

MUSIC AND EMOTION

Rémi de Fleurian
Music Cognition Lab
Queen Mary University of London
r.defleurian@qmul.ac.uk



Why study it?

- Music is a fundamental human behaviour
 - Universal feature of human societies
 - Prime motivation: regulating emotions/moods
- Practical applications
 - Music composition
 - Music therapy
 - Music industry
 - Marketing

Outline

1. Brief history
2. Structure of emotions
3. Mechanisms and modifiers
4. Methods and measures
5. Example: Salimpoor et al. (2009)
6. Current challenges

1. Brief history

- Long-standing interest in music and emotion
 - Philosophy (Aristotle, Plato, Rousseau)
 - Evolutionary theory (Darwin)
 - Contemporary psychology (Wundt)

1. Brief history

- Isolated efforts to study music and emotion
 - Emotions and expectations (Meyer)
 - Arousal and stimulus properties (Berlyne)
 - Affective circumplex model (Russell)

1. Brief history

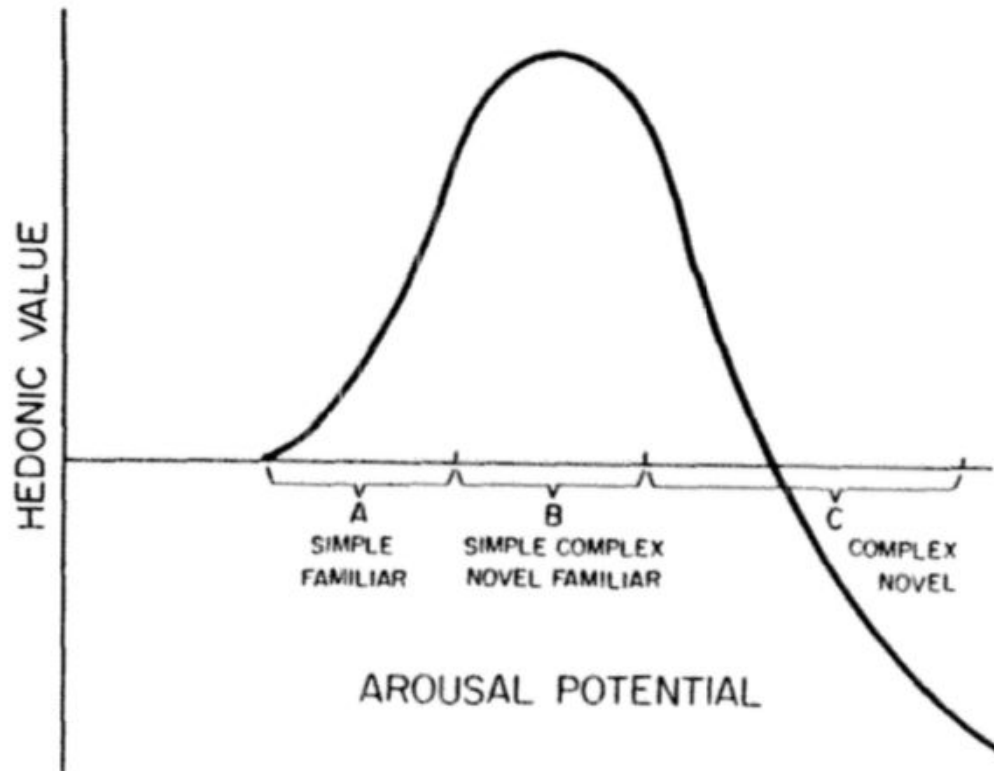


Figure 13-3 Effects of novelty and complexity on hedonic value interpreted in terms of the Wundt curve. (From Berlyne, 1970d).

1. Brief history

- Rise of popularity in the early 1990s
- Now a rich, interdisciplinary field of study
 - Anthropology
 - Computer Science
 - Musicology
 - Neurobiology
 - Philosophy
 - Psychology
 - etc.

2. Structure of emotions

<i>Affect</i>	This term is used as an umbrella term that covers all evaluative – or ‘valenced’ (positive/negative) – states (e.g., emotion, mood, preference). The term denotes such phenomena in general. If that is not intended, a more precise term (e.g., emotion, preference) is used.
<i>Emotion</i>	This term is used to refer to a quite brief but intense affective reaction that usually involves a number of sub-components – subjective feeling, physiological arousal, expression, action tendency, and regulation – that are more or less ‘synchronized’. Emotions focus on specific ‘objects’ and last minutes to a few hours (e.g., <i>happiness</i> , <i>sadness</i>).
<i>Musical emotions</i>	This term is used only as a short term for ‘emotions that were somehow induced by music’, without any further implications about the precise nature of these emotions.
<i>Mood</i>	This term is used to denote such affective states that are lower in intensity than emotions, that do not have a clear ‘object’, and that are much longer lasting than emotions, several hours to days (e.g., <i>gloomy</i>).
<i>Feeling</i>	This term is used to refer to the subjective experience of emotions or moods. One component of an emotion that is typically measured via verbal self-report.
<i>Arousal</i>	This term is used to refer to physical activation of the autonomic nervous system. Physiological arousal is one of the components of an emotional response, but could also occur in the absence of emotion (e.g., due to exercise). Arousal is often reflected in the ‘feeling’ component (i.e., the subjective experience).
<i>Preference</i>	This term is used to refer to more long-term affective evaluations of objects or persons with a low intensity (e.g., liking of a particular piece or style of music).
<i>Aesthetic judgment</i>	This term is used to refer to a subjective evaluation of a piece of music as art based on an individual set of subjective criteria (explained further in Section 3).

2. Structure of emotions

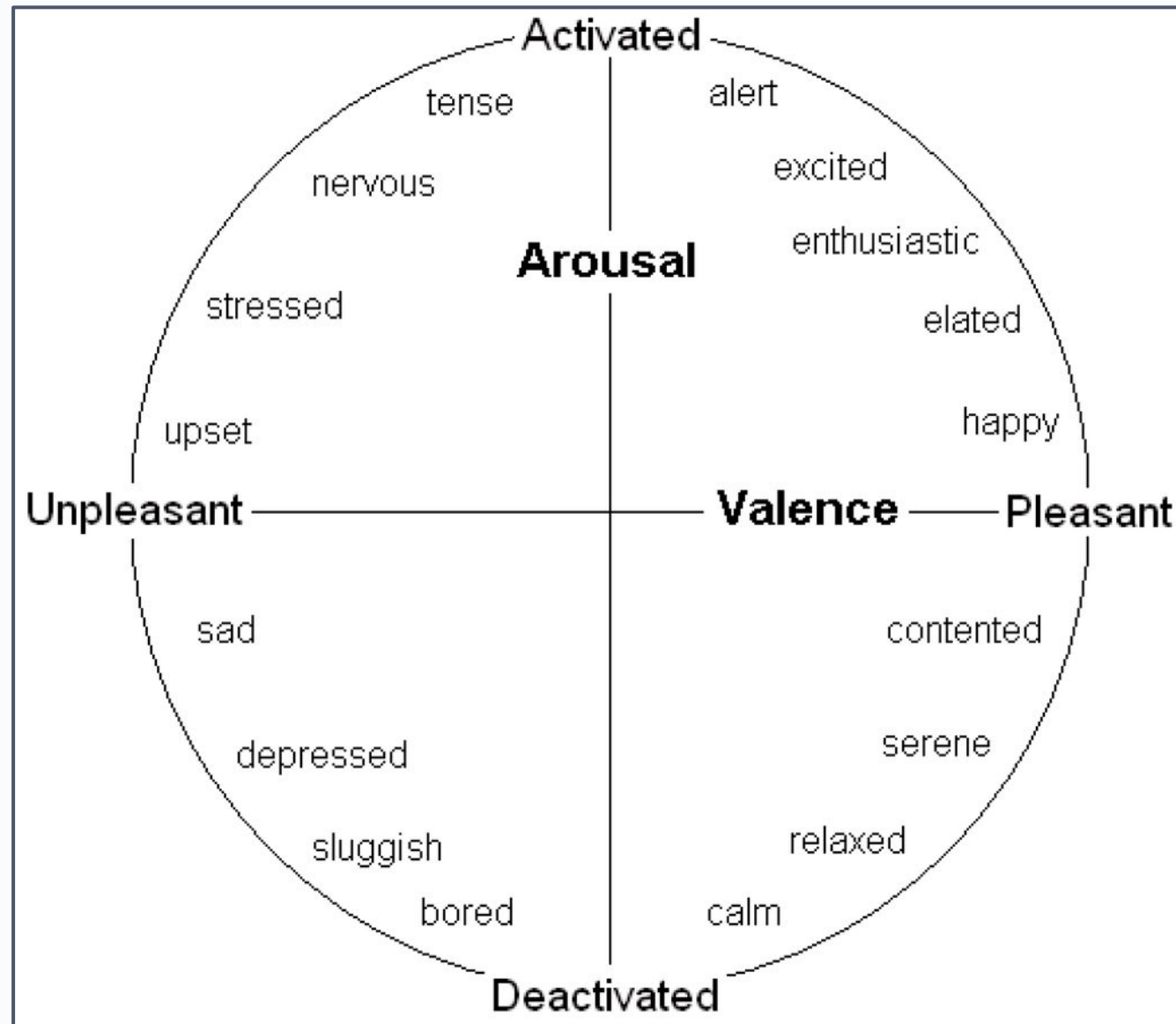
Emotion function	Organismic subsystem and major substrata	Emotion component
Evaluation of objects and events	Information processing (CNS)	Cognitive component (appraisal)
System regulation	Support (CNS, NES, ANS)	Neurophysiological component (bodily symptoms)
Preparation and direction of action	Executive (CNS)	Motivational component (action tendencies)
Communication of reaction and behavioral intention	Action (SNS)	Motor expression component (facial and vocal expression)
Monitoring of internal state and organism–environment interaction	Monitor (CNS)	Subjective feeling component (emotional experience)

Note: CNS = central nervous system; NES = neuro-endocrine system; ANS = autonomic nervous system; SNS = somatic nervous system.

2. Structure of emotions

- Dimensional models of core affect
 - Pleasure, arousal, strain/relaxation (Wundt)
 - Circumplex model: valence, arousal (Russell)

2. Structure of emotions



2. Structure of emotions

- Categorical models of emotions
 - Basic emotions - anger, disgust, fear, happiness, sadness, surprise (Ekman)
 - Complex and aesthetic emotions - joyful activation, nostalgia, peacefulness, power, sadness, tenderness, tension, transcendence, wonder (Zentner et al.)

2. Structure of emotions

- Locus of emotions (Gabrielsson)
 - Perceived emotions - external locus
 - Experienced emotions - internal locus
- Positive pull (Eerola)
 - Perceived emotions can be negative or positive (e.g. sad music), but experienced emotions are generally positive (e.g. nostalgia)
 - Likely due to absence of obvious material effect of music on well-being

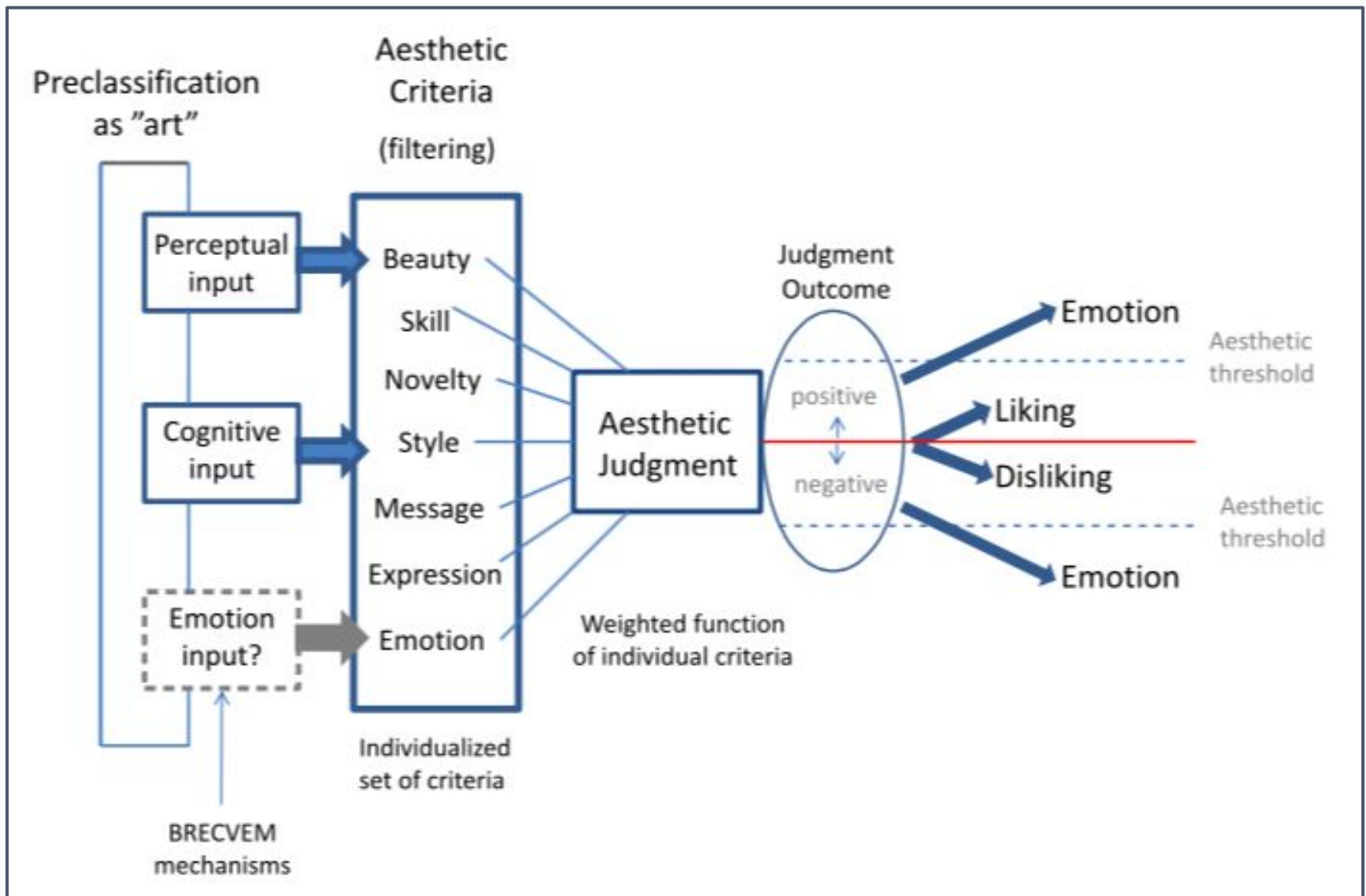
3. Mechanisms and modifiers

- BRECVEMA framework
 - Underlying mechanisms of emotional responses to music
 - Not fully tested yet, but provides an extensive, widely accepted set of hypotheses

3. Mechanisms and modifiers

Mechanism	Order	Survival value of brain function	Information focus
Brain stem reflex	1	Focusing attention on potentially important changes or events in the close environment	Extreme or rapidly changing basic acoustic characteristics
Rhythmic entrainment	2	Facilitating motor coordination in physical work tasks	Periodic pulses in rhythms, especially around 2 Hz
Evaluative conditioning	3	Being able to associate objects or events with positive and negative outcomes	Covariation between events
Contagion	4	Enhancing group cohesion and social interaction, e.g. between mother and infant	Emotional motor expression reminiscent of human voices
Visual imagery	5	Permitting internal simulations of events that substitute for overt and risky actions	Self-conjured visual images
Episodic memory	6	Allowing conscious recollections of previous events and binding the self to reality	Personal events in particular places and at particular times
Musical expectancy	7	Facilitating symbolic language with a complex semantics	Syntactic information

3. Mechanisms and modifiers



3. Mechanisms and modifiers

- Contextual modifiers of emotions
 - Music, listener and situation
 - Cultural knowledge
 - Musical expertise
 - Personality traits
 - Music preference

4. Methods and measures

- Self-report measures
 - Likert scales
 - Forced choice
- Standardised scales
 - PANAS - positive and negative affect schedule
 - POMS - profile of mood states
 - SAM - self-assessment manikin
 - DES - differential emotions scale
 - etc.

4. Methods and measures

- Peripheral measures (for experienced emotions)
 - Skin conductance response
 - Heart rate variability
 - Breathing rate
 - Facial electromyography
 - Temperature
- Chills
 - Self-reported
 - Measured (Benedek)

4. Methods and measures

- Neural measures
 - EEG - electroencephalography
 - MEG - magnetoencephalography
 - fMRI - functional magnetic resonance imaging
 - etc.
- Indirect measures
 - Reaction time
 - Perceived duration
 - Viewing time

5. Example: Salimpoor et al. (2009)

- Hypothesis
 - Relationship between increases in pleasure states and physiological indicators of emotional arousal

5. Example: Salimpoor et al. (2009)

- Participants and stimuli
 - 26 participants who experience chills as an intensely pleasurable response to music
 - 3-5 songs which reliably cause chills reported by each participant
- Conditions
 - 3 self-reported, pleasurable songs
 - 3 familiar, neutral songs from other participants

5. Example: Salimpoor et al. (2009)

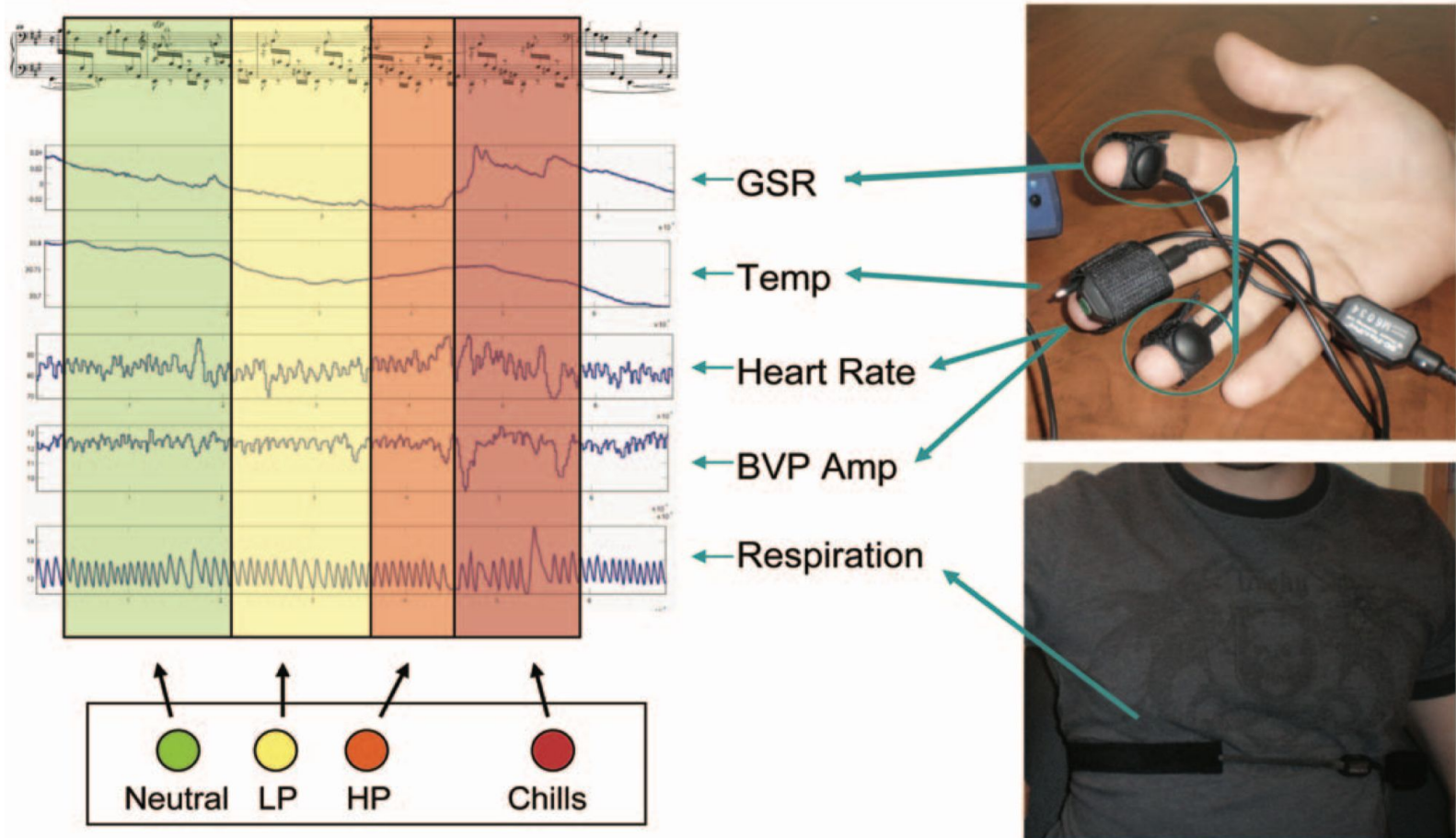


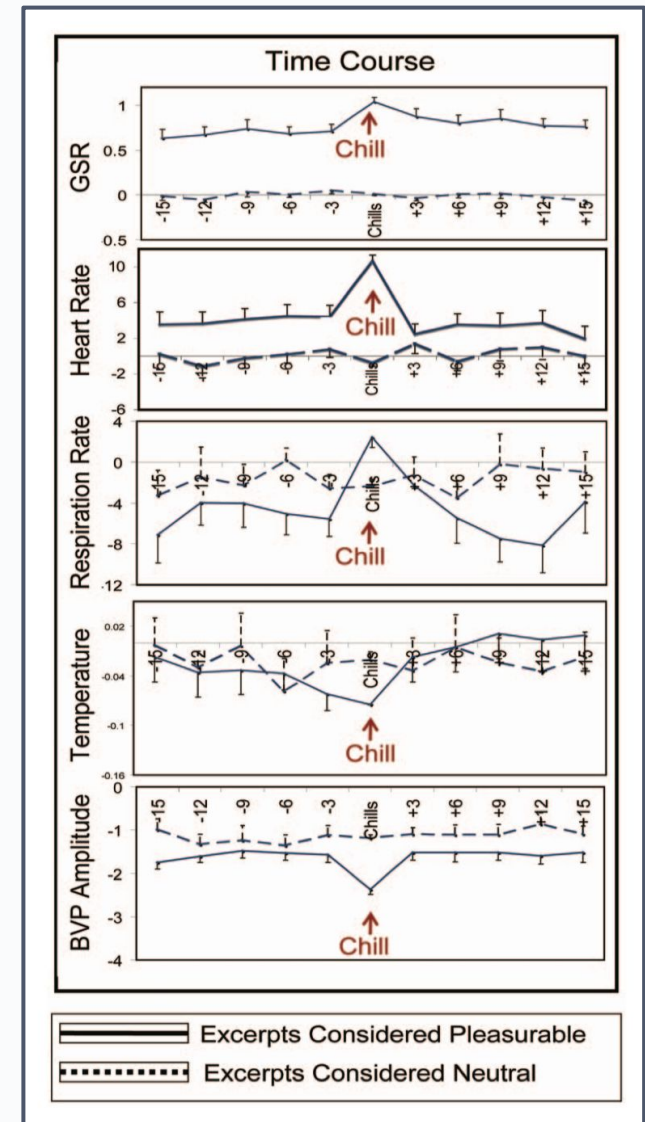
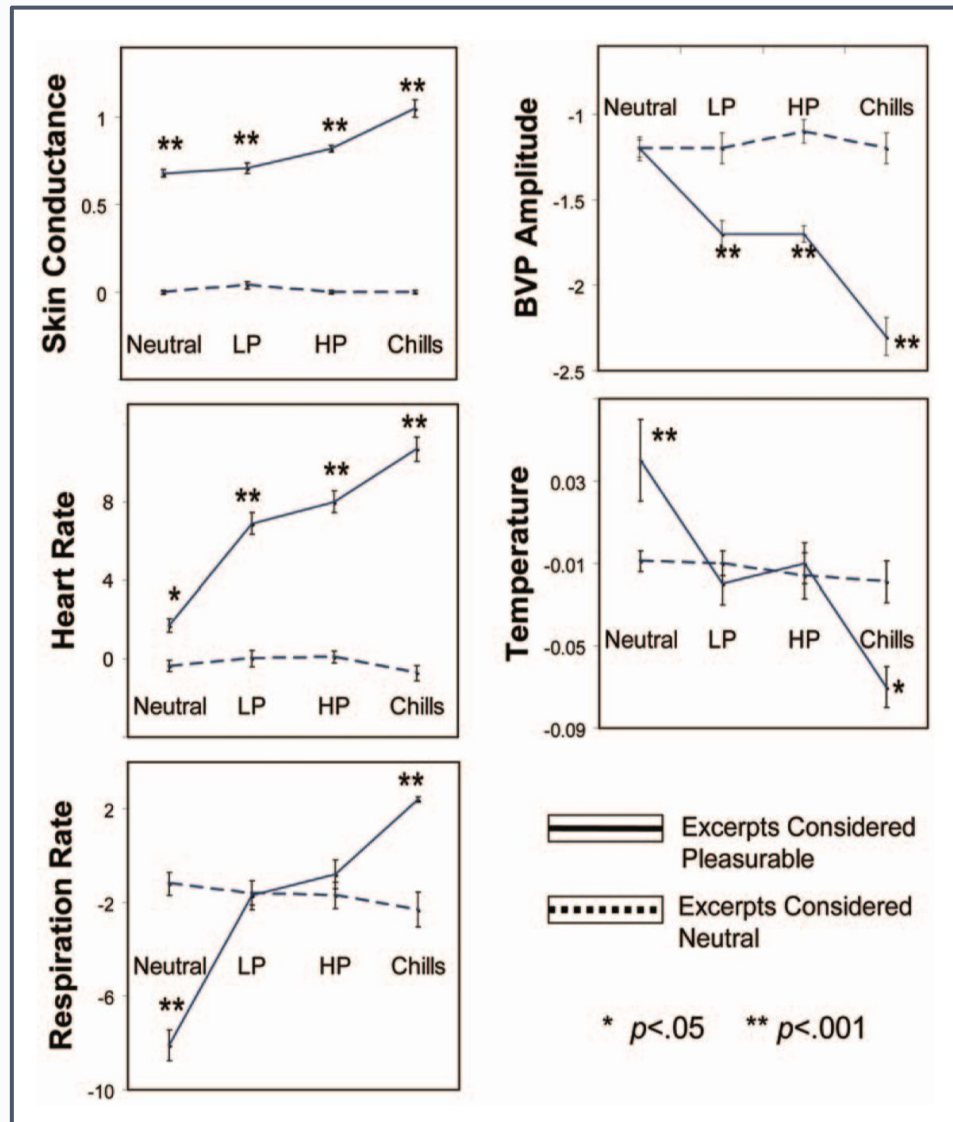
Figure 1. Assessment of Pleasure and Emotional Arousal. Emotional arousal was assessed through psychophysiological measurements of galvanic skin response (GSR), temperature, heart rate, blood volume pulse (BVP) amplitude, and respiration rate. Pleasure states were continuously obtained through subjective ratings of "neutral", "low pleasure", and "high pleasure" using a button box. Chills were also indicated through button presses. Psychophysiological correlates of each pleasure state were analyzed to determine systematic relationships between increases in pleasure and emotional arousal.

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5. Example: Salimpoor et al. (2009)

- Continuous subjective measures
 - Neutral / Low pleasure / High pleasure
 - Occurrence and intensity of chills
- Retrospective ratings
 - Intensity of chills
 - Pleasure felt in response to excerpt
- Physiological measurements
 - GSR, temperature, heart rate, BVP amplitude, respiration rate

5. Example: Salimpoor et al. (2009)



6. Current challenges

- Generalisability
 - WEIRD participants
 - Western art music
- Ecological validity
 - Artificial stimuli and lab environment
- Design limitations
 - Self-reports
 - Retrospective ratings
 - Causality