

Individual Differences Analysis of Affective Traits for Chord Listening -Study of Triads-



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Introduction

- Background
 - Promoting design that considers individual differences
 - Enhance wellbeing
 - Reduce social loss
 - Realize a sustainable society
 - Researchers have conducted many studies that quantify sound impressions
 - Comfort with dissonance (Popescu et al., 2019)
 - Affections associated with cadences (Smit et al., 2020)
 - Individual differences in affective evaluation of chords have rarely been examined

- Purpose
 - Model individual differences in affective evaluation of triads

Methods

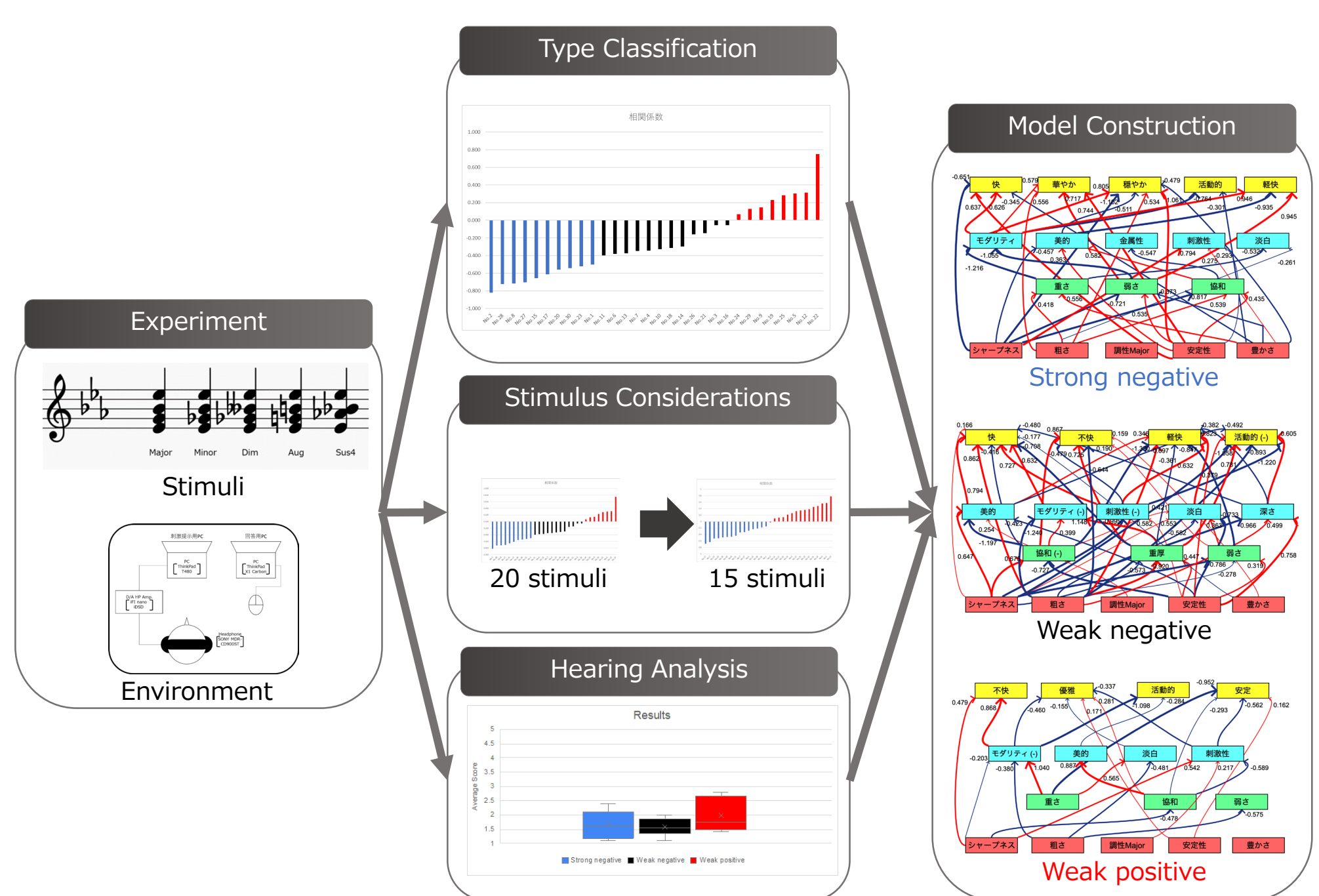


Fig 1. Overview of our research flow

- Participants: 30 students (15 musicians, 15 non-musicians)
 - Musicians have at least 8 years of music experience (Taniguchi, 1989)
- Environment: Face to face in a sealed darkroom (Fig. 2)
- Stimuli: 20 stimuli (5 triads × 4 tones)
 - Triads: Major, Minor, Dim, Aug, Sus4 (Fig. 3)
 - Tones: Piano, Clarinet, Trumpet, Violin
- Evaluation
 - Affect Grid method (4 evaluation per 1 stimulus)
 - Rating scale method (1 evaluation per 1 stimulus)
 - 61 words
 - 7 scales
- Procedure
 - ① Listening (4 sec) → ② Evaluation (Fig. 4 or Fig. 5) → ③ Silence for 10 sec → ④ Listening (4 sec) (Repeat ①~④ for each stimuli)

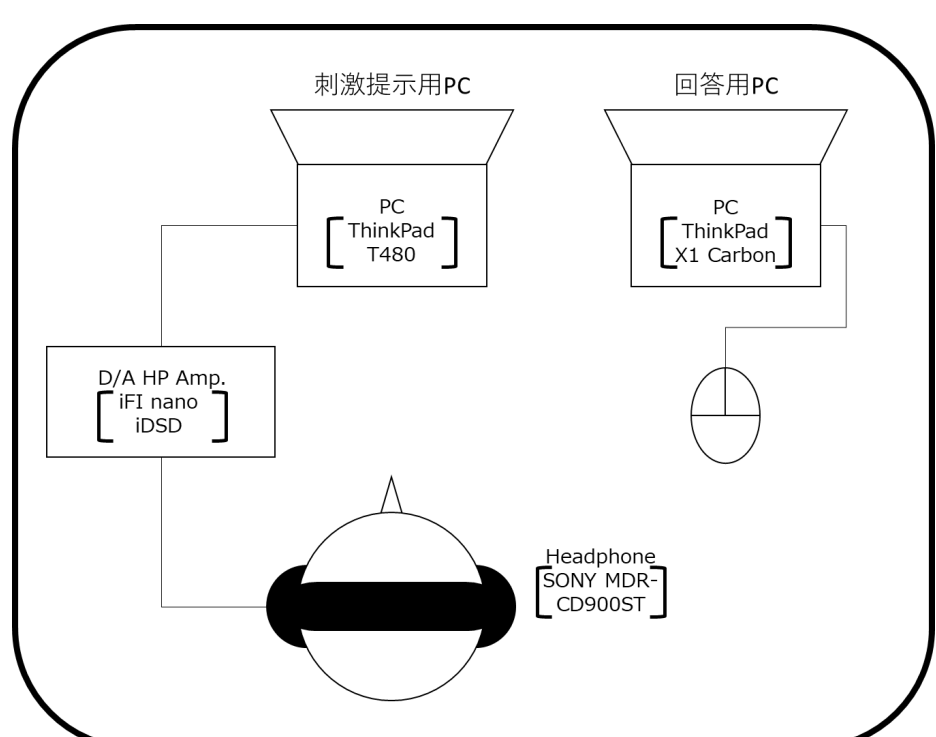


Fig 2. Environment

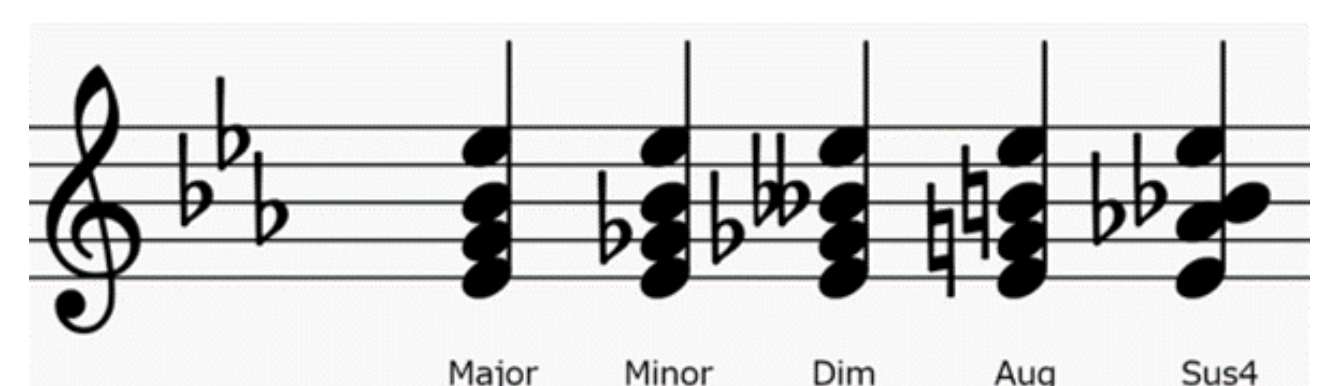


Fig 3. Triads used for experimental stimuli

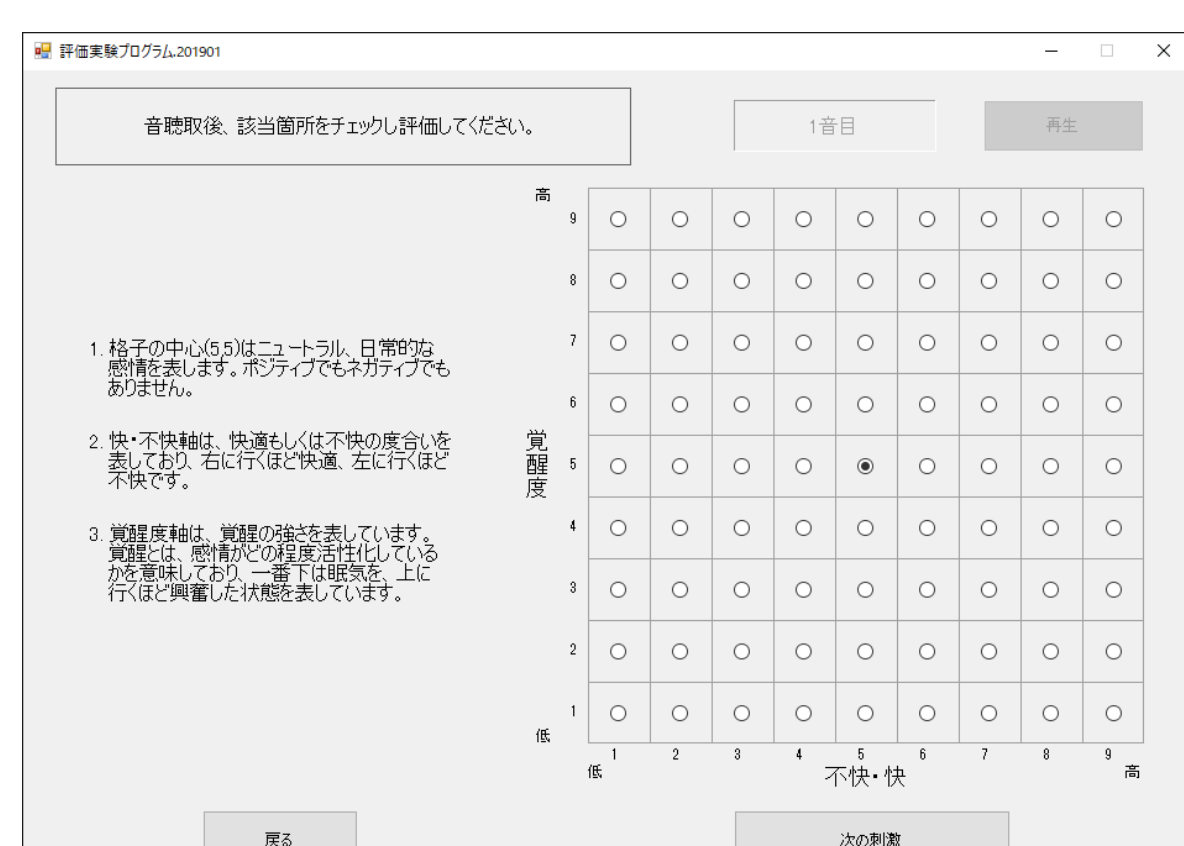


Fig 4. Evaluation screen of Affect Grid method



Fig 5. Evaluation Screen of rating scale method

Result 1 (Type classification)

- Cluster analysis (Ward's method)
 - Based on correlation coefficients
 - Between pleasure and arousal
 - Representative value: Average of 4 evaluations
 - Divided into 3 types (Fig. 6)
 - Weak positive: 8 people (3 musicians)
 - Weak negative: 12 people (6 musicians)
 - Strong negative: 10 people (6 musicians)

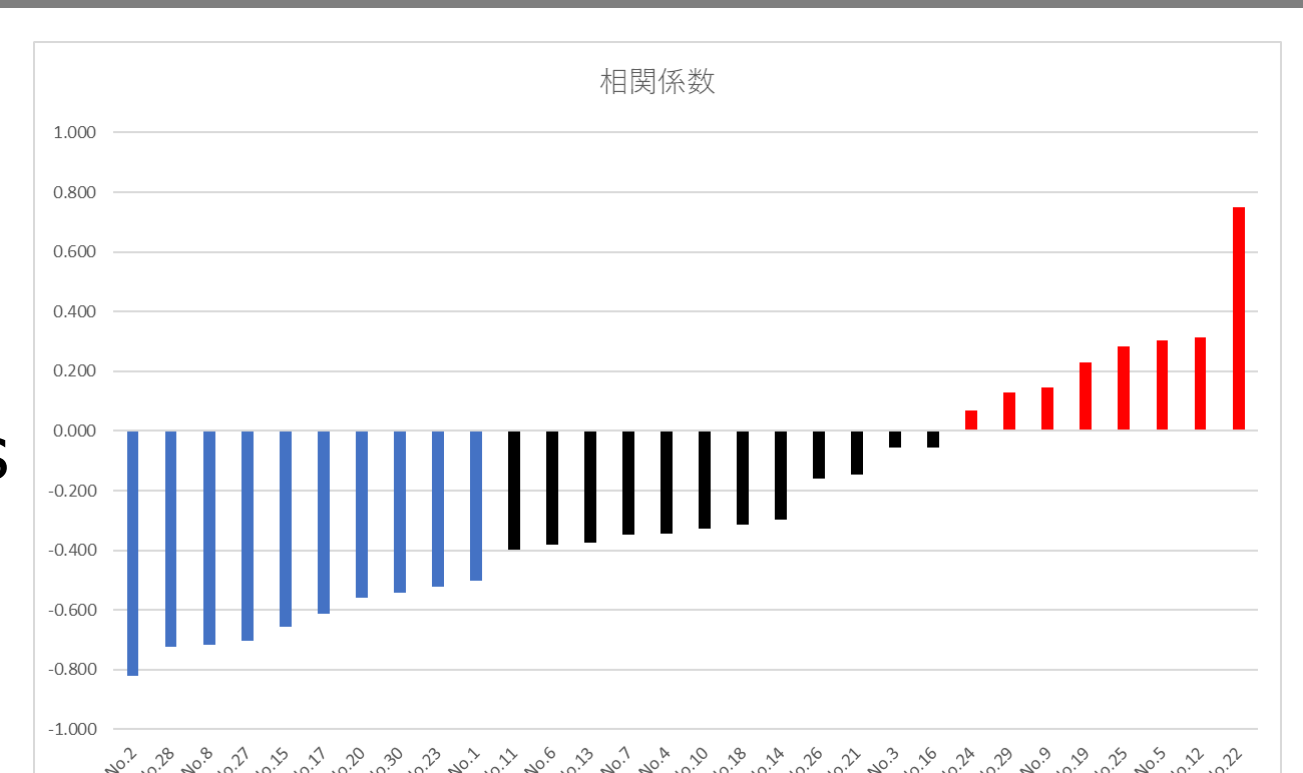


Fig 6. Distribution of correlation coefficients

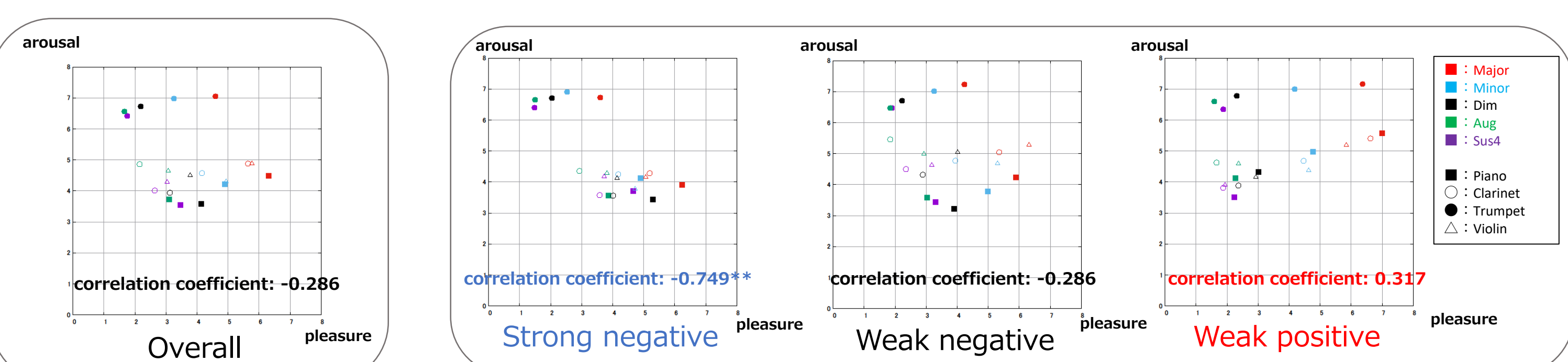


Fig 7. Average rating per stimulus

Fig 8. Average rating per stimulus by type

Result 2 (Model construction)

- Structural equation modeling (Fig. 9)
 - Construction by type
 - Visualization of the connection between acoustic features and each evaluation item
- Structural differences between types (Fig. 10)
 - Pleasant
 - Weak positive, strong negative: increases with increasing modality
 - Weak negative: increases with decreasing modality
 - More than twice as many valid paths exist than other types

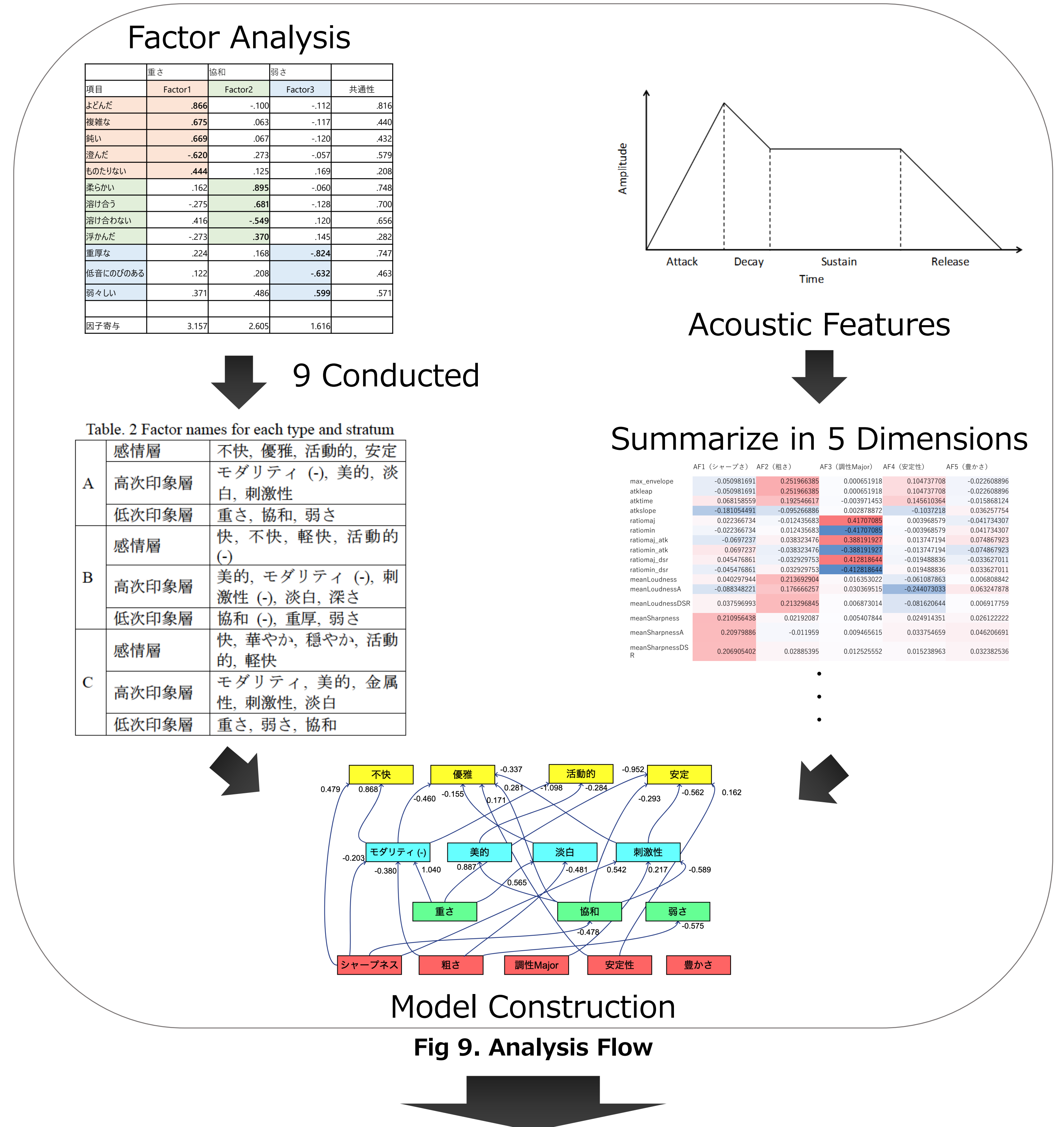


Fig 9. Analysis Flow

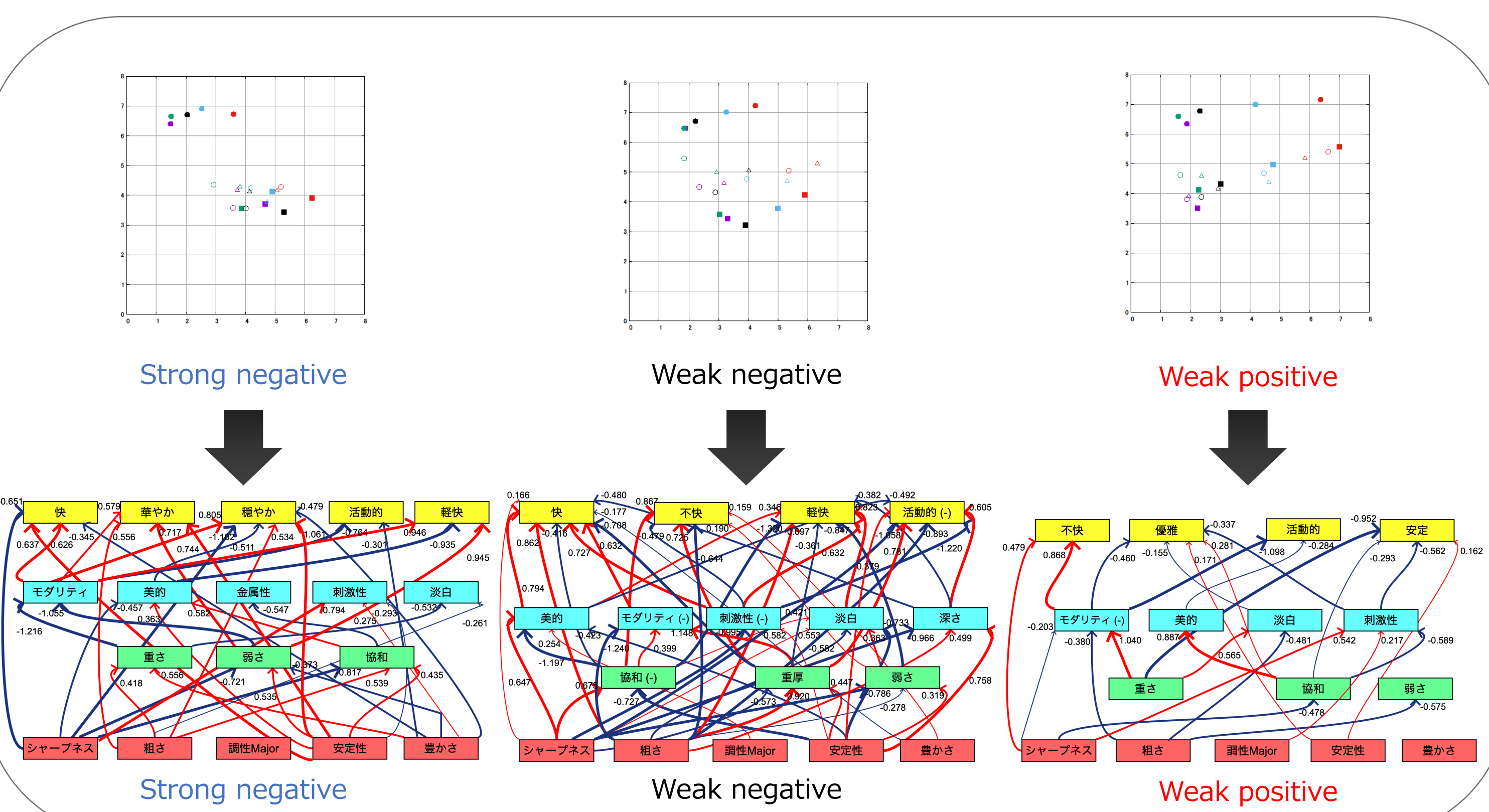


Fig 10. Construct by type

Conclusion

- Result 1 (Type classification)
 - No association between musical experience and tendency to evaluate affections
- Result 2 (Model construction)
 - Construct models by type
 - 3 types of evaluation exist for the same sound
- Future Study
 - Review the model construction
 - Validate the constructed model
 - Validate the estimation accuracy
 - Compare with previous studies