

THE SOUND OF TEACHING MUSIC

Didactics and Joint Action in Music Acquisition



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Comprehensive examination 2018

Cultural transmission

- Social learning (Tomasello et al., 1993; Whiten, 2017)
- From generic knowledge to expertise
 - Stone knapping (Stout, 2011)
 - Music (Honing et al., 2015)
- Expressive techniques
 - Intensive practice
 - Experts' support



Overview

Music Expertise Acquisition

- Didactics
 - Study 1-3
- Joint action
 - Study 4-5

Didactics



- Didactic behaviour by experts
 - Infant-directed speech and motion (Fernald, 1985; Brand et al., 2002)
- Experts' sound modulation
 - Exaggerated actions (McEllin et al., 2017)
 - Prosodic cues (Kuhn, 2004)
- Cognitive effects
 - Attentional biases (Fernald, 1985; Brand & Shallcross, 2008)
 - Memory (Yoon et al., 2008)
 - Overimitation (Legare & Nielsen, 2015)

Methods

and Predictions

- Study 1 (+ 2 & 3)
 - Experts' sound modulation
 - Detection & Memory
 - Reproduction of musical expression
- Study 4 & 5
 - Turn-taking
 - Playing in synchrony

Study 1: Experts' sound modulation

Participants: Expert pianists

Condition: Didactic vs. Non-didactic (within-subjects)

Stimuli: Articulation / Tempo change

The image shows two rows of musical notation. The top row illustrates four techniques: Legato (a smooth curve under the notes), Staccato (notes with short vertical dashes), Accelerando (a dashed line above the notes curving upwards), and Ritardando (a dashed line above the notes curving downwards). The bottom row provides audio visualizations for each: Legato has a continuous sound icon, Staccato has a short burst sound icon, Accelerando has a sound icon with an upward arrow, and Ritardando has a sound icon with a downward arrow.

Legato

Staccato

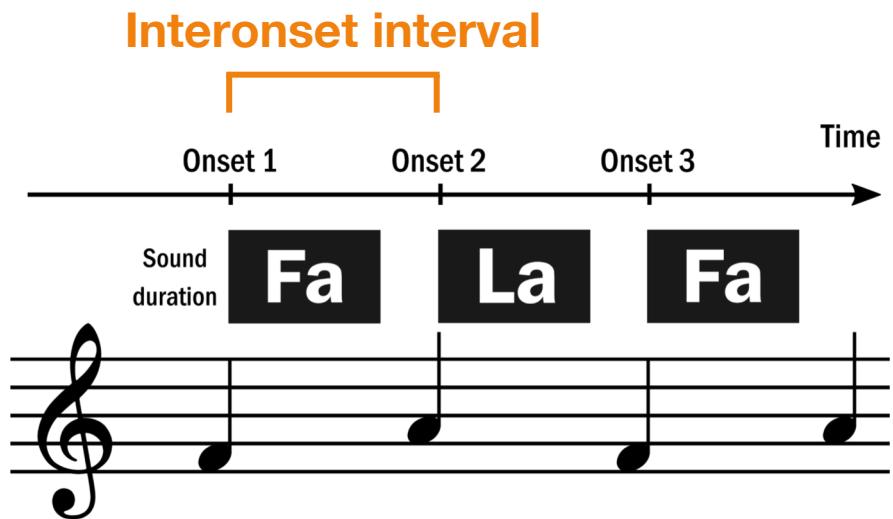
Accelerando

Ritardando

Measurement: Interonset interval, Articulation, Tone intensity

Measuring musical expressions

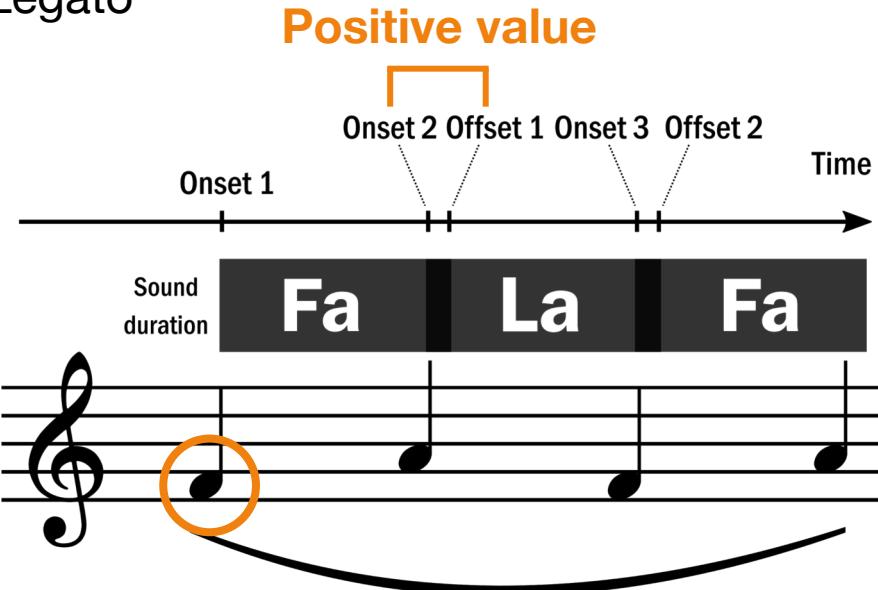
- Interonset interval (IOI)
 - Accelerando (Speed up)
 - Ritardando (Slow down)



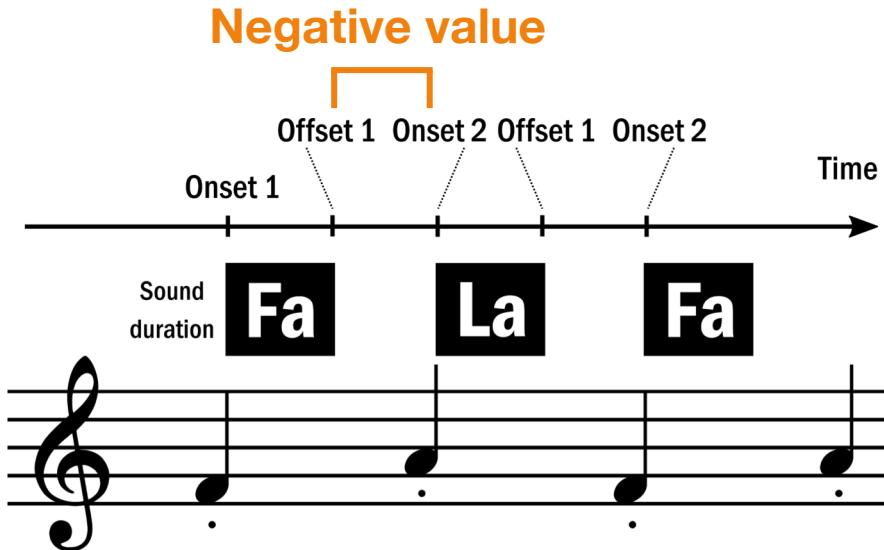
Measuring musical expressions

- Articulation
 - ❖ Offset 1 - Onset 2
 - Legato
(Smooth sound)
 - Staccato
(Sharp sound)
- Tone intensity
 - ❖ Note 1 - Avg Note 2-4
 - Grouping
(for legato)

a) Legato



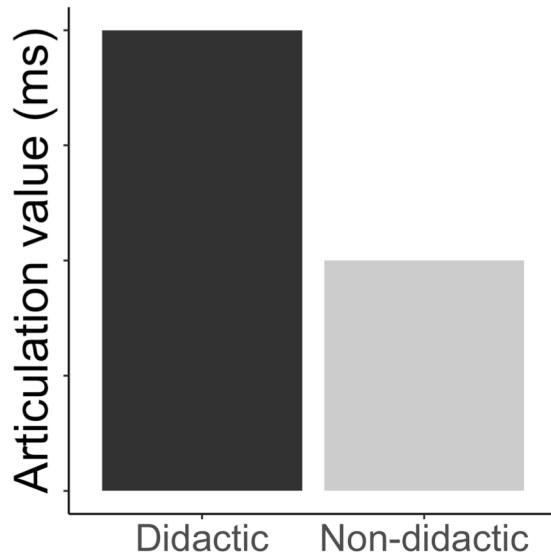
b) Staccato



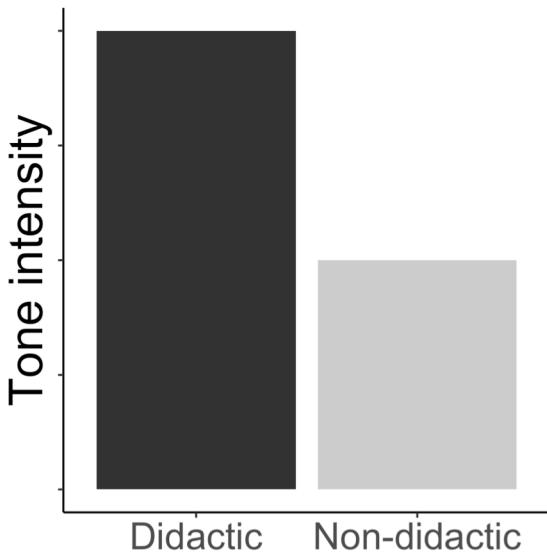
Predicted results (Articulation)

Experts exaggerate
skill-related sounds
with regard to each
dependent variable

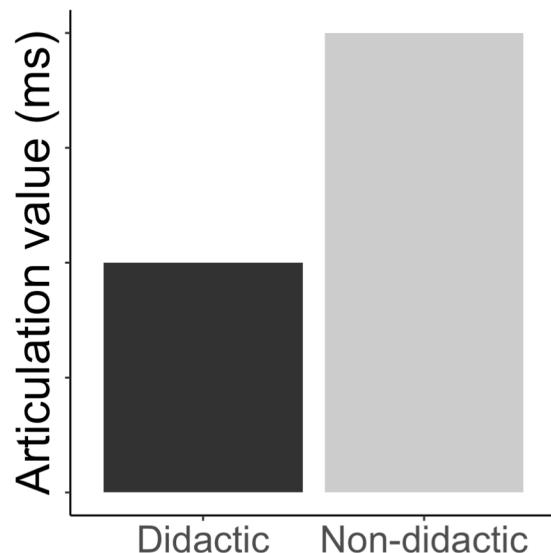
a) Legato - smooth sound



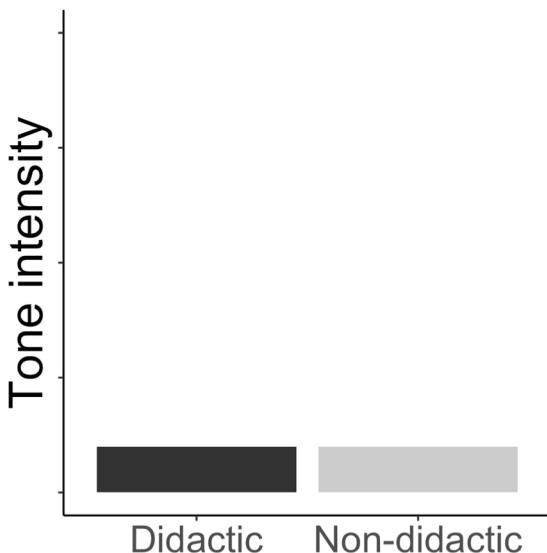
Tone intensity



b) Staccato - sharp sound



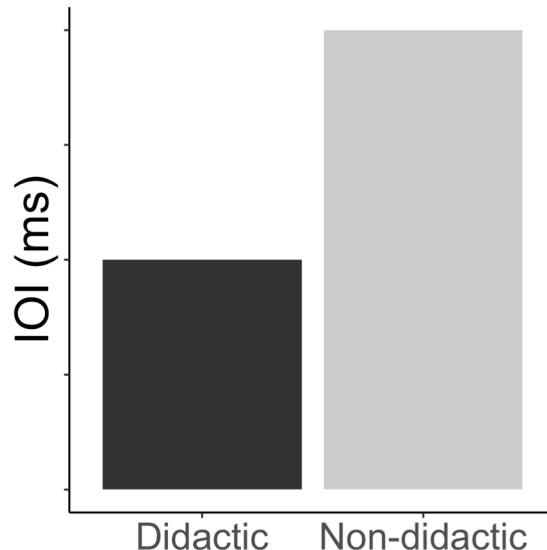
Tone intensity



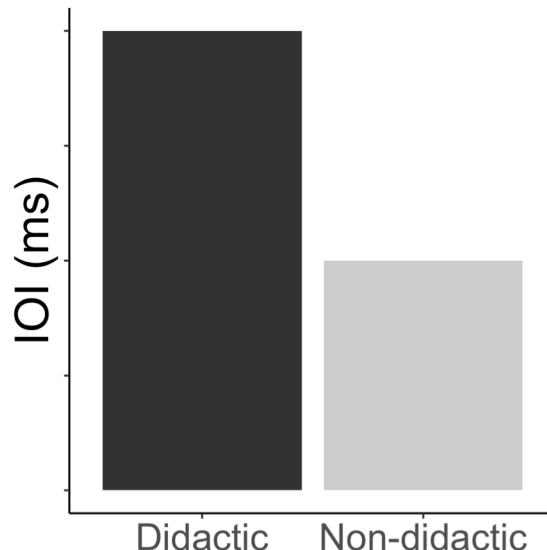
Predicted results (Tempo change)

Experts exaggerate skill-related sounds with regard to each dependent variable

- c) Accelerando
 - Speed up



- d) Ritardando
 - Slow down



Study 2 & 3

2. Detection and Memory

- Can novices discriminate between didactic and non-didactic performance?
- Can novices remember didactic performances better than non-didactic performances?

3. Reproduction

- Do didactic cues facilitate novice learning?
 - Reproduction of musical expression
 - Imitation of experts' performance

Overview

Music Expertise Acquisition

- Didactics
 - Study 1-3
- Joint action
 - Study 4-5

Musical Joint Action (Phillips-Silver & Keller et al., 2012)



- Experts' demonstration
 - Turn-taking
 - Intentional signals
 - Experts model and novices imitate
(Haston, 2007)
- Playing in synchrony with experts
 - Precise temporal coordination
 - Prediction of others
(Sebanz & Knoblich, 2009;
Wolpert et al., 2003)

Methods

and Predictions

- Study 1 (+ 2 & 3)
 - Experts' sound modulation
 - Detection & Memory
 - Reproduction of musical expression
- Study 4 & 5
 - Turn-taking
 - Playing in synchrony

Study 4 & 5: Turn-taking vs. Playing in synchrony

Participants: Pairs of an expert and a novice

Condition: Feedback vs. No-feedback (within-subjects)

Learning: 8 sessions plus 1 pre-learning

Stimuli: Articulation vs. Tempo change

Study 4: Experts and novices alternate playing.

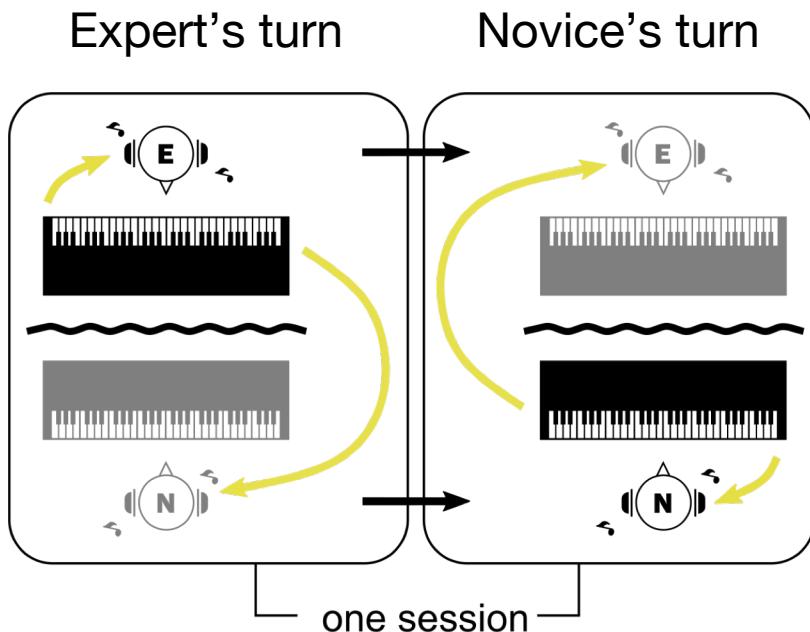
- ❖ Beneficial for learning articulation?

Study 5: Experts and novices play in synchrony.

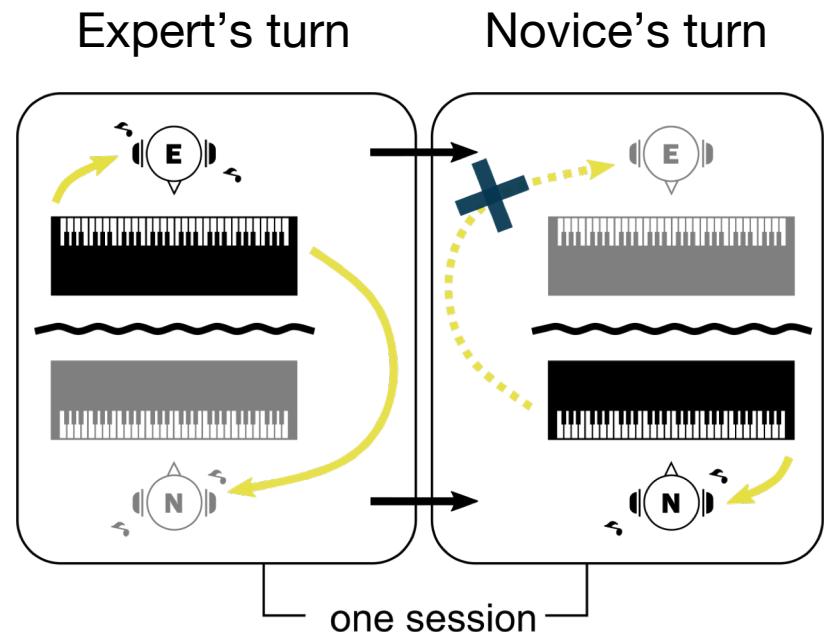
- ❖ Beneficial for learning tempo change?

Study 4: Procedure

Feedback



No-feedback

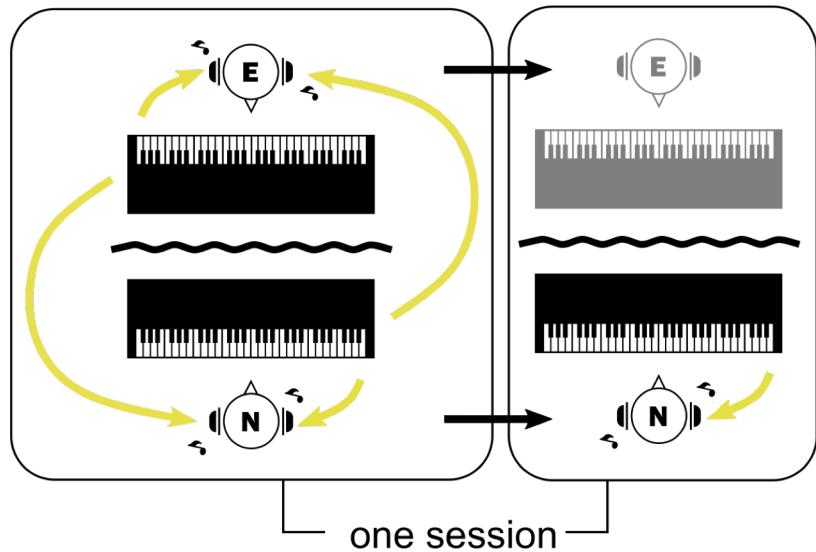


Study 5: Procedure

Feedback

Playing together

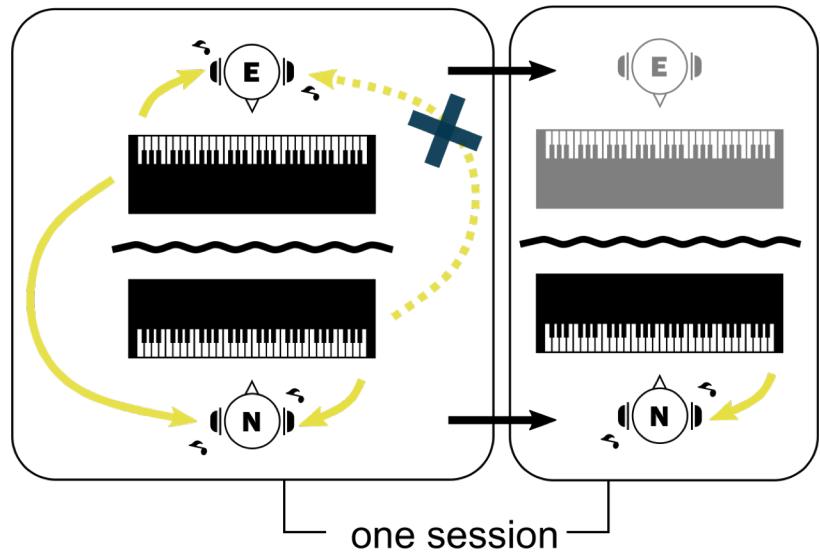
Novice playing



No-feedback

Playing together

Novice playing

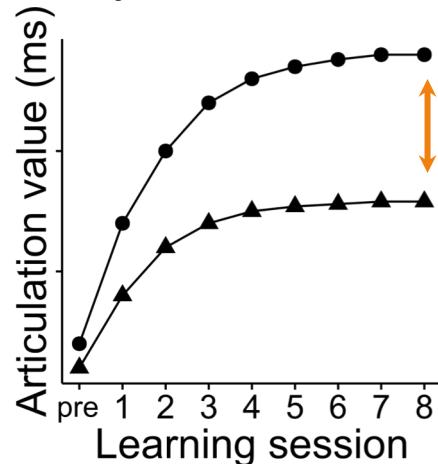


Predicted results (Articulation)

- Adjustments will help novices acquire skills.
- Turn-taking will be more beneficial for articulation than playing in synchrony

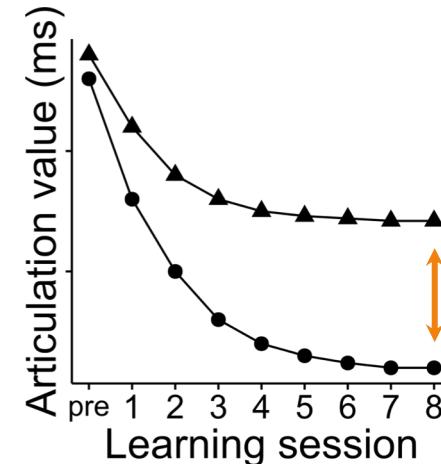
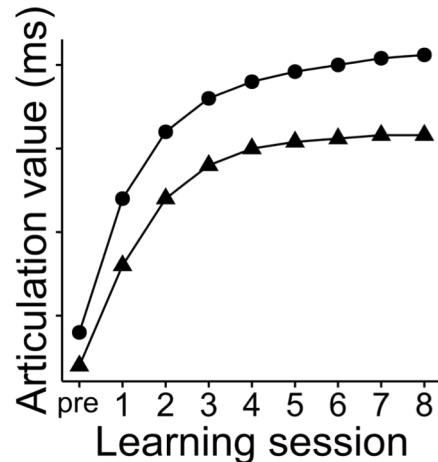
a) Legato
Smooth sound

- Study 4



b) Staccato
Sharp sound

- Study 5



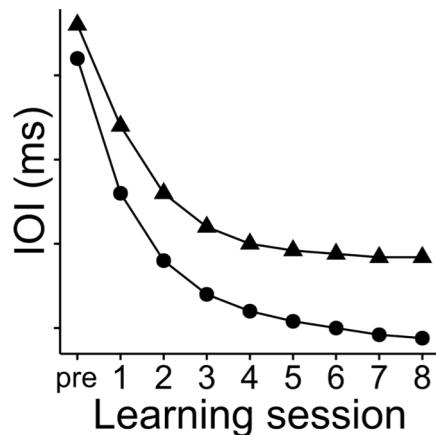
● Feedback ▲ No-Feedback

Predicted results (Tempo change)

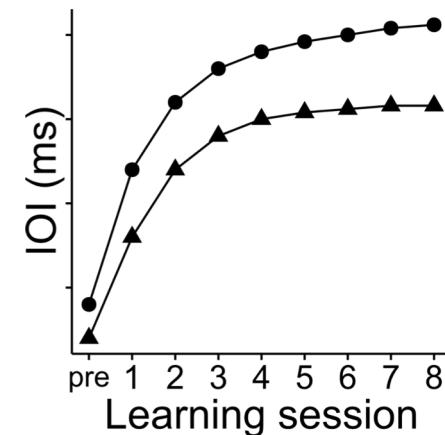
- Adjustments will help novices acquire skills.
- Playing in synchrony will be more beneficial for tempo change than turn-taking

c) Accelerando
Speed up

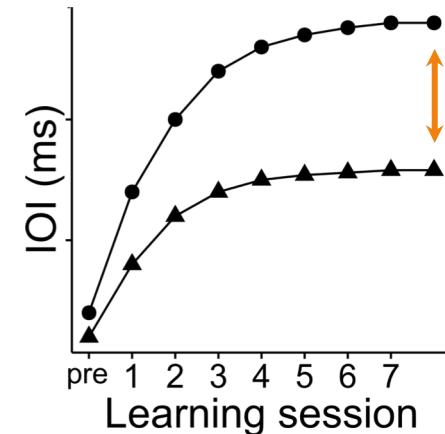
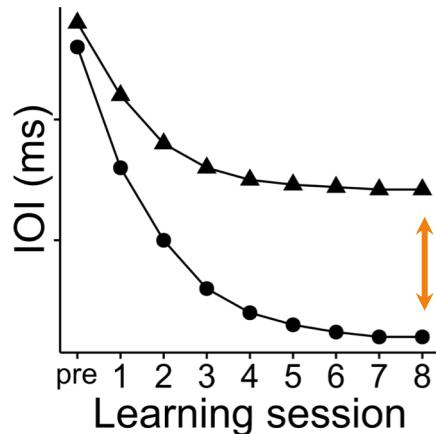
- Study 4



d) Ritardando
Slow down



- Study 5



● Feedback ▲ No-Feedback



Study 2: Detection and memory of didactic sound

1. Discrimination task

- Listen to a performance.
- Answer if the sound is produced by a human pianist or a computer.
- Answer if the performance is didactic or non-didactic.

2. Memory task

- Listen to a performance.
- Answer if the performance sounds familiar or not.

Study 2: Detection and memory of didactic sound

1. Discrimination task

- Condition: Didactic vs. Non-didactic vs. MIDI normative

e.g.,

- Didactic by pianist 1
- Non-didactic by pianist 1
- MIDI

2. Memory task

- Stimuli: Old didactic vs. New didactic vs. Non-didactic

e.g.,

- Didactic by pianist 1 & 2
- Non-didactic by pianist 1 & 2
- MIDI

Study 3: Reproduction of musical expression

Participants: Beginners

Condition: Didactic vs. Non-didactic

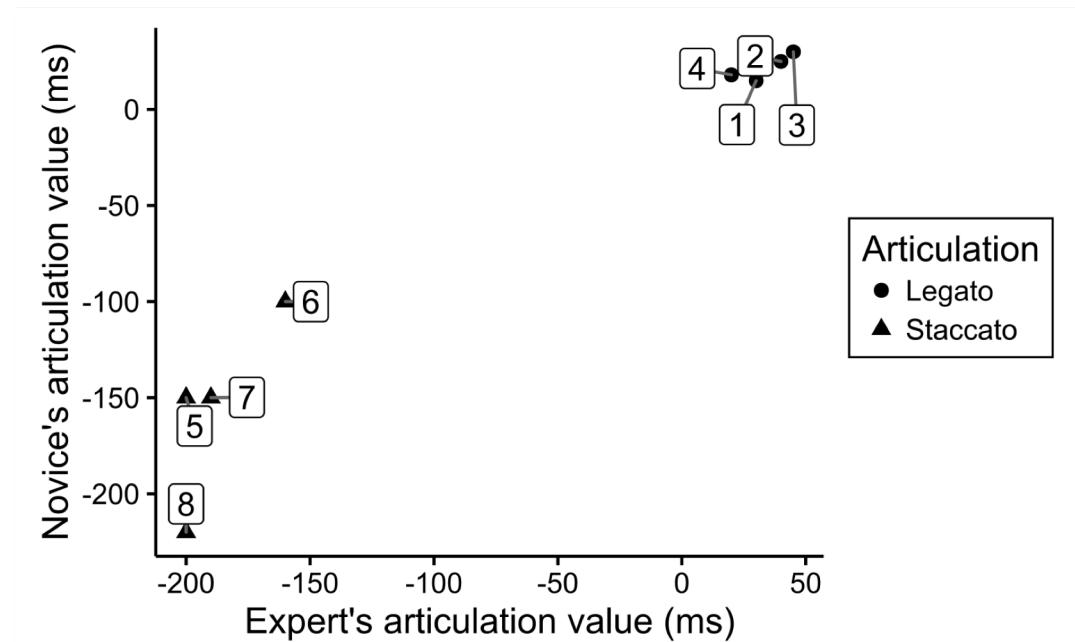
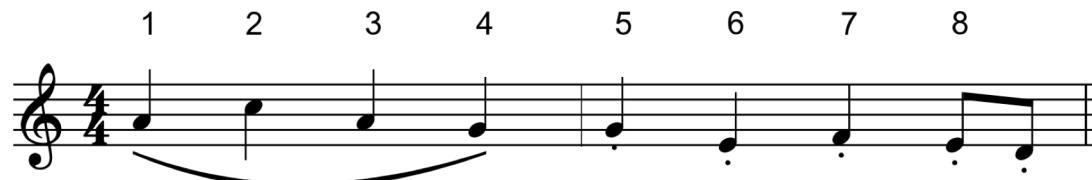
Learning: 8 sessions + 1 pre-learning

Stimuli: Articulation vs. Tempo change

- Listen to a expert's performance (i.e., a recording from Study 1)
- Learn musical expression from the expert's performance
- Reproduce musical expression

Study 3: Correlation coefficient

- The similarity of a novice's performance to a stimulus



Study 5: Asynchronies

- Subtracting the onset time of the expert's sound with regard to each musical note from that of the novice's sound
 - Positive - the expert is early
 - Negative - the novice is early

Possible follow-up studies

Study 1

- Visual information (e.g., kinematics, eye gaze)
- Verbal instruction
- Ask experts how they put expression on normative notations

Study 2

- Piano experts vs. Novices
- Piano experts vs. Musicians of other instruments
- Piano experts vs. Expert audience

Study 3

- Rule generalisation
- Audience liking

Study 4 & 5

- Novices' belief of whether experts can listen to their performance
- Audience liking

Accelerando and ritardando

- E.g., Liszt - La leggierezza