

... And I Just Can't Hide It!

Implicit and Explicit Assignment of Gender Stereotypes to Musical Instruments

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Background

Stereotypes appear as a combination of (social) categories with associated attributes (Ashmore & Del Boca, 1979). Musical instruments are inherently genderless and yet subjects rated e.g. harp, flute, piccolo, etc. as feminine, while tuba, double bass, trumpet, etc. turned out to be particularly masculine (Griswold & Chrobak, 1981). Questionnaires were used to elicit these (explicit) stereotypes. These can be biased by social desirability or can result in impaired validity due to lack of awareness of one's own stereotypes (Spinner, Cameron & Ferguson, 2020). The Implicit Association Test (IAT) is used to measure the strength and direction of association between target-attribute-pairs. The measurement is based on the fact that incongruent concepts and attributes in the task lead to a longer processing time and thereby longer reaction time. This is interpreted as the result of higher task difficulty (Greenwald, McGhee & Schwartz, 1998). Implicit measures can be extended by eye-tracking, which allows inferences to be made about workload and arousal. While blink rate and fixation duration tend to decrease with increasing workload, pupil dilation increases (Holmqvist et al., 2011).

Methods

In this laboratory experiment the participants ($N=54$; $17-73$ ys, $M=30.5$, $SD=12.6$) completed two IATs along with an eyetracking measurement. The target concepts of IAT1 were photos and pictograms of different flutes and drums, while IAT2 included harps and trombones. The attribute stimuli for both IATs consisted of "feminine" and "masculine" words. Combinations of targets and attributes were presented randomly to avoid sequence effects (total trials per participant=360). For comparison with the implicit measures (IAT, eyetracking) explicit gender associations were collected via questionnaire. To find correlations with personality traits, musical preference or sexism, *BFI-2* (Danner et al., 2016), *STOMP* (von Georgi, 2013), *Ambivalent Sexism Inventory* (Eckes & Six-Materna, 1999) and *Ambivalence Toward Men Inventory* (von Collani & Werner, 2003) were used.

We assume, that drums/trombones with masculine expressions and harps/flutes with feminine ones form congruent pairs, while other combinations are incongruent.

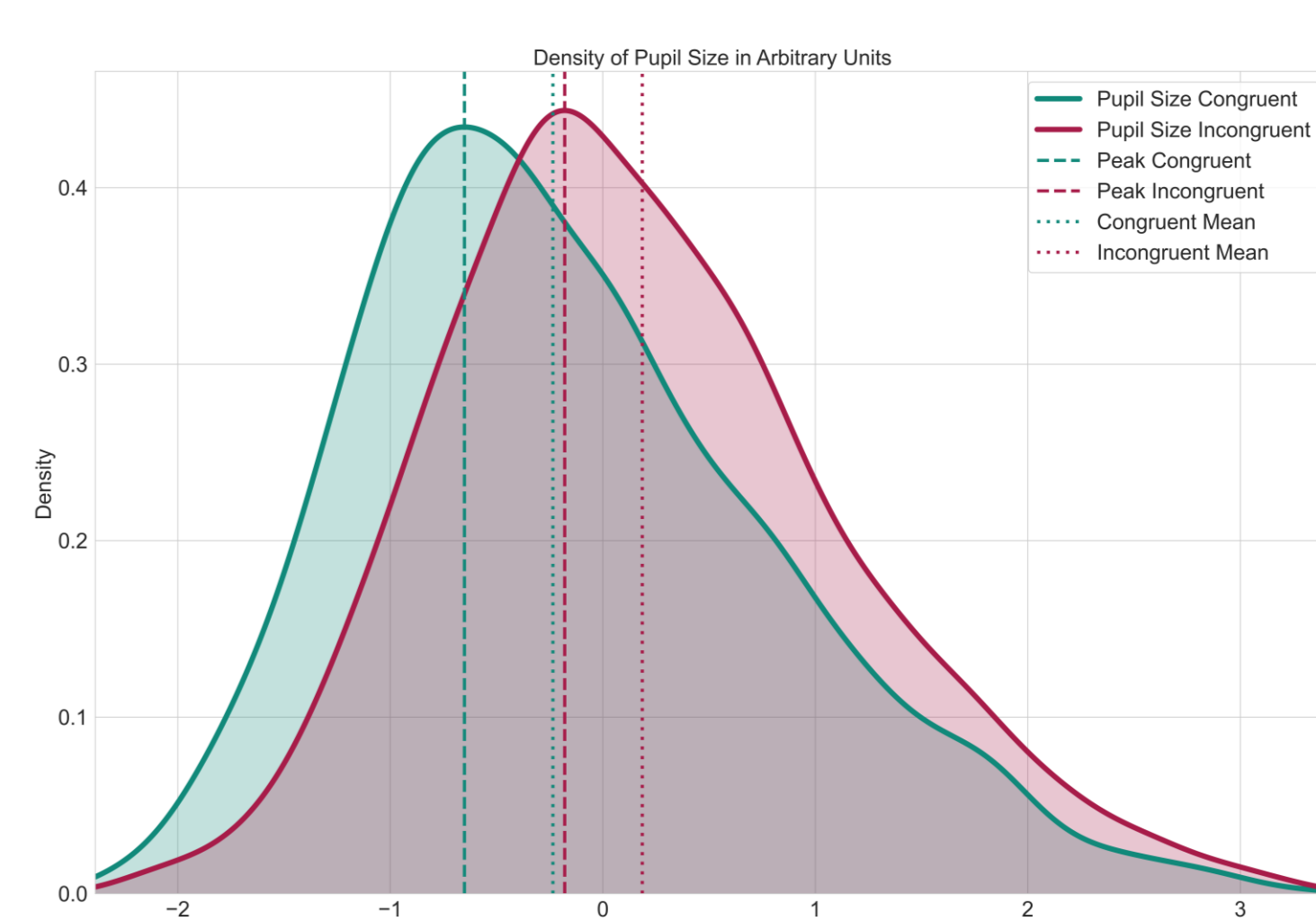
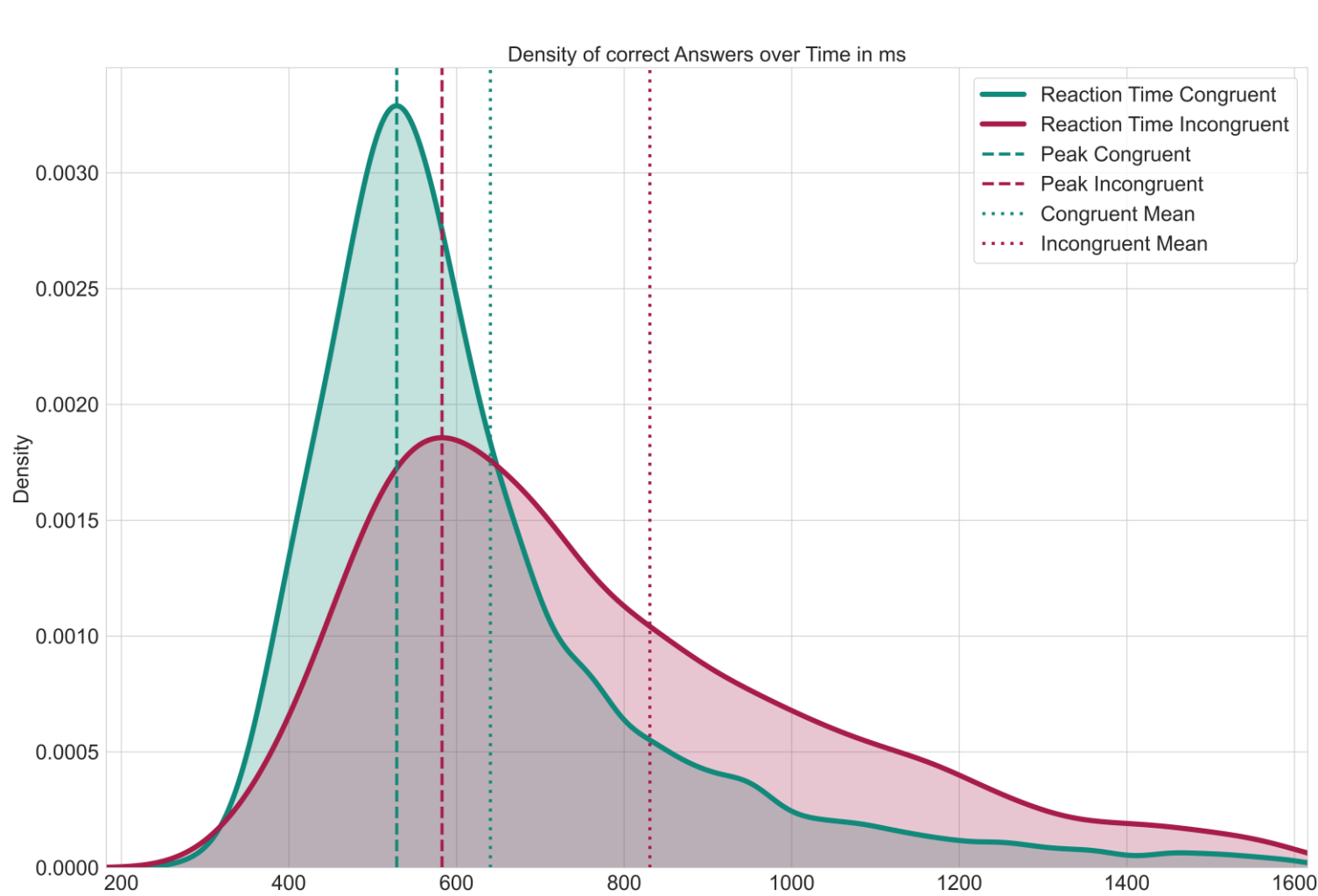
Reaction time was measured via MilliKey Response Box, gaze data were sampled binocular at 1,000 Hz using the SR Research EyeLink 1000 Plus, followed by the questionnaire in SoSci Survey.

Hypotheses

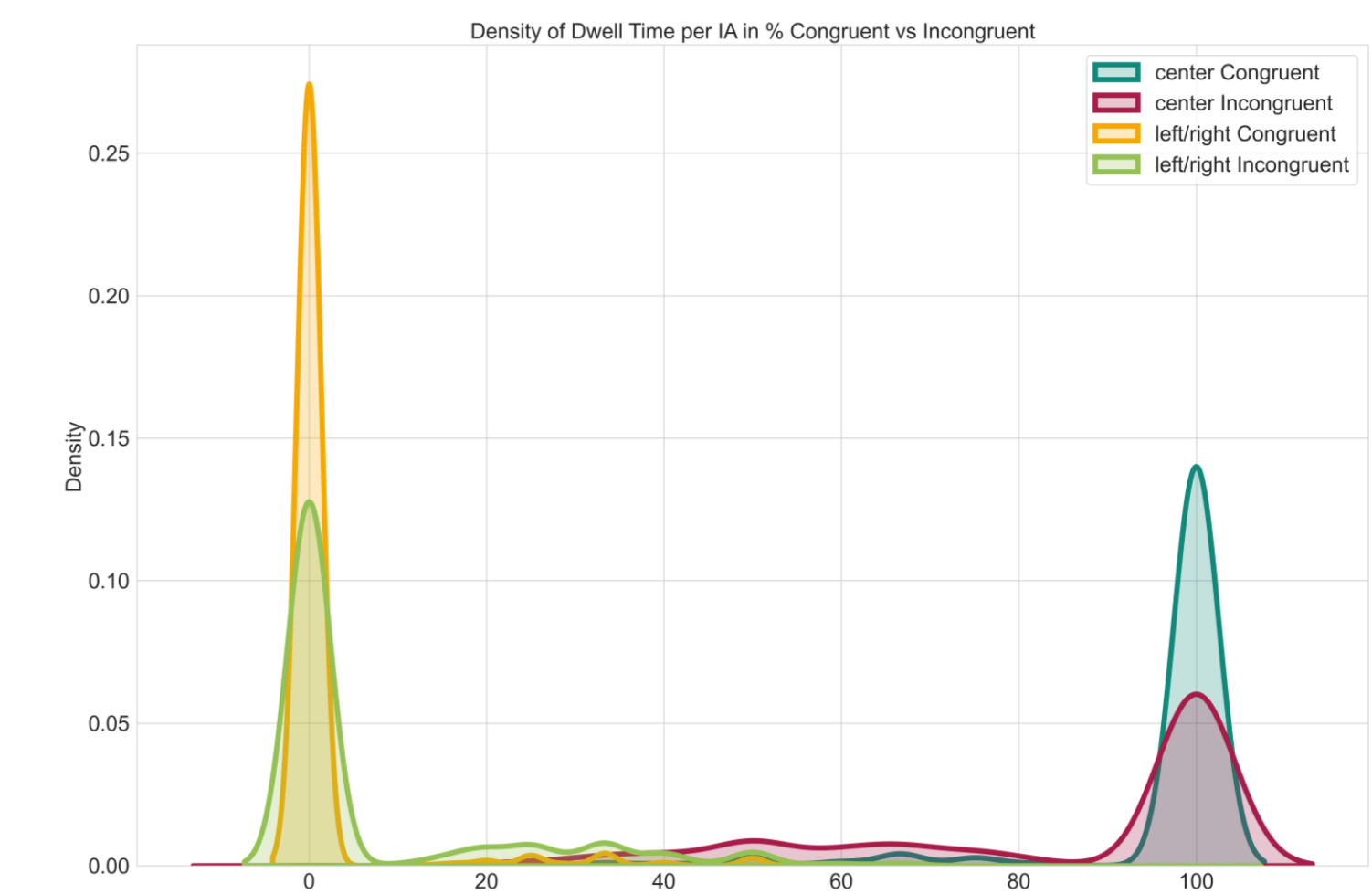
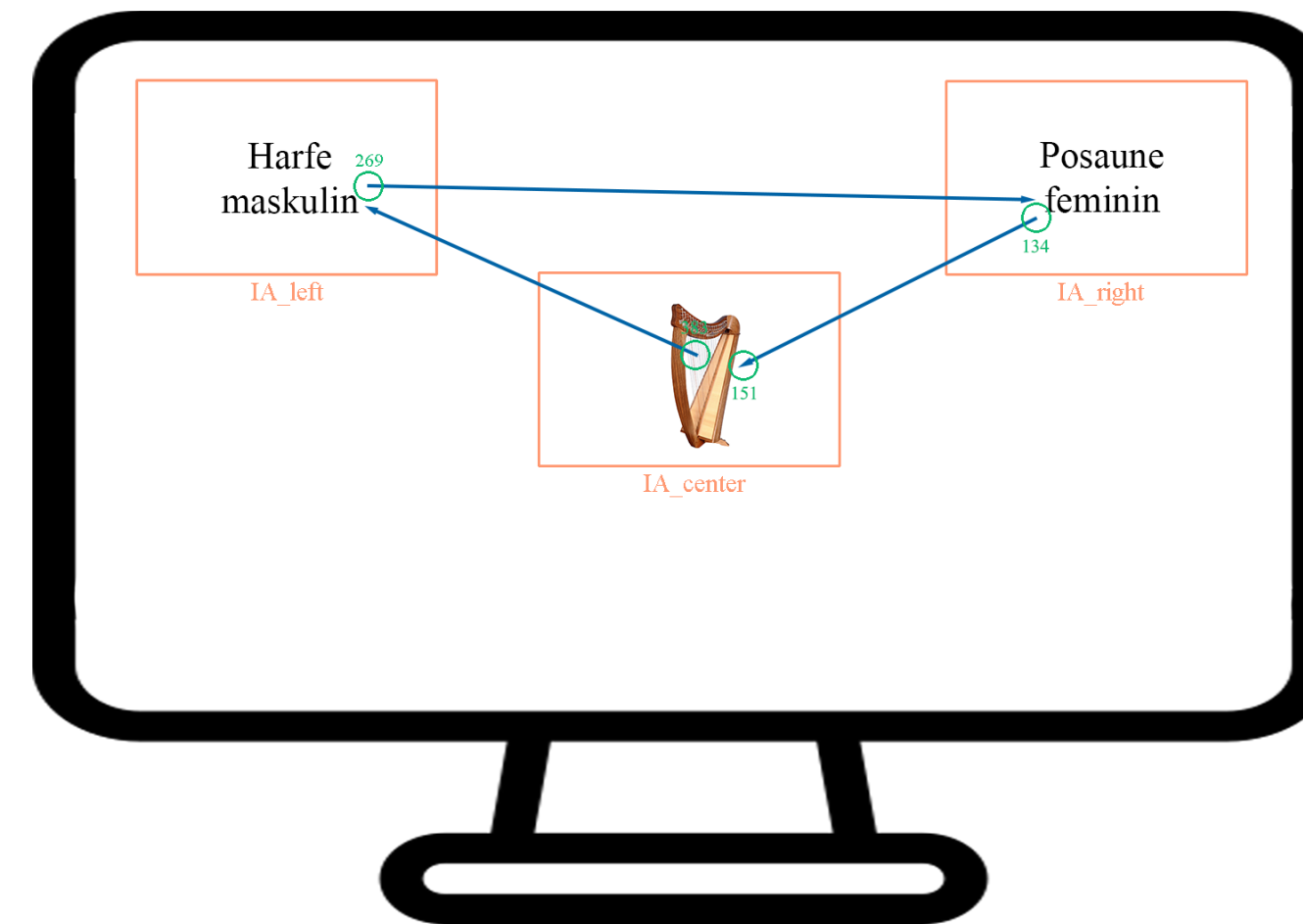
- H1: Incongruent target-attribute-pairs lead to longer reaction time.
- H2: Incongruent target-attribute-pairs lead to pupil dilations.
- H3: Incongruent target-attribute-pairs lead to a lower blink rate.

Results

For H1 the average reaction time was calculated. In the IAT1 (drums/flute) the average reaction time was 627.9 ms for congruent and 876.8 ms for incongruent pairs ($p<.001$, $d=1.41$). IAT2 shows similar results – 689.3 ms for congruent and 905.7 ms for incongruent pairs ($p<.001$, $d=0.9$). Overall, the average reaction time for both IATs was 661.5 ms for congruent and 895.4 ms for incongruent pairs ($p<.001$, $d=1.21$), which supports H1.



H2 is supported by the fact that the pupil dilation was significantly higher in the incongruent target-attribute-pairs compared to the congruent ones (IAT1: $p<.001$, $d=1.25$; IAT2: $p<.001$, $d=1.33$). To ensure that eye movements do not conflict with pupil size measurements, we additionally calculated the pupil size in the interest area (IA) located in the center of the screen (area=623x401px), which leads to similar results ($p<.001$; $d=0.38$).



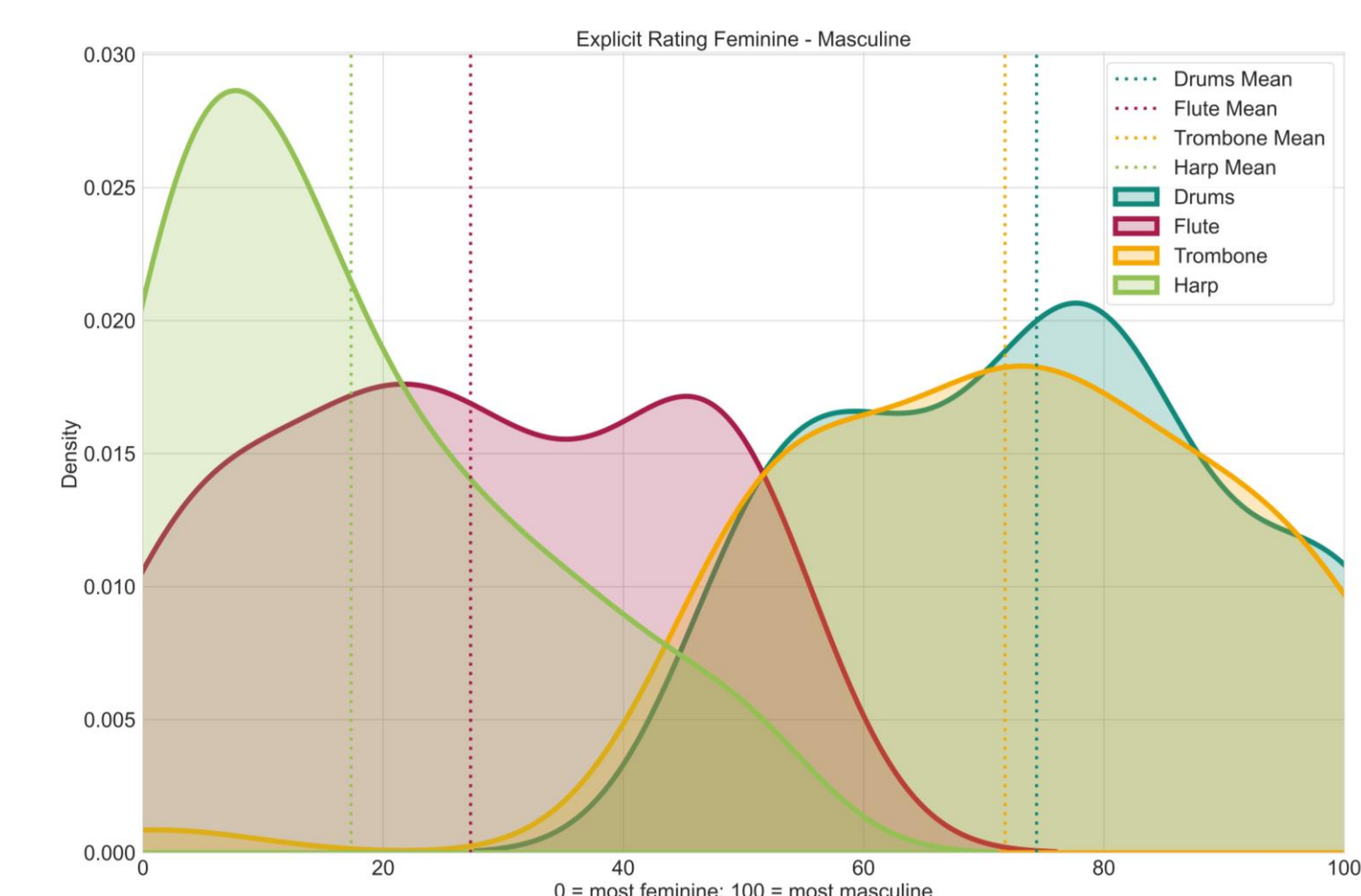
Overall, three IAs were defined in the analysis (center=stimuli, left & right=target/attribute). In the incongruent condition, participants looked less at the center (-10.1%, $p<.001$, $d=0.89$), and more to the left (5.4%) or to the right (4.5%).

Contrary to expectations (H3), we found no significant differences in blink rate between the conditions.

To compare the implicit (IAT) and explicit (rating) assignments of gender to musical instruments, we took the *D* score-values (0.61 for IAT1, 0.44 for IAT2) and the differences in subjective ratings (distance between the pairs) from the questionnaire.

No significant correlations were found between implicit and explicit association strength. Furthermore, there are no noteworthy significant correlations between personality traits, musical preferences, sexism score and the *D* scores from the IATs or the gaze data.

No explicit data correlate with eyetracking data, *D*-scores, or reaction time.



Summary

The gender assignment to music instruments could be shown in both implicit and explicit measurements. Both reaction time and pupil dilation are significantly different depending on the (in)congruency of the target-attribute-pairs, which we interpret as a difference in workload and/or task difficulty. The findings are further supported by the fact that the dwell time percentage shifts from the center, where the stimuli are presented, to the sides, where the targets/attributes are defined. This indicates that subjects got more confused when the pairs were not perceived as stereotypically fitting.

Even though the data from implicit and explicit measurements point in the same directions, surprisingly no correlations between them could be seen. Both methods contribute to a better understanding of the matter, however, the underlying mechanisms are quite complex and the relationship between them remain unclear. In summary, the gender assignment of musical instruments is still deeply embedded in society. A follow-up study with a similar design to broaden the range of musical instruments is already underway.

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