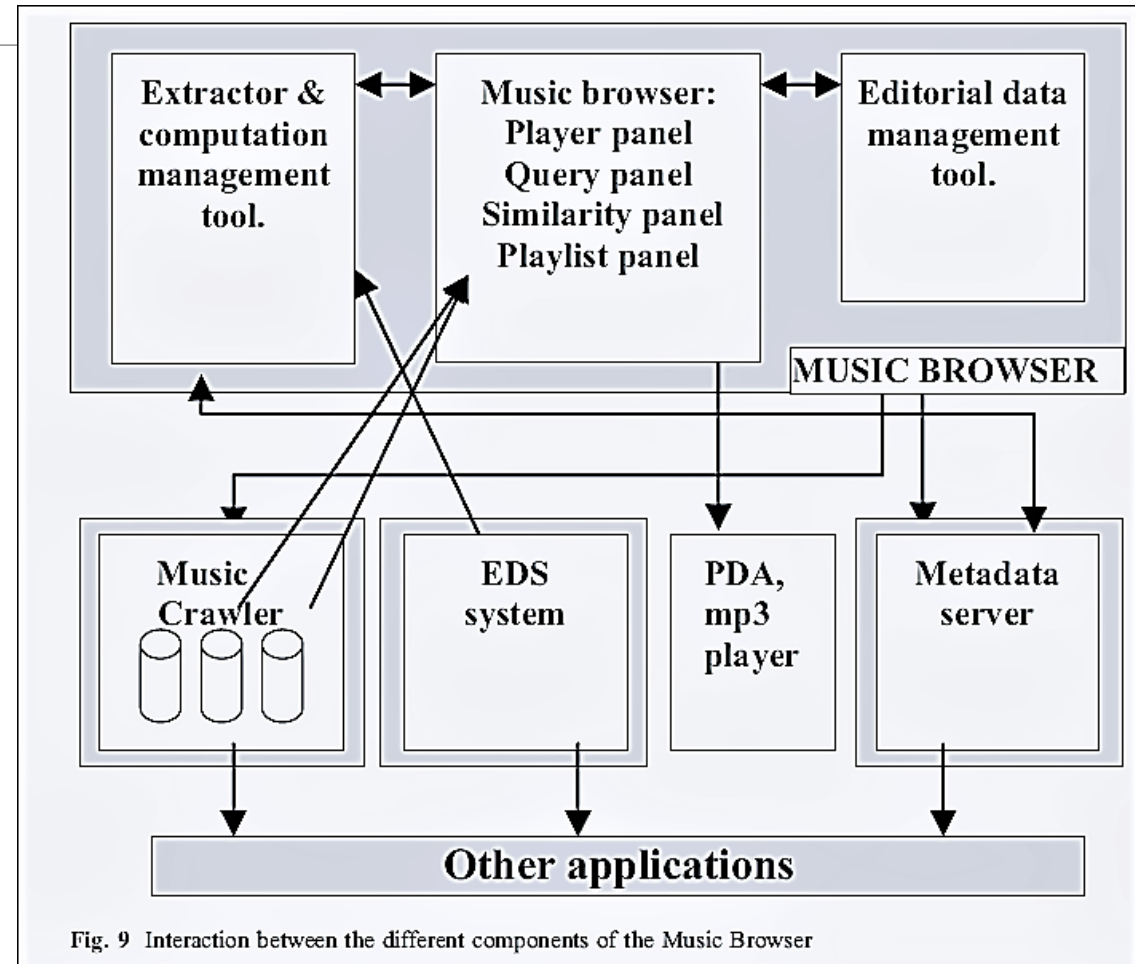


Fig. 9 Interaction between the different components of the Music Browser

Other **striking research** on timbral similarity

1. PERRITT AND GJERDINGEN (1999--)

- **Genre identification** via radio by 17-year-olds
- 10 genres, popular music
- Aim: establish shortest interval to identify preferred genre

2. DANIEL LEVITIN (c 1996)

- Listeners and **pitch entrainment**
- Listeners and **tempo entrainment**