Embodiment in Musical Learning and Development: a guide to discovery

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Outline

1. Introduction

Embracing Complexity / Embodiment as '4Es'

2. Empirical Work

a) Audiovisual synchrony

b) Peer-to-peer learning

c) Teachers' views

d) "Meet4Music"

3. Conclusion

Future directions / open questions

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1. Introduction

Embracing Complexity / Embodiment as '4Es'

2. Empirical Work

a) Audiovisual synchrony - Embodied

b) Peer-to-peer learning - Embedded

c) Teachers' views - Extended

d) "Meet4Music" - Enactive

3. Conclusion

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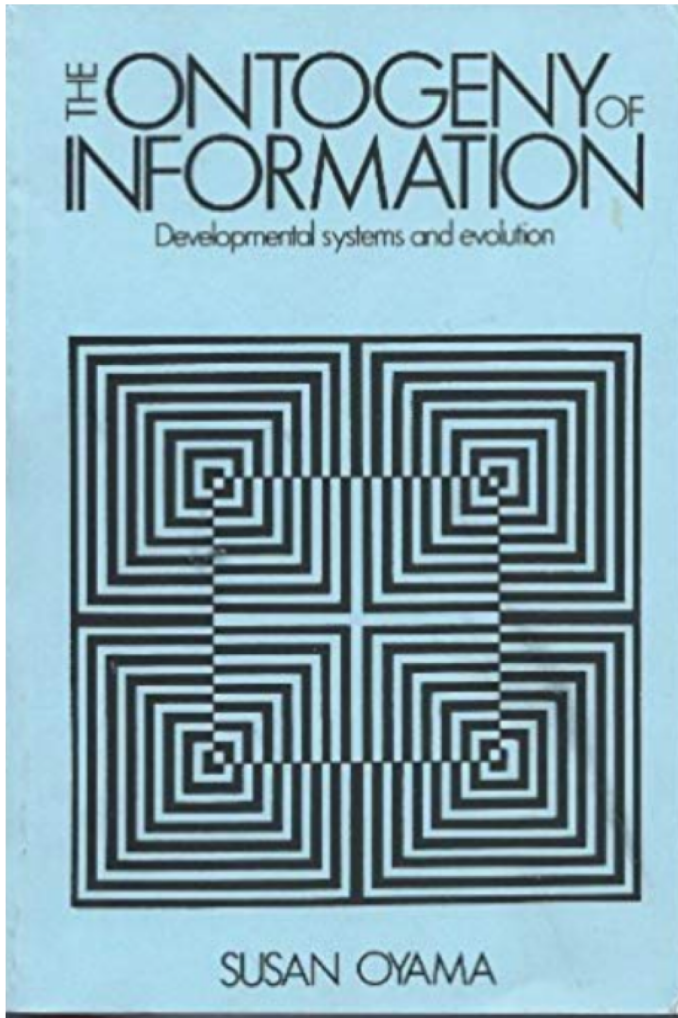
Intro – embracing complexity

Organisms   Environment

Minds   World

Intro – embracing complexity

THE ONTOGENY OF INFORMATION
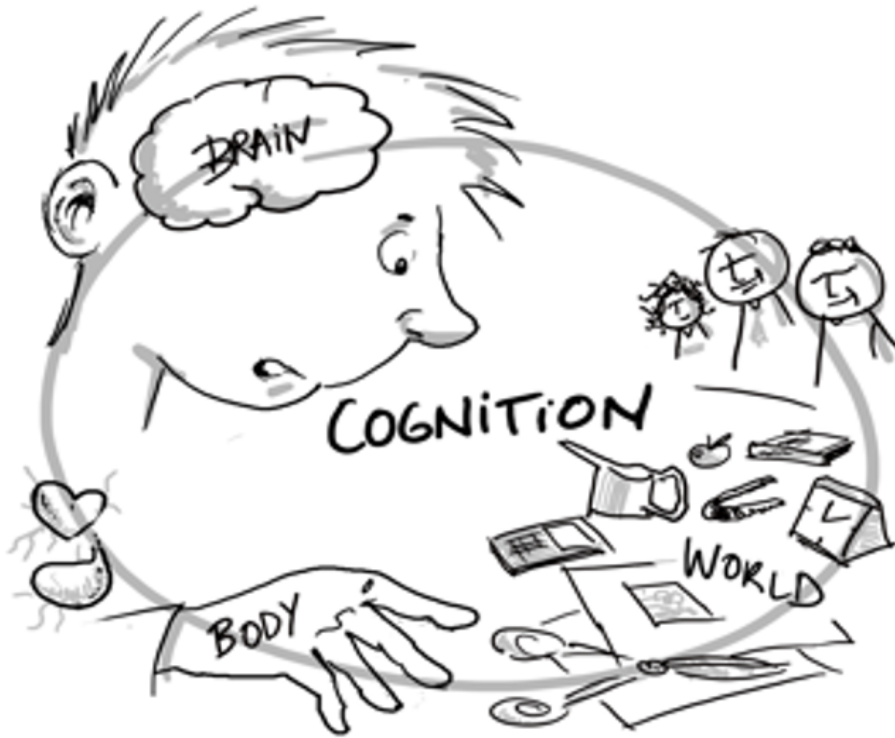Developmental systems and evolution

SUSAN OYAMA

- Co-dependencies of **organisms** and their associated ecological **niches**
- Mutuality of **developmental** and **evolutionary** processes.

Embodiment as "4E" Cognition

Embodied
Embedded
Extended
Enactive.

(pic from Van Dijk, 2013)

Intro - 4Es

- **Embodied**

Cognition is based on the brain-body system, conceived of as a functional unity, and is not reducible to processes 'in the head'. (Gallagher, 2005; Thompson, 2007).

Research Article

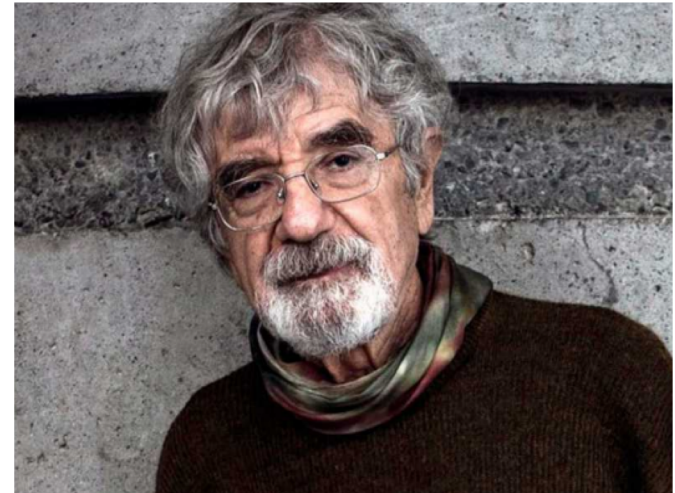### THE ROLE OF EFFORT IN PERCEIVING DISTANCE

Dennis R. Proffitt, Jeanine Stefanucci, Tom Banton, and William Epstein

University of Virginia

Intro - 4Es

- **Embedded**

Cognition arises from and helps develop our social, cultural and physical interactions with the environment. It does not happen in a vacuum.

"living systems are units of interactions; they exist in an ambience. From a purely biological point of view they cannot be understood independently of that part of the ambience with which they interact: the niche; nor can the niche be defined independently of the living system that specifies it" (Maturana, 1970, p. 5).
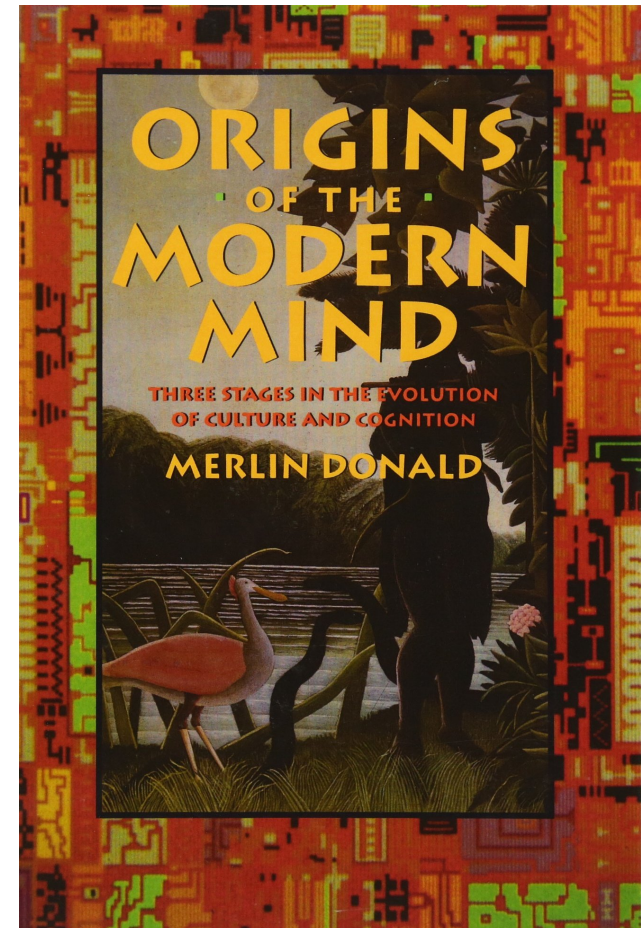
Intro - 4Es

- **Extended**

Material and symbolic tools not only offer adequate scaffolding to cognition: if functionally coupled to the organism, they can co-constitute cognitive processes - e.g., biological memory and external memory.
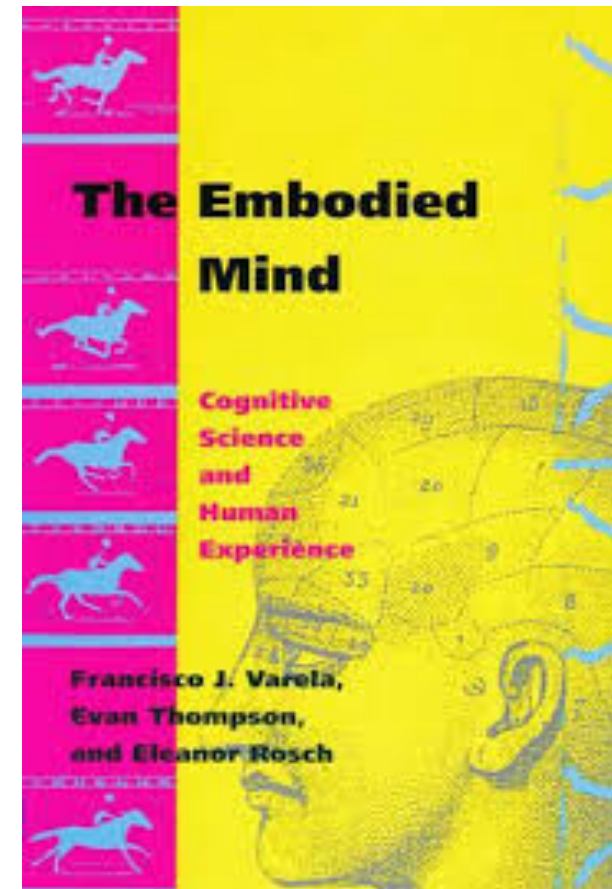
(see Clark & Chalmers, 1997)

ORIGINS OF THE MODERN MIND

THREE STAGES IN THE EVOLUTION OF CULTURE AND COGNITION

MERLIN DONALD

Intro - 4Es

- **Enactive**

Organisms create their own experience through action rather than through representational recovery.

(Gallagher, 2017; Thompson, 2007; Varela et al., 1991)

Intro - 4Es

- **Enactive**

Depending on their biological complexity, autonomous organisms establish meaningful relationships ('sense-making') with the environment that are relevant to their well-being. (Colombetti, 2013; De Jaegher & DI Paolo, 2007)

- Music is one of the many possible relationships -

(Clarke, 2005; Reybrouck; 2007; Schiavio et al., 2017; 2018; 2019)

Intro - 4Es

"Music has been widely […] accepted as a matter of cognitive understanding, or special intelligence, instead of flesh-and-blood experience"

Westerlund, H. & Juntunen, M.-L. (2005). Music and Knowledge in Bodily Experience. In D. Elliott (ed.) *Praxial Music Education: reflections and dialogues*. New York: Oxford University Press, (pp. 112-122)

Intro - 4Es

Can Embodied Cognitive Science, in its 4E dimensions, help us better understand the musical mind?

- Acquisition of musical skills -

Embodiment in Music

1) Does <u>action</u> shape our capacity to acquire novel musical skills?
(*Embodied*)

2) What kind of <u>interactions</u> facilitate musical learning?
(*Embedded*)

3) Can teaching or learning roles be <u>distributed</u> among peers?
(*Extended*)

4) What is the relationship between <u>individuality and collectivity</u>?
(*Enactive*)

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Audiovisual Synchrony

PLOS | ONE

Active Drumming Experience Increases Infants' Sensitivity to Audiovisual Synchrony during Observed Drumming Actions

Sarah A. Gerson[1,2,☯]*, Andrea Schiavio[3☯], Renee Timmers[3], Sabine Hunnius[2]

1 University of St Andrews, School of Psychology & Neuroscience, St Andrews, United Kingdom, 2 Donders Institute for Brain, Cognition, and Behaviour, Center for Cognition, Radboud University, Nijmegen, The Netherlands, 3 Music Mind Machine in Sheffield, Department of Music, The University of Sheffield, Sheffield, United Kingdom
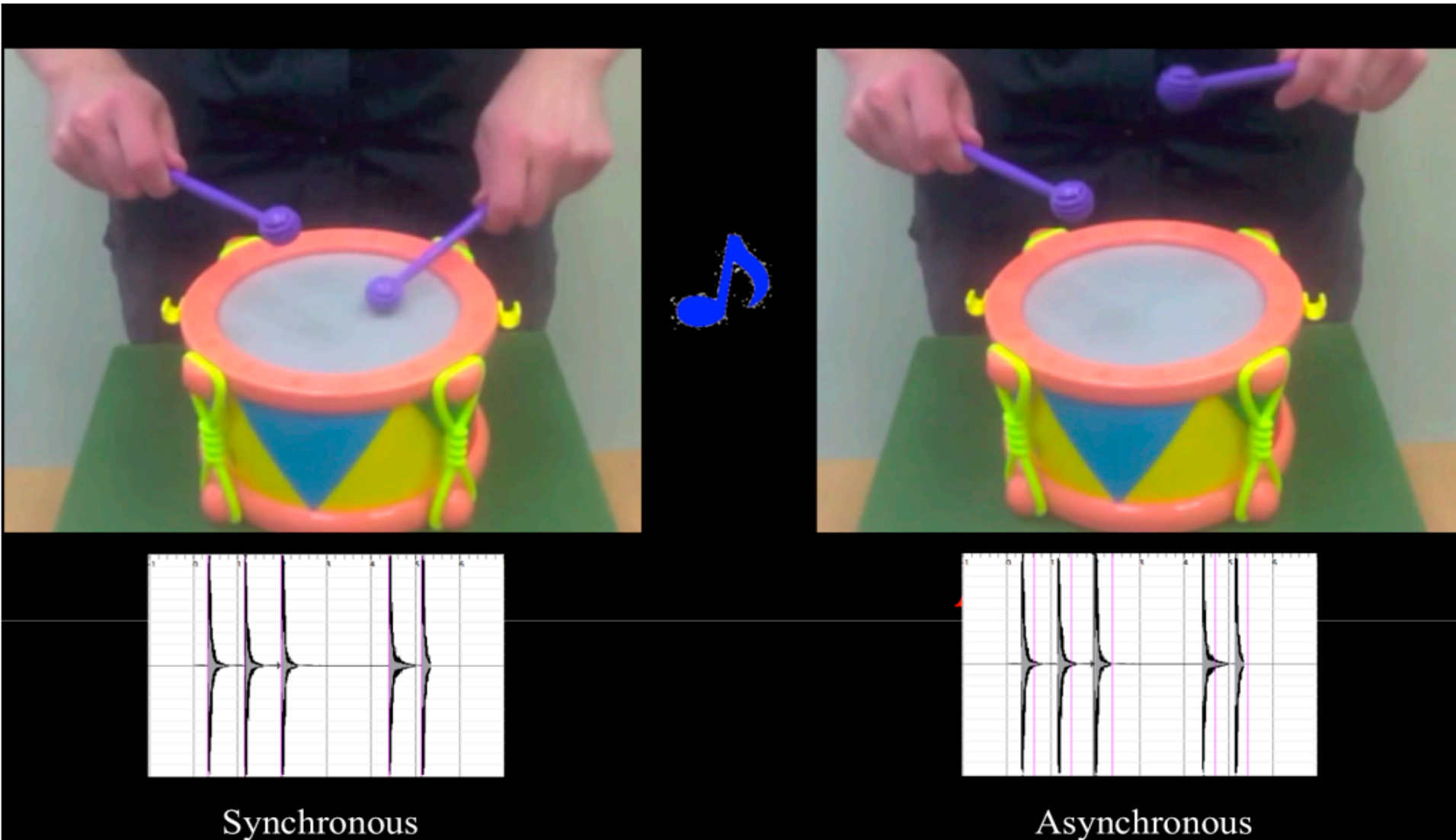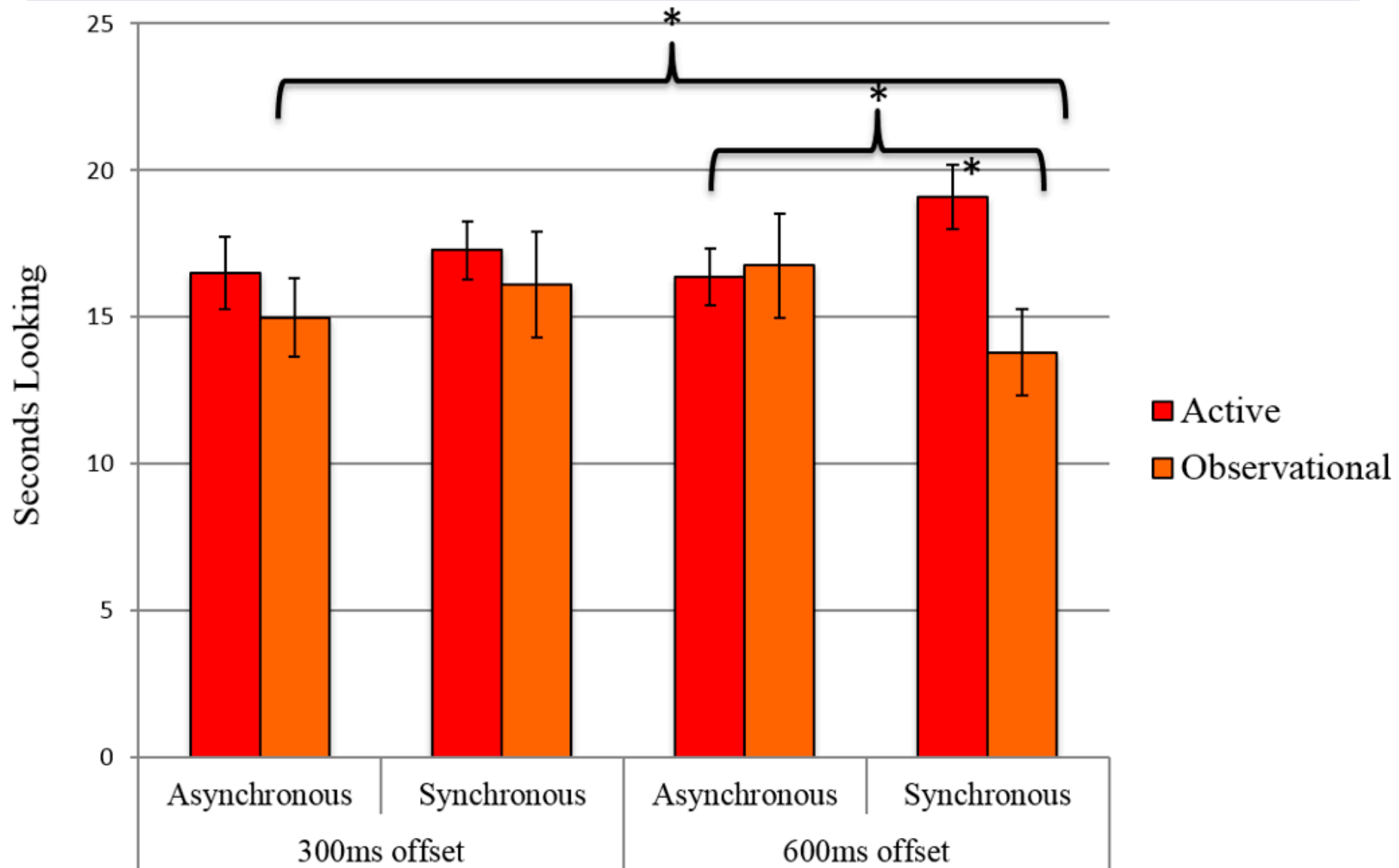
Audiovisual Synchrony

Active Training
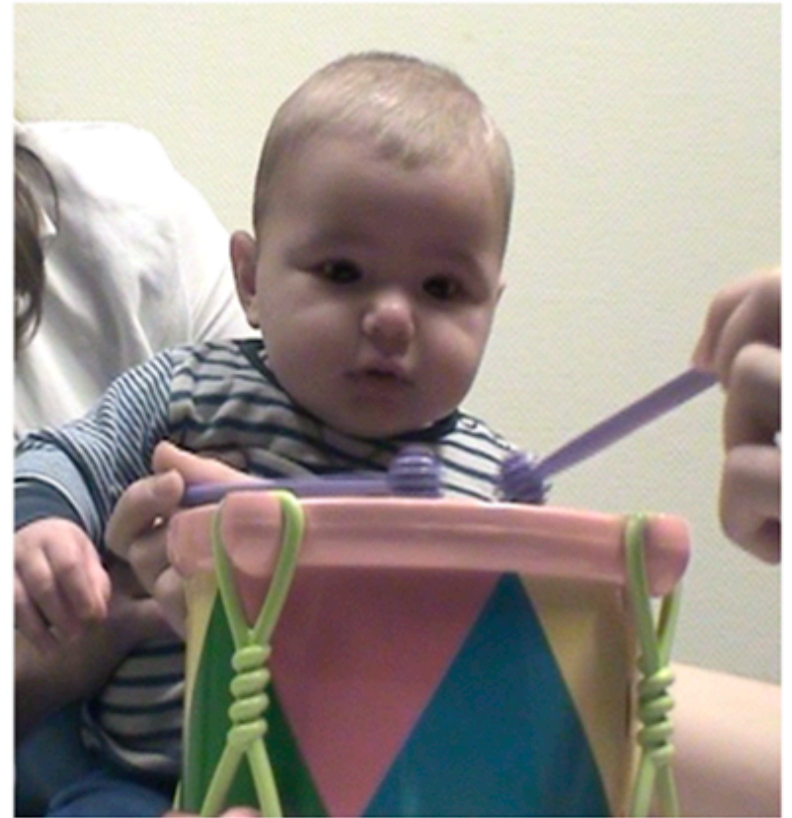
Observational Training

Audiovisual Synchrony

Synchronous   Asynchronous

Audiovisual Synchrony

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1) Key role of active experience for early musical development
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Peer-to-Peer Learning

Schiavio, A., Stupacher, J., Parncutt, R. & Timmers, R. (under review).
Learning music from each other. Synchronization, turn-taking, or imitation?

Aims:

- Assessing 3 learning modalities (synch; turn-taking; imitation)
- Comparing individual and collective learning in non-musicians

Peer-to-Peer Learning

Participants:

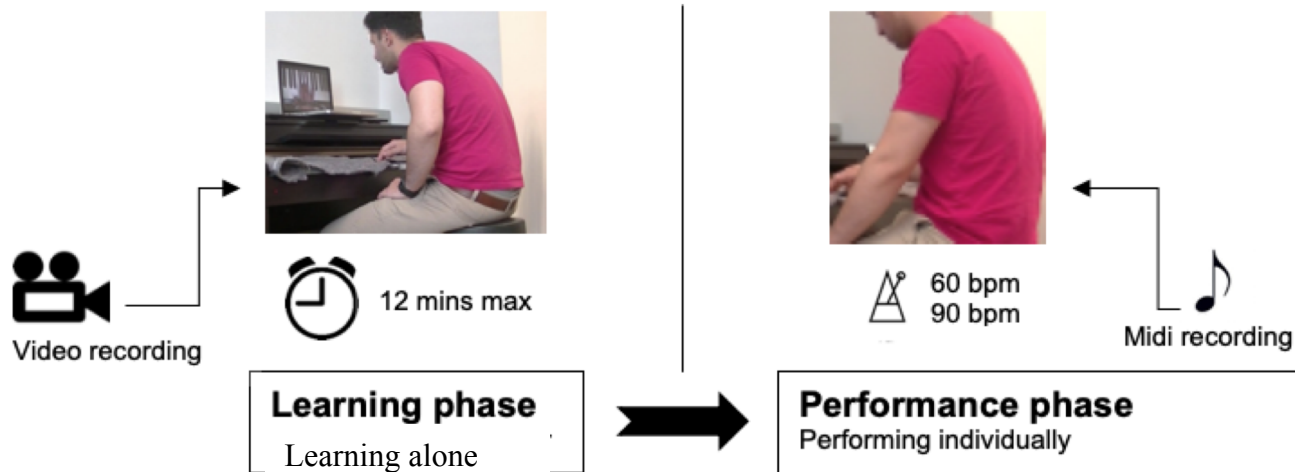- 54 subjects: 18 individuals vs 18 dyads (mean age 23,1 years old)
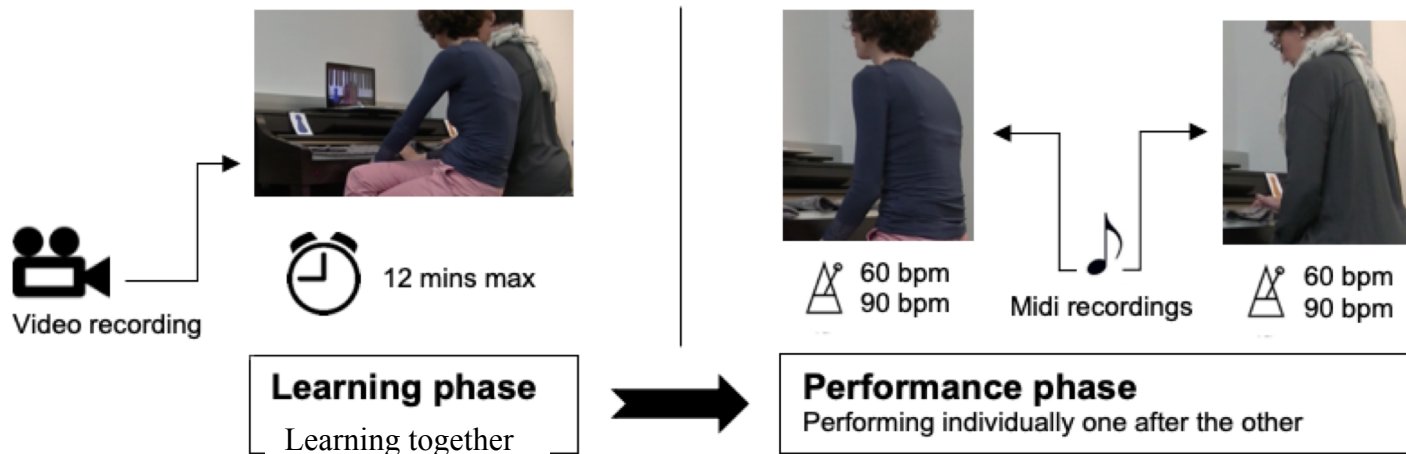
Stimuli:

- 3 melodies with different features

Procedure:

- Learning phase (solo o duo; different melody and learning condition)

- Performance phase (temporal and pitch accuracy)

- 3 times

Solo group

Video recording → Learning phase (Learning alone) — 12 mins max → Performance phase (Performing individually) — 60 bpm / 90 bpm — Midi recording

Duo group

Video recording → Learning phase (Learning together) — 12 mins max → Performance phase (Performing individually one after the other) — 60 bpm / 90 bpm — Midi recordings — 60 bpm / 90 bpm
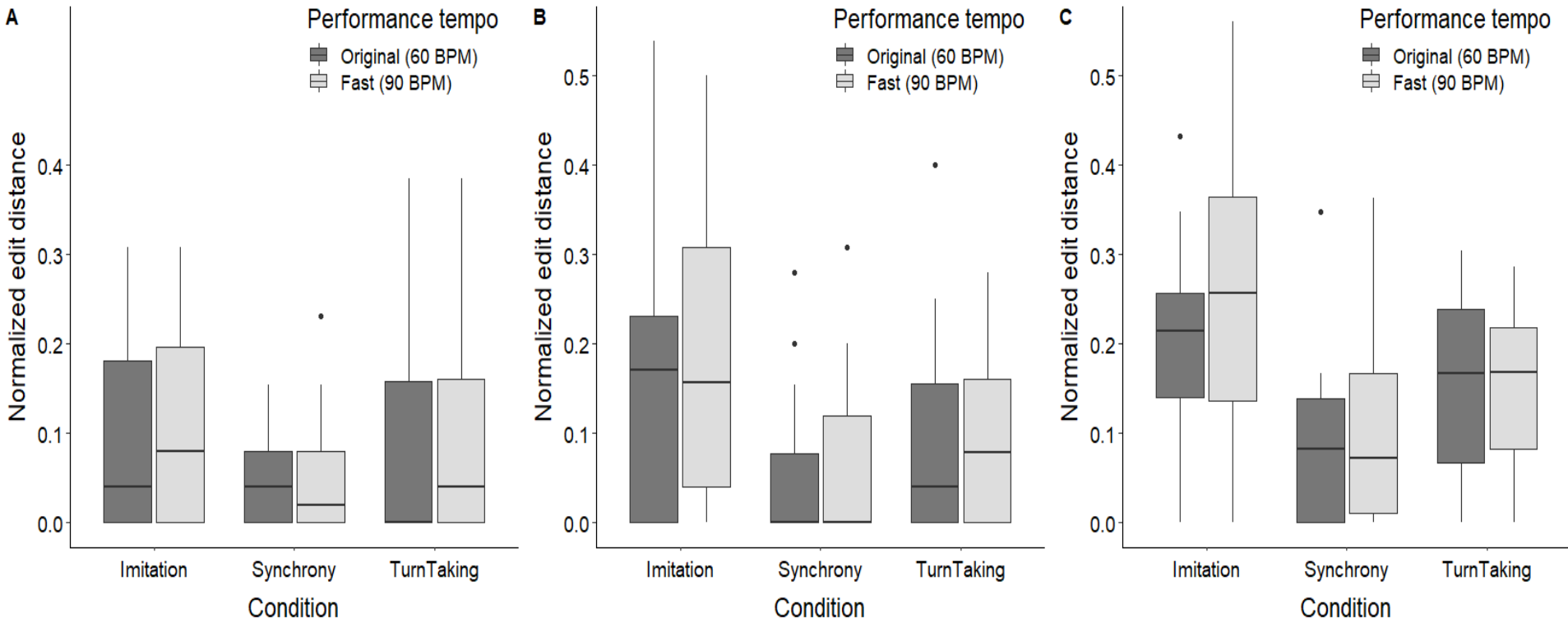
Peer-to-Peer Learning

Example of learning video (turn-taking)

Melody B

Peer-to-Peer Learning

Pitch similarity as the normalized edit distance between two vectors including MIDI pitch values.

A) **Solo group**: Normalized edit distances between performances and original stimulus;
B) **Duo group**: Normalized edit distances between performances and original stimulus;
C) **Duo group**: Normalized edit distances between the two performances.

Peer-to-Peer Learning
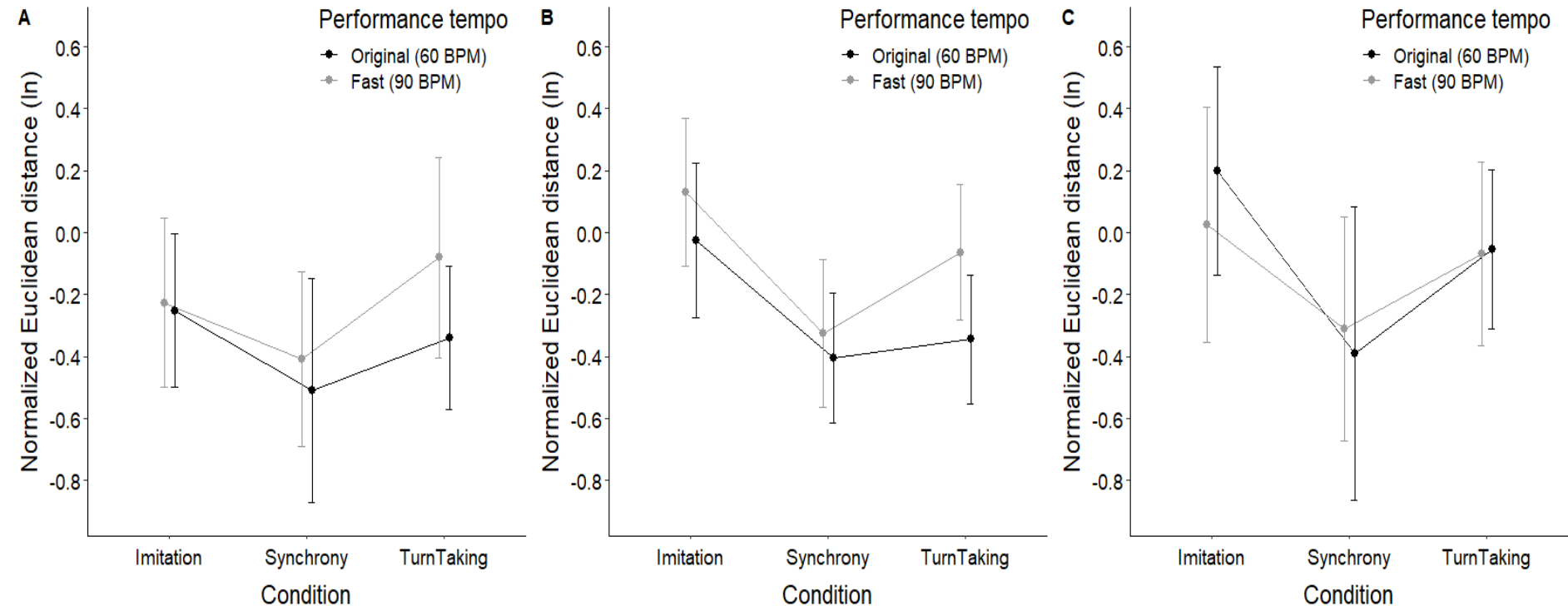
Temporal similarity as the normalized Euclidean distance between two time series.

A) **Solo group**: ln-transf. sum of Euclidean distances between performances and the original stimulus;
B) **Duo group**: ln-transf. sum of Euclidean distances between performances and original stimulus;
C) **Duo group**: ln-transf. sum of Euclidean distances between the two performances.

Peer-to-Peer Learning

- **pitch and temporal cues** of the newly learned musical excerpts were **more accurate** when participants engaged in **synchronous learning and turn-taking**, over imitation.

- No significant difference between the solo and duo groups

- Novices can maximize their learning in both individual and collective settings when they *actively participate* in the generation of musical material.

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(*Enactive*)

Embodiment in Music

1) Key role of active experience for early musical development (*Embodied*)

2) Interaction based on mutual participation and responsibility (*Embedded*)

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Teachers' views

A matter of presence: A qualitative study on teaching individual and collective music classes

Andrea Schiavio iD
University of Graz, Austria
University of Sheffield, UK

Michele Biasutti
University of Padua, Italy

Dylan van der Schyff
University of Oxford, UK

Richard Parncutt iD
University of Graz, Austria

Teachers' views

Participants

11 expert music teachers. Piano (n = 6), guitar (n = 2), drums (n = 1), flute (n = 1), violin (n = 1), in the contexts of classical music (n = 8), jazz (n = 2) and improvisation (n = 1).

Questionnaire

A) initial general part (demography and musical background)
B) 18 open-ended questions
    B1) 1-11 → themes associated to <u>individual tuition</u>
    B2) 12-18 → both <u>collective tuition</u> and their differences from
             individual ones

Teachers' views

Examples of open-ended questions

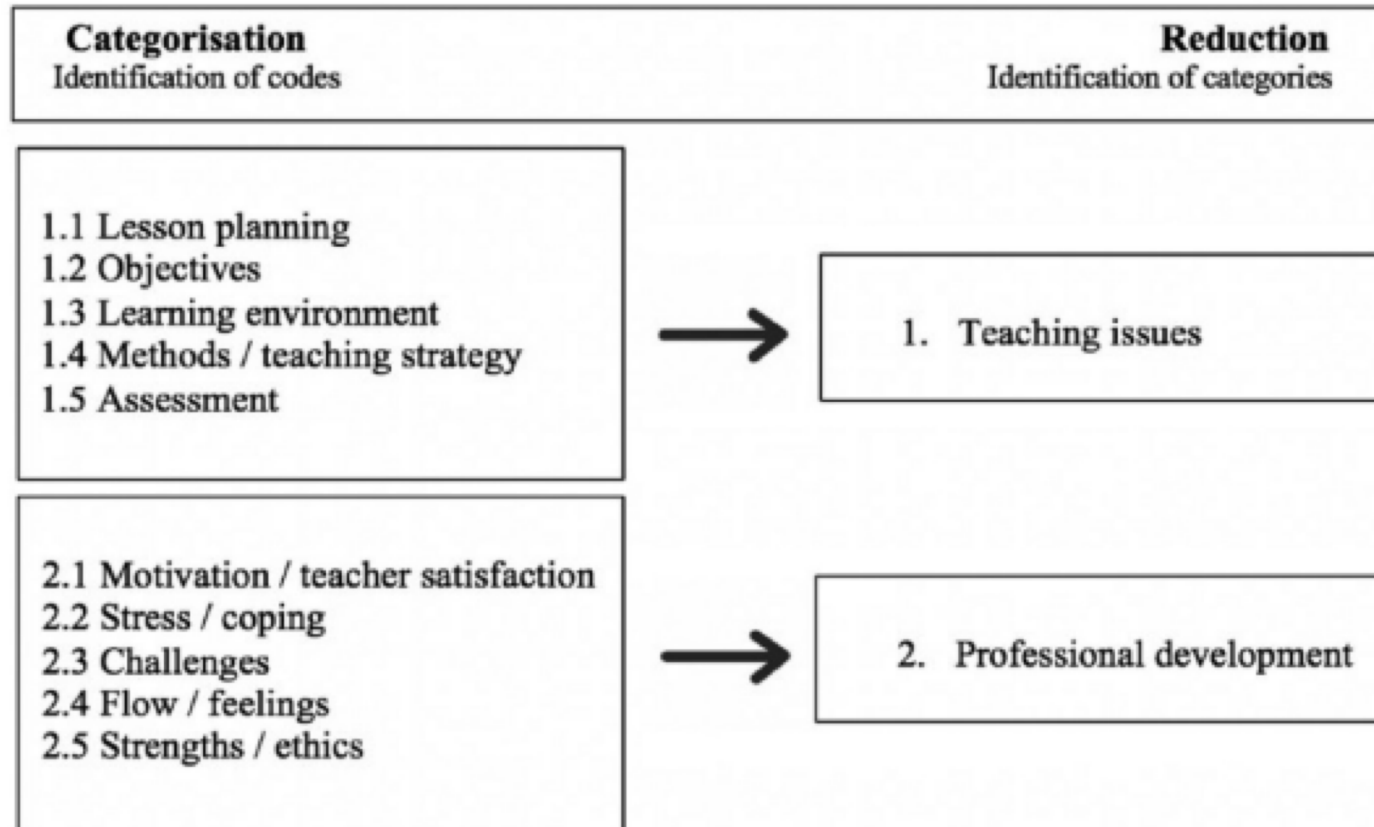"What are the aspects that you like the most in group music lessons (ensemble or other practice-based classes)?"

"What are the main differences between individual and collective lessons?"

"Which aspects of the learning/teaching process would you like to improve?"

Teachers' views

Data Analysis

Grounded Theory: codes and categories extracted from the data

Categorisation	Reduction
Identification of codes	Identification of categories

1.1 Lesson planning
1.2 Objectives
1.3 Learning environment
1.4 Methods / teaching strategy
1.5 Assessment

→ 1. Teaching issues

2.1 Motivation / teacher satisfaction
2.2 Stress / coping
2.3 Challenges
2.4 Flow / feelings
2.5 Strengths / ethics

→ 2. Professional development

Teachers' views

Results

"presence"

Individual tuition: 'I tend to want to control the trajectory of lessons, perhaps more than I should. I don't know if this would be better in terms of musical learning, but it is an ethical ideal that I believe in'

Collective tuition: '[a teacher's satisfaction lies in] the fact that it can trigger a healthy competition between participants. Dealing with different levels it is also a joy whether a skilled student may be encouraged to take a "teaching" role for his/her fellows'.

Teachers' views

Results

"presence"

'There is a certain energy that comes from working and learning in a group. I think **students learn a lot from each other as well as from the instructor.** There are kinds of music that can only be realized through team effort. […] I find goals achieved through ensemble work much more satisfying than goals achieved through individual effort alone.'

'Students **have to take more responsibility for the role they play in the group** and the effects their actions or inaction may have on the collective.'

Teachers' views

Extended Teaching?

- In one-to-one contexts, the roles of 'teacher' and 'learner' tend to be more **prescribed**, and if not approached carefully this can result in an overly self-conscious and stressful environment for both participants

- Conversely, in collective situations certain pedagogical dynamics tend to be **functionally distributed** across the entire group.

Teachers' views

- Students in collective settings are often seen taking new roles that may serve a similar function to those of **teachers** – where the latter, because of this, may tend to '**step back**' and be less directly involved in the unfolding learning dynamics

- **Students complement existing teaching goals** (often brought forth by the teacher), allowing novel strategies to be formed and developed within the learning context.

Teaching becomes an *extended process* where goals and responsibilities are negotiated in real time

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3) Teachers can 'step back', offload their teaching role to students
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Negotiating individuality and collectivity in community music. A qualitative case study

Andrea Schiavio[1,2], Dylan van der Schyff[3], Andrea Gande[4] and Silke Kruse-Weber[4]

M4M

- Low-treshold **community based** project.

- Organized in weekly sessions with **alternating artistic activities** for everyone – **minorities and refugees** in particular.

- **Four facilitators,** each with a distinctive background and approach help attendees in their 'guided' improvisations.

- **Qualitative study** with facilitators as participants

(see also Gande & Kruse-Weber, 2017)

M4M

Semi-structured interviews with facilitators

- How do facilitators engage with participants from diverse backgrounds?

- What strategies do they use to provide equal access to music-making, considering the differences in expertise, social skills, age, and culture of the participants?

- What understandings of collectivity and individuality are developed within M4M as a process?

M4M

Collaboration
Non-verbal Communication
Sense of Togetherness

M4M

- According to enactive theorists, living systems develop a concerned perspective about their niche; they form an "identity."

- Importantly, this identity cannot be understood as separate from the organism's biological complexity, nor as isolated from the environment that sustains it.

- Organism and environment, self and other, become co-arising aspects of the same extended system.

- Being "autonomous" and "in-interaction" with the environment is an important feature of M4M, which allows participants to develop and share their musical identity in creative ways
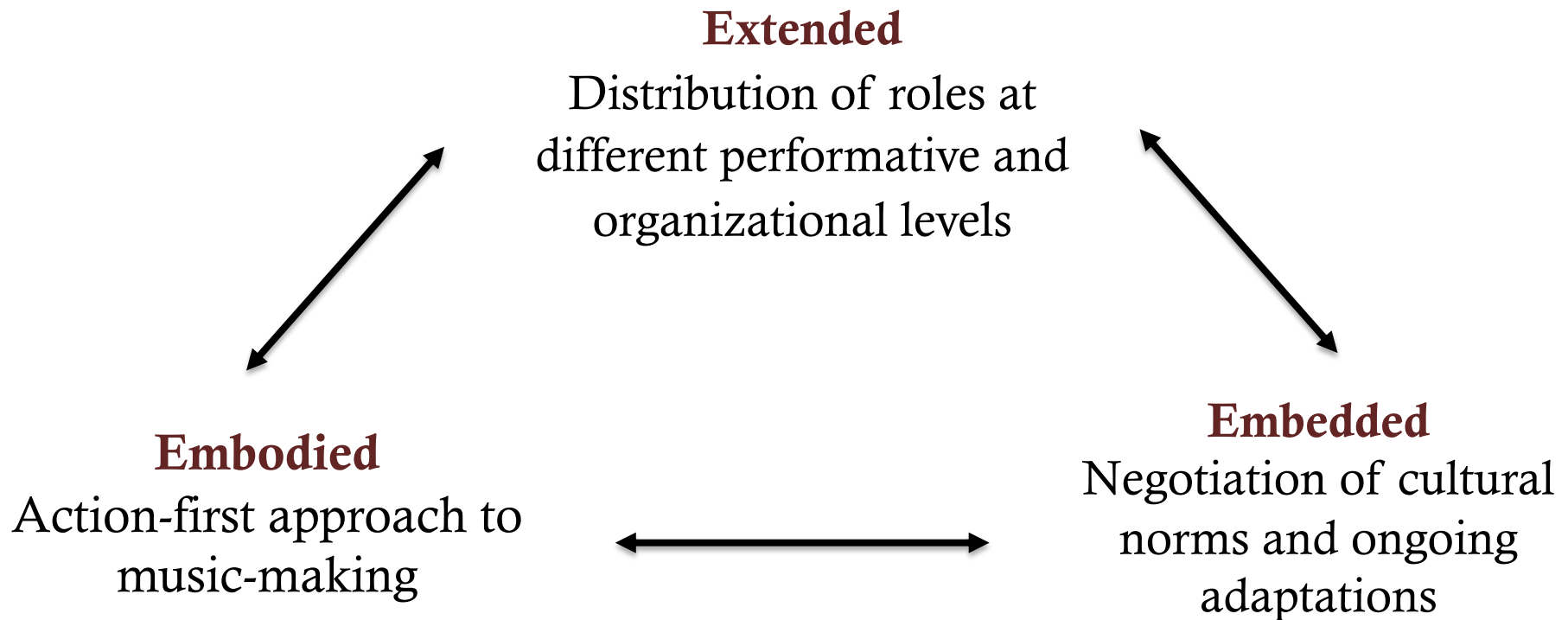
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3) Teachers can 'step back', offload their teaching role to students
(*Extended*)

4) Mutual interplay transforms individual & collective perspective
(*Enactive*)

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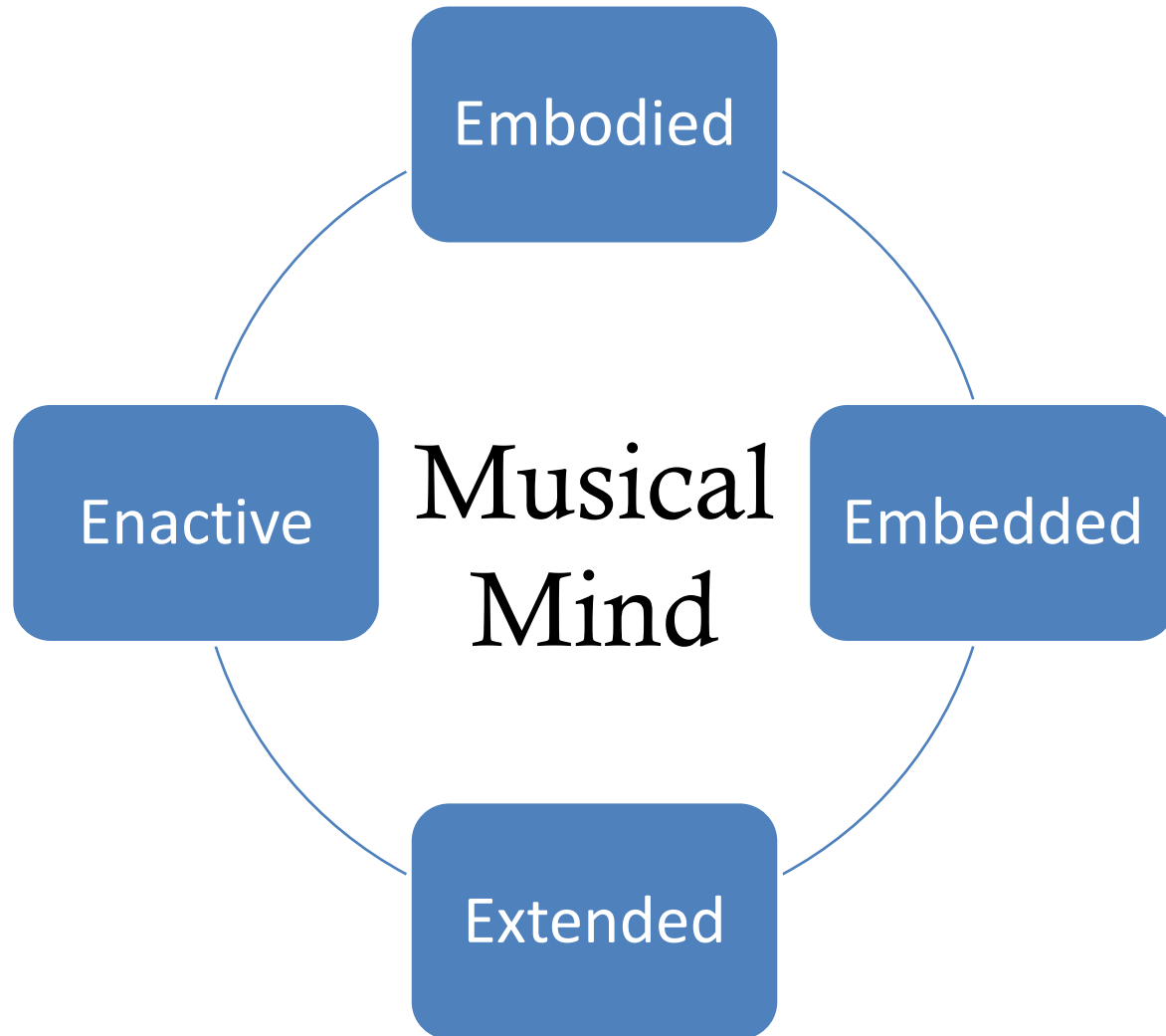
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Embodiment in musical learning

- **Decentralisation of learning** from the head - the emphasis is on the body and its power of action

- Social and material **environment participate in constituting musical experience**

- **Musicking as 'responsible' exploration** of the socio-material environment; of ourselves

Conclusion

Challenges for music education

- to consider the '**body-in-action**' as constitutive of musical experience since early infancy (*doing-first philosophy*).

- to allow students to freely express their own **culture** and musical background (*fostering active engagements*)

- to encourage meaningful musical **interactions** with others (*creative use of ensemble and technologies*)

- to let students take more responsibility for their own **learning** and flourish as musical beings (*new pedagogical settings*).

Conclusion

Upcoming Book (monograph)

van der Schyff, D., Schiavio, A. & Elliott, D.
Musical Bodies, Musical Minds. Enactive Cognition and the Meaning of Human Musicality.
MIT Press (forthcoming)

Thanks!

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