

# The Sound of Teaching Music

## Experts' sound modulation for novices



Atsuko Tominaga, Günther Knoblich & Natalie Sebanz  
Department of Cognitive Science, Central European University (Austria)

### Introduction

- Experts tend to modulate their behaviour for teaching purposes.
  - For example, slower demonstration and exaggeration (Brand et al., 2002; Kuhl, 2004; Uther et al., 2007; McEllin et al., 2017)
- Do experts use similar strategies to teach expertise such as artistic expression where subtle modulations are crucial?
- The current study focuses on musical expressive techniques (articulation, dynamics).

#### Predictions

- In general, experts will **play more slowly** when teaching.
- Depending on what type of technique experts are teaching, they will **exaggerate only relevant aspects of the technique** to be taught (e.g., make a larger contrast between forte and piano when teaching dynamics).

### Methods

**Participants:** 20 expert pianists (average years of training: 15.7,  $SD = 5.67$ )

#### Conditions:

Participants were instructed to perform the piece with the designated expressive technique in order to:

- teaching* condition: teach it to students (e.g., lesson)
- performing* condition: perform it to an audience (e.g., concert)

**Stimuli:** two expressive techniques

#### ❖ articulation (smoothness) legato & staccato



#### ❖ dynamics (loudness) forte & piano



**Design:** Two within-subjects factors

- 2 (*teaching / performing*) x 2 (*articulation / dynamics*)

#### Dependent variables:

- Tempo: Interonset intervals (IOIs)
  - Larger IOIs - slower tempo, smaller IOIs - faster tempo
- Articulation: Key-overlap ratio (KOR)
  - legato -  $KOR > 0$ , staccato -  $KOR < 0$
- Dynamics: Key velocity (KV)
  - Values vary between 0-127, forte > piano
- Dynamics contrast: Key velocity difference (KV-Diff)
  - Particularly interested in differences between forte and piano

### Results

Significance levels: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

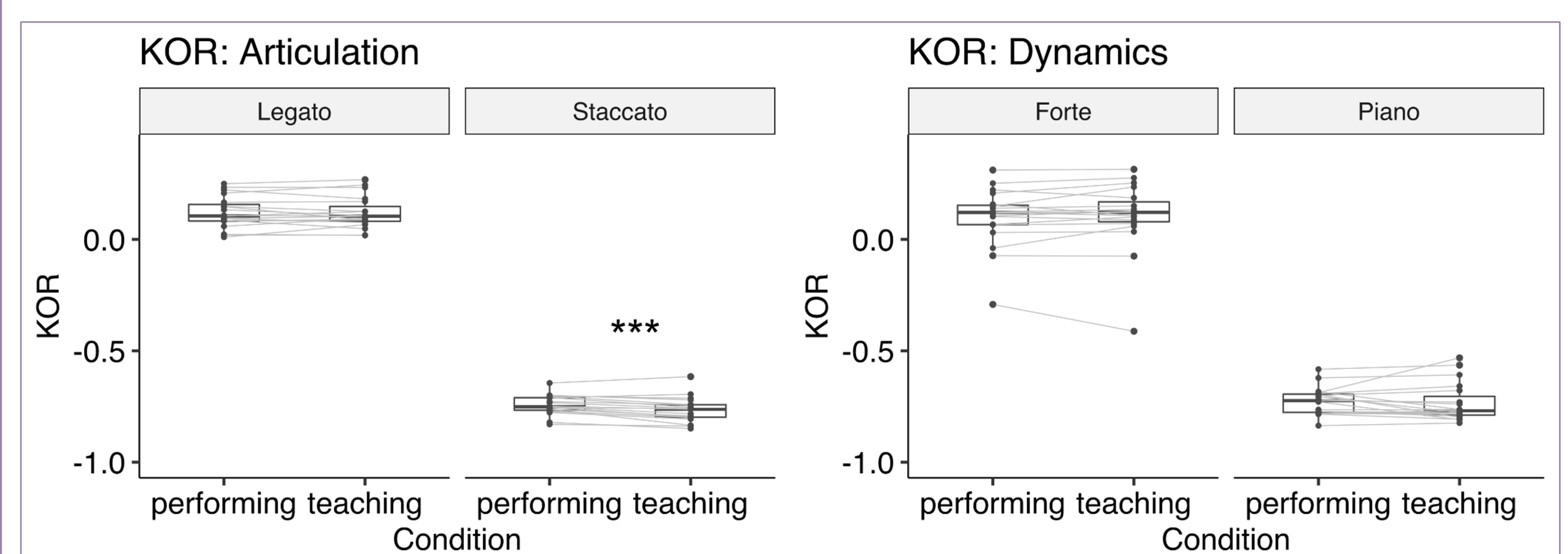
#### 1) Tempo

##### Experts played slower only when teaching articulation

(normalised IOIs: teaching condition:  $[M = 0.97, SD = 0.042]$ , performing condition:  $[M = 0.96, SD = 0.034]$ ;  $t(18) = 2.64, p = 0.017$ )

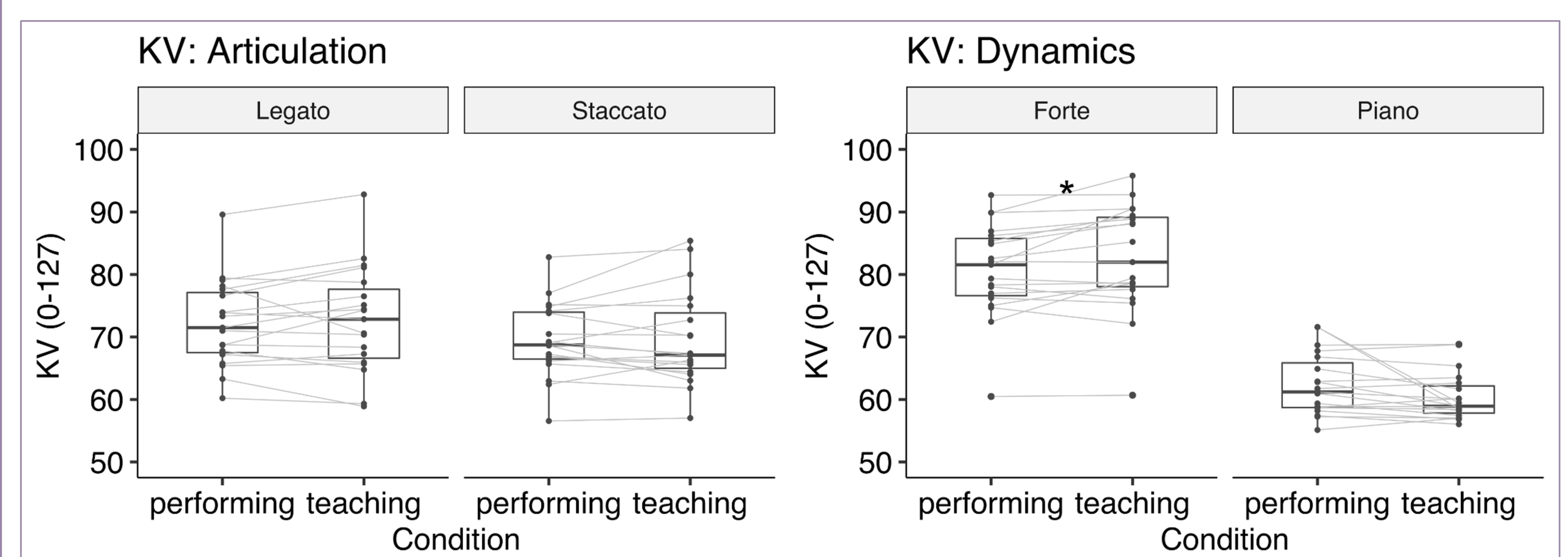
#### 2) Articulation

- While teaching articulation, experts produced shorter staccato** whereas there was no difference for legato.
- While teaching dynamics, there was no difference for forte and piano.



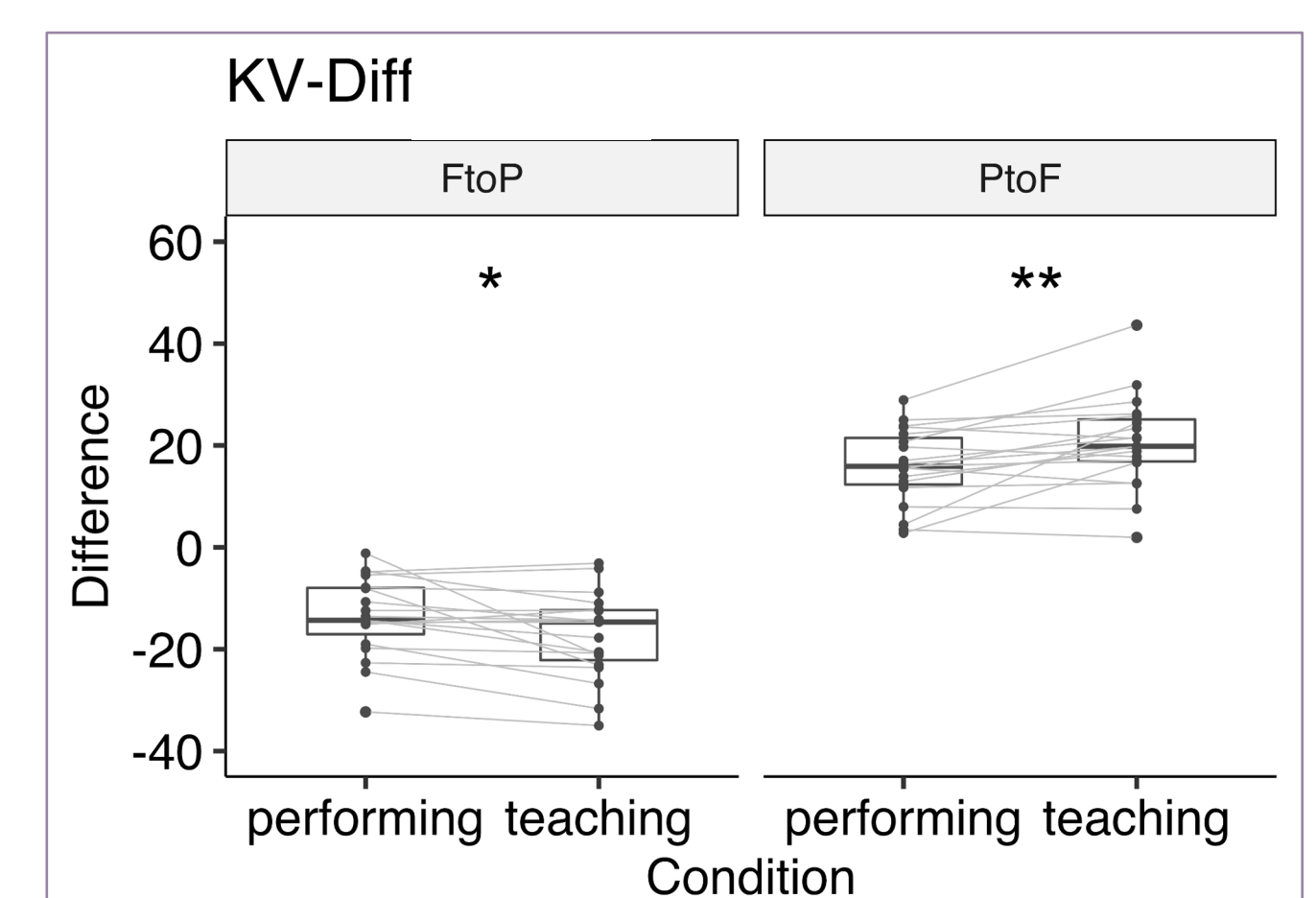
#### 3) Dynamics

- While teaching dynamics, experts produced louder forte** whereas there was no difference for piano.
- While teaching articulation, there was no difference for legato and staccato.



#### 4) Dynamics contrast

- While teaching dynamics, experts made a larger contrast between forte and piano**
- While teaching articulation, there was no such difference.



### Discussion

- Experts systematically modulated their performance for teaching with a naturalistic piece of music.**
  - We replicated our previous findings that were based on a simpler piece.
- In a more interactive setting where experts know the skill level of novices, do experts flexibly adjust their performance for novices?
- Can these modifications be used by novices for learning?
- How can listeners tell apart teaching from interpretation? (e.g., slower performance might not necessarily be for teaching, but may indicate a performer's interpretation)

#### References

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Upper image: <https://www.disneyplus.com/movies/the-sound-of-music/4c1Sp2qE83Fc>

