Listening Context and Listening Mode: Towards a Unified Approach for Examining the Connection between Music, Emotion, and Mood.

音楽聴取の背景と様式
―音楽、情動、気分の関係を分析するための統合的方法をめざして―

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September 29, 2020

ABSTRACT

A comprehensive investigation into music and emotion/mood research models (Eerola & Vuoskoski, 2013)[1] uncovered notable shortfalls in the selection of test instruments (primacy of classical recordings); limitations of testing conditions (clinical, theoretical, or self-reporting); opportunistic choice of test participants (selected out of convenience); and research practice following historical models (scientific or sociological methodologies). This paper sought to address these issues and presented a considered approach to sourcing music stimuli; identified a wider participant cross-section and testing options; and pinpointed the need for the application of a unified, interdisciplinary research method - a model that can integrate music's disciplines, forms, and types of engagement (ie. systematic musicology)[2] with a human's neural, physiological, behavioural, and expressive elements (ie. psychophysiology):

> (Systematic) Musicology today covers all disciplinary approaches to the study of all music in all its manifestations and all its contexts, whether they be physical, acoustic, digital, multimedia, social, sociological, cultural, historical, geographical, ethnological, psychological, physiological, medicinal, pedagogical, therapeutic, or in relation to any other musically relevant discipline or context. (Parncutt, 2007. Ibid.).

Scientific methodologies (biological/neurological) measure *physiological* responses at the expense of *psychoacoustic* responses - an assumption that clinical measurement techniques and algorithmic solutions present an efficient model to classify or explain the relationship between music and emotion/mood. Sociological methodologies (psychological/theoretical) suppose that *symbolic interactionism* or *structural functionalism* in music drives an emotional response and affects mood - an assumption that music is a semiotic system, and its constructs are either reflections of the cultural genre around which that music grew or inherent personality traits - and are imbued with messages and meaning. Therefore, this paper proposed a mixed method analysis to measure the true effect of music manifestations on emotion/mood.

Outlined in this document are four aspects central to performing a critical investigation into music vs emotion/mood: a) the need for clear principles and criteria in the curation of test instruments and test subjects, b) the importance of the listening context (profile, orientation, and acrophase) of respondents, c) the significance of the listening mode (cause-based, semantic-focus, or ambient-type) of respondents in the research process, and d) the recognition of music-induced emotions and their physiological/psychological triggers on respondents is temporal, as music means different things to different people at different times.

This paper annotated key musical stimuli (music elements/genres), examined listening contexts (situational macro-variables), and explored listening modes (cognition/appreciation factors) that impact upon listening experiences using a 5W+1H[1] inquiry method for compilation. Selected historical cases of claimed music-induced emotional responses or behavioural modification, as well as consciously constructed works by composers to elicit emotional responses, were presented side-by-side with theoretical templates used to map emotion/mood.

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[1] Eerola, T., and Vuoskoski, J. (2013, February). A Review of Music and Emotion Studies: Approaches, Emotion Models, and Stimuli. In *Music Perception. An interdisciplinary Journal.* Volume 30. Issue 3. pp. 307-340.

[2] Parncutt, R. (2007, Spring). Systematic musicology and the history and future of western musical scholarship. In *Journal of Interdisciplinary Music Studies.* Volume 1, Issue 1, pp. 1-32.

As music-listening experiences today integrate a substantial visual/interactive component in their consumption, via a proliferation of audio-visual device options (screen music, music video, promotional/commercial contents), a diverse range of samples were also included in the paper's discussion. The general recommendations and conclusions of this paper were that:

i)   in the development-stage of the music/emotion/mood research plan, it is paramount that a *curated menu* of test instruments, applicable across a *representative spectrum of listeners*, and measurable in *varying listening environments*, be created prior to undertaking research.

ii) using test instruments without a qualifying *listening context* template, and using test procedures without distinguishing *listening mode* foci, will diminish research results. Participant-profiling will determine listening backgrounds/purposes and fine-tune testing.

iii) via the lens of *systematic musicology* which encompasses all music disciplines, and an integrated quantitative/qualitative data collection and analysis or *mixed method* research model (Creswell & Plano Clark, 2011)[3], this will address shortcomings of prior research.

Categories & Subject Descriptors: systemic musicology; music therapy; music psychology; psychoacoustics; physiological response; cognitive penetration/recognition; music semiotics.
General Terms & Key Words: loudness/pitch; timbre/texture; consonance/dissonance; harmonics/resonance; groove/meter; monophony/homophony/polyphony/heterophony.
Additional Key Words: frisson/goosebumps; perception/perspective; familiarity/habituation; acrophase/circadian rhythm; genres/subgenres/microgenres; Mondegreen/McGurk effects.

INTRODUCTION

The composition of participants in music and emotion/mood research has largely been drawn from an easy-to-access field of institute attendees who are investigated in clinical surroundings. While emotion/mood research findings should apply broadly to any human, the absence of a background profile on respondents and their relative familiarity with music, music genre, and music engagement; the conducting of tests outside of the natural contexts of listening in homes, venues, or commuting; and the omission of real-world listening situations in a music study is incongruous with the nature of measuring humans for genuine response.

On Musicians: Clinical research determined that the act of *music performance* (doing)[4] gave greater emotional cardio-modulation than *music perception* (listening)[5]; that heart rate (HR) and its variability (HRV) were significantly greater during music performance than during music perception. It also indicated that conscious insight of a musically trained listener (incl. recording engineers) can increase the emotional effect of music and vice-versa[6] via the accumbens nucleus' two neural transmitters - *dopamine* (desire/reward) vs *serotonin* (inhibition/appetite). Additional clinical findings showed that musicians exhibited different patterns of emotion to non-musicians when listening[7], and that they mentally insert sounds while score-reading or composing or listening[8].

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[3] Creswell, J. and Plano Clark, V. (2011). *Designing and conducting mixed methods research*. Sage.
[4] Burunat, I., Brattico, E., Puolavali, T., Ristaniemi, T, Sams, M. & Tioviainen P. (2015). *Action in Perception: Prominent Visuo-Motor Functional Symmetry in Musicians during Music Listening*. PLoS ONE 10(9): e0138238.
[5] Francis, P., Furuya, S., Masuko, T., & Nakahara, H., (2011, June). International Journal of psychophysiology 81(3): 152-8. *Performing music can in duce greater modulation of emotion-related psychophysiological responses than listening to music*.
[6] Schaefer, H. (2017, November). Music-evoked emotions - Current Studies. In *Frontiers in Neuroscience*. 11:600. Retrieved from https://doi.org/10.3389/fnins.2017.00600
[7] Mikutta, C., Maissen, G., Altorfer, A., Strik, W, & Koenig, T. (2014, May 30). Professional musicians listen differently to music. In *Neuroscience*. Volume 268: 102-111
[8] Bailes, F., Bishop, L., Stephens, C., & Dean, R. (2012, December 3). Mental imagery for musical changes in loudness. In *Frontiers in Psychology*. Retrieved from https://doi.org/10.3389/fpsyg.2012.00525

> Musical training leads to sensory and motor neuroplastic changes in the human brain … suggests that motor training affects music perception. (Burunat et al. 2015. Ibid)

The research found that the musician's brain was wired to process music at a special level. Zatorre and Krumhansl (2003) were able to identify this core neural system. Parallel genetic research also suggested that a predilection for music was a hereditary trait[9]:

> Music depends on specific brain circuitry which dissociates itself from processing all other forms of sound including speech, song lyrics. (Zatorre & Krumhansl, 2003[10]).

Between *professional musician* and *general listener* is the *music aficionado*, and a test-group often omitted in research. "Mood" is secondary to their listening *raison d'etre*.

On Music Aficionados: A *music connoisseur's* listening primacy is with the creative and performative musical effects; artistry/virtuosic skills of the performer; and backstory/details of the composition. They can critique or judge a work against other versions or periods or genres. Listening for them is about absorbing a work in its entirety, rather than cherry-picking music-tracks or forming playlists. An *audiophile's* listening primacy centres on supreme high-fidelity sound reproduction. Audio technologies, components, power-sources, listening space, and collectable recordings define them. Jazz, AOR, and Classical are their preferred genres, as their listening-target is for their sound system to re-produce music as if the artists or band are in the room. From Alan Parsons, Grammy-winning recording engineer: "Audiophiles don't use their equipment to listen to your music. Audiophiles use your music to listen to their equipment."[11]

On General Listeners: A professional music-work's evolution takes the following pathway: from composer (creation) to performer (interpretation) to studio (manipulation) to stage (live-interaction) or consumer (passive-consumption). Along this continuum, the music's meaning and format have been subjected to inputs by multiple collaborative agents (songwriters, artists, studio-engineers, live-engineers, producers) by the time the final product reaches the listener's ears. On pre/post-release, the effects of commercial marketing (reviews, press, interviews) and peer-group factors (fan-club, social-media, peers) contribute to forming pre-conceptions and perceptions towards the musician and their music ie. listener responses can be pre-shaped by both internal (production) and external (conditioning) forces[12] impacting research implications.

Analogue to Digital: Platforms for music content delivery and consumption have significantly changed with the advent of the Digital Age in the early 21C. Digital music sales[13] account for over 80% of the music industry's revenue. The disruption to the physical music market (from vinyl/cassette/compact disc to downloading/streaming); the shift in delivery systems (from broadcast to narrowcast to pointcast); the developments in sound technologies (from mono to stereo to high-resolution); and the portability/functionality of devices (from fixed/passive to wired/interactive) have seen a quantum shift in consumption patterns. The sheer volume of content and levels of accessibility, connectivity, and penetration have ramifications on consumption patterns such as purchasing, valuing, interaction, and experience.

In Summary: User-portraits above illustrate three fundamental listener profiles - professional musician/engineer (informed listener), music aficionado (hobbyist listener), or music consumer (generalist listener). Each has subsets of listener-patterns (eg. audiophile: entry-level, hobbyist, hardcore, cult-influencer). Each core-stream or subset-user also engages with music in unique ways. In addition, market forces and new technologies add another layer of consideration for

[9] Driscoll, M., Bollu, P, & Tadi, P. (2020, July 31). *Neuroanatomy, Nucleus Caudate*. StatPearls Publishing. FL.
[10] Zatorre, R. & Krumhansl, C. (2003, January). *Mental models and musical minds*. Science. 298(5601):2138-9
[11] Waldrep, M. (2015, October 1). Real HD-Audio. *Alan Parsons: The Audiophile Mixup*. Retrieved from www.realhd-audio.com/?p=5260
[12] Brown, S. & Volgsten, U. (2006). *Music and manipulation: on the social uses and social control of music*. NY: London. Berghahn Books.
[13] Routley, N. (2018, October 6). *The visual capitalist: visualizing 40 years of music industry sales*. Retrieved from https://www.visualcapitalist.com/music-industry-sales/

research preparation. Therefore, profiling respondents prior to testing is critical to determine that test instruments (genre-materials, playback gear) match their daily environment; and that source-material selection matches user-profile experience - to prevent skewed research results.

Figure 1: Nature or Nurture: Cultural transmission, learning environment, environmental conditioning … or a hereditary trait? Driscoll, M., Bollu, P, & Tadi, P. (2020 Ibid.) proposed the latter - as evidenced in John Lennon (L.) to Julian Lennon (R.)[14]. Julian and his brother Sean followed in the musical footsteps of father, John.

"Too Late For Goodbyes" - Julian Lennon
Virgin, Charisma JL1 UK 1984 (7" Single)
https://youtu.be/DewlxVPyz4U

Figure 2: Cognitive penetrability: To what degree can a cognitive process consciously influence a listener? A father with Alzheimer's gains respite with his son[15], experiencing periods of lucid memory triggered by popular music. First reported therapeutic use of music was in 1789, from which evolved the Field of Music Therapy[16].

"Quando Quando Quando" - Father/Son: Car Karaoke
Teddy Mac Studios SAM004 2017 (Vinyl LP)
https://youtu.be/Pf0sFRm5yyI

The structure of this paper takes the following form:

Organized Sound: Description of music stimuli - in particular, the 7 Elements of Music as the core sonic components, used singly or in combination - and an annotated list of test-aspects used to measure music for emotion/mood response within each element.

Listening Models: A taxonomy of music types - genre, subgenre and microgenre - and a presentation of alternate models and real-world applications of music forms as a source-menu for the development of a fresh approach to test instrument design.

Music and Emotion | Mood: Defining the difference between emotion and mood; examining separate models of emotion and mood; and exploring the core research question of "Does music induce emotion?"

Listening Contexts & Modes: Investigating situations and macro-variables that shape listening experiences - via the 5W+1H lens of *"Who?, What?, Where?, When?, Why?,* and *How?"* - and selected historic samples of cognitive/perceptual behaviour enhancement claims.

Discussion and Conclusions: Overview and benchmark-samples of psychological triggers and techniques used by seminal composers to elicit both conscious and unconscious emotion/mood responses, and recommendations on developing a unified research model.

Special Note: Music examples listed in this paper include recording label and catalogue data from the music industry reference site DISCOGS (https://www.discogs.com); a reference liner-note for soundtrack insights; and in selected cases, a YouTube cue for music previewing. For maximum auditory/sensory impact, a quality listening environment (acoustically treated room-setting) and high spectral resolution equipment (audiophile-grade playback and speaker system) are recommended.

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[14] Morley, R. [Roberta]. (n.d.). *Beatles Sons and Daughters.* [Pinterest post]. Retrieved September 11, 2020.
[15] Carpool Karaoke. (2016, August 5). *Quando Quando Quando | The Songaminute Man.* [Video file]. YouTube. URL https://youtu.be/Pf0sFRm5yyI
[16] Howland, K. & Rogers, K. (2016, July). *Music Therapy.* Encyclopedia Britannica. Retrieved from https://www.britannica.com/topic/music-therapy

ORGANIZED SOUND - THE ELEMENTS OF MUSIC

The standard clinical approach used to measure and identify causal factors in music-emotion responses has been through the preparation of music stimuli drawn from the fundamental building blocks of music - its seven elements: *Melody, Harmony, Rhythm, Form, Tempo, Dynamics,* and *Tone Colour*. These sonic elements apply across all historical periods, genres, or cultural styles. Terminology in this paper follows a western music paradigm. Each descriptor below expresses in its simplest sonic form the characteristic of that element and a breakdown of the music test-cues used to generate responses from various clinical trial materials.

Melody: The rise and fall of sound. Experimental trials measured responses to pitch (sound) weight vs pitch range; pitch duration vs pitch induction; audio source vs simultaneous audio/visual (score) recognition; melody vs monotone samples; familiar melodic phrases vs altered melodic phrases; melodic shape variations; continuous vs sectional melodies; theme vs variations (augmentation, diminution, retrograde, sequence, inversion compositional devices); motifs and repetition; counterpoint/canon/fugue recognition and differentiation (simultaneous, multiple melodies in a song) etc.

Harmony: The blending of sound. Experimental trials measured responses to consonance and dissonance; chord progressions; melody v accompanied melody; functional v non-functional harmony; statement v stasis v waiting harmonic frameworks; tonal centres v chromaticism etc.

Rhythm: The distribution of sound-packets (notes) over a period-of-time. Experimental trials measured responses to simple rhythms v complex rhythms; syncopation etc

Form: The shape of a song - commonly recognized as chorus-verse-chorus. It is the song's plan or blueprint. Experimental trials measure recognition of returning phrases or sections; contrasts and variations etc.

Tempo: The speed or speed change in music either expressed as a word or a metronome setting (MM - Malzel's Metronome). Experiments in music-and-emotion measure beat vs no beat; beat vs metre; beat vs shifting beat; speed vs speed change etc.

Dynamics: Graduations of loudness and softness. Experiments in music and emotion in this element measure volume vs volume change; crescendo vs decrescendo; ranging volume change durations; impact of accents and articulations etc.

Tone Colour: The quality of sound which distinguishes one instrument (timbre); or group of instruments (ensemble, band, orchestra texture); or music genre/style, period, or ethno-music culture from another. Also referred to as sound texture, it has four forms - monophony, homophony, polyphony, and heterophony. Measuring for music-and-emotion included testing: tone (sine wave) vs noise (white noise); harmonic series detection (fundamental vs upper-partials); simple tones vs complex vibrations; psychoacoustics phenomena (mood, genre), and synesthesia phenomena (sound produces an inter-sensual results).

NB: Of all music elements, **tone colour** stimuli provided the highest percentage response-rate.

LISTENING DIET - MUSIC GENRES

Researchers in musicology define genre in a more cultural sense. Seminal researcher Philip Tagg (Tagg, P., 1987)[17] classifies music via a trichotomy - *art* (classical/formal) vs f*olk* (traditional/world) vs *popular* (mass-media disseminated/commercialized) ie. the notion that music can only be divided into three categories with variants of each described as "styles".

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[17] Tagg, P. (1987). *Musicology and the semiotics of popular music.* Semiotica. 66: 1-3. Mouton de Gruyter. Amsterdam.

Franco Fabbri (Fabbri, F. 1981)[18] likens music genres to "events" and describes sub-genres as different "sets" whose construct is determined by the various groups that adhere to them ie. "a set of musical events (real or possible) whose course is governed by a definite set of socially accepted rules". Further, we see his rule supporting micro-genres too:

> The notion of set, both for a genre and for its defining apparatus, means that we can speak of sub-sets like "sub-genres", and of all the operations foreseen by the theory of sets: in particular a certain "musical event" may be situated in the intersection of two or more genres, and therefore belong to each of these at the same time. For "musical event", the definition of "music" … any type of activity performed around any type of event involving sound.

Fabbri further describes the spawning of music genre "variance" as following both a semiotic (symbolism) and codifying (system) process:

> Of course, all the rules of genre are semiotic, since they are codes which create a relation between the expression of a musical event and its content. A new genre is not born in an empty space but in a musical system that is already structured. Therefore, a considerable part of the rules that define it are common to other genres already existing within the system, those that individualize new genre being relatively few.

Music-genre maps are visually represented as a "tree" ie. *broad genres* (eg. *Rock, Pop, Jazz, Classical, Folk, Country, Metal* et al) - as the main boughs of the music tree; *subgenres* (eg. *Soft Rock, Hard Rock, Art Rock, Folk Rock, Punk Rock, Glam Rock* et al) - as the branches of the music tree boughs; and *micro-genres* (eg. *Mumble Rap, Chillwave, Acidhouse, Hipster Hop* et al) - as derivatives of sub-genres or the leaves of the music tree. Google's "big data" algorithm (Figure 3.) sampled albums/artists from the 1950s~Present, representing genres as "streams" changing width to indicate permeance or influence:
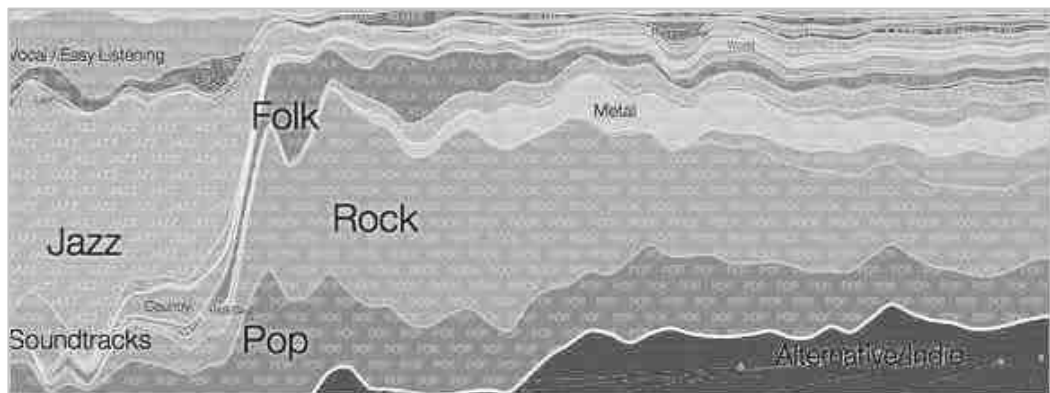

Figure 3. Google Big Picture & Music[19] | Album/Artist Statistics from 1950s ~ Present

General mapping or concept mapping for music genre classification usually takes the form of a pictorial visualization showing interrelationships ie. 2-D infographic or mind-map or genre-tree format to represent a *music genealogy* (Figure 5.). A more effective model is a systematic mapping approach in 3-D format ie. digital, online representation which allows for genre, sub-genre, micro-genre sizing-scale, adjunct genre background information, artist discography, playable track samples, and direct links to similar artists in the genre (Figures 4., 6., and 7.).

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[18] Fabbri, F. (1981). *A theory of musical genres: two applications.* Popular Music Perspectives. (ed. D. Horn and P. Tagg; 1982, Göteborg and Exeter: International Association for the Study of Popular Music, p. 52-81)

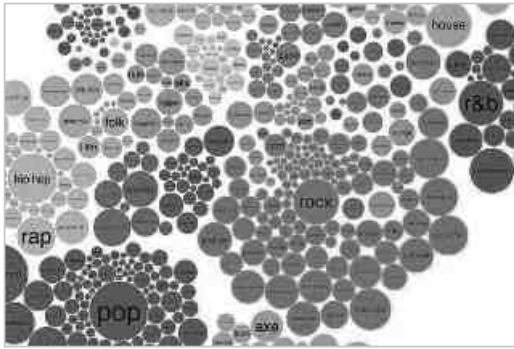[19] Big Picture Group | Google Brain (n.d.) *Music Timeline.* Google Research. Retrieved from http://research.google.com/bigpicture/music/#

Figure 4. 2-D and 3-D Bubble Mapping[20] | AI
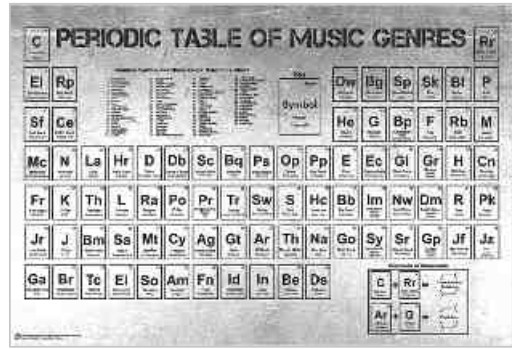
Figure 5. 2-D Periodic Table of Music Genres[21]

Figure 6. 2-D Text - Every Noise[22] | Scatterplot AI
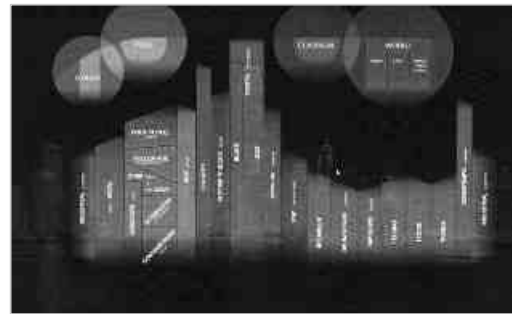

Figure 7. 3-D Musicmap[23] | AI

EXPLORING THE MUSIC GENRE "TRICHOTOMY"

Merging Tagg's (ibid.) trichotomy of genre streams (art | folk | popular) with Fabbri's (ibid.) concept of events (genre) and subsets (sub-genres), this musicology-based perspective examined music under its fundamental streams ie. "formal" or classical music (western music systems), "ethnocentric" or folk music (global music forms), and "mass-market" or popular music (distribution and consumerism) and provides a global structure for emotion | mood testing. In this paper, one style from each of these genre streams has been selected to include lauded artists and works of its type - *Art Music*, *World Music*, and *Adult Oriented Rock* (AOR).

ART MUSIC: As with terms *Early Music, Medieval, Renaissance, Baroque, Classical,* and *Romantic* periods, Art Music is its own distinct period, and is a form of music inspired by "Art". Spawned in the Romantic period (Late-19C), the main catalysts for change were wars (WW1, WW2), breakthroughs in science (Einstein & Schrodinger), birth of psychoanalysis (Freud & Jung), new wave paintings/sculptures (Picasso & Rodin), and a new language of music tonality (Debussy & Schoenberg).

Prior to 1900, the principle of organizing pitch around a central tone was the governing music system. For hundreds of years prior to the 20C, composers had created an interrelationship of tones and chords - "tonic would follow dominant" (first and fifth degrees of a scale), and substituting one chord for another created suspense, melancholy, or emotion. "Art" musicians

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[20] Lamere, P. [Peter] (n.d.). *Music Pop-corn.* [Web]. Spotify for Developers - Web API. Retrieved from https://developer.spotify.com/community/showcase/music-popcorn/

[21] Zapista A. (2019, July 6). *The Periodic Table of Music Genres.* [Poster] Retrieved from http://www.posterswholesale.com/resize/Shared/Images/Product/Periodic-Table-of-Music-Genres/51519.jpg

[22] McDonald, G. [Glenn] (n.d.). *Every Noise At Once.* [Web] Retrieved from http://everynoise.com

[23] Crauwels, C. [Kwinten] (n.d.) *Musicmap | The Genealogy and History of Popular Music Genres.* [Web] Retrieved from https://www.musicmap.info/

of the 20C dispensed with this conventional approach. There was now no hard-and-fast rule for how tones must relate to each other. And with technology advancements in transportation, communication, and recording, 20C composers were able to access a wider range of music for inspiration. Creativity became borderless, and internationalization was a driving force. Music from different continents and cultures was like a painter's palette for the composer of the 20C.

Music reaches our ears in four textural varieties: *monophony* (a single-line), *homophony* (primary-line with backing), *polyphony* (multiple, independent lines), *heterophony* (simultaneous single-line variations). Polyphony - both tonal and atonal - drives the construct of music in this Art period. It is very texture-rich with a convergence of diverse tone-colours and complex harmonies. Below (Figure 8.) are ten critical works from each sub-genre of this period. While some of the pieces featured (especially *Impression, Neo-Classicism, Folk, and Nationalism*) are easier to consume as they fit a tonal "comfort zone", other samples in this sub-genre take time and perseverance to understand. Each contains a liner-note descriptor. Given the complex compositional techniques, rich texture soundscapes, and extended-duration recordings, the Art Music genre is a particularly powerful source-material test instrument field for *music aficionados* - in particular "music connoisseurs" - from which to draw selections.

IMPRESSIONISM: CLAUDE DEBUSSY | "Prelude to Afternoon of a Faun" | Columbia ML 5112
Inspired by a poem. Debussy's most famous work. Changed the course of music composition.

NEO-CLASSICISM: GUSTAV MAHLER | "Symphony No.2" | Decca 325-6
Renowned for large symphonic orchestras, No.2 is one of Mahler's most-loved works.

EXPRESSIONISM: ARNOLD SCHOENBERG | "Five Pieces for Orchestra" | Philips 838 409 AY
A musical-heavyweight. Exponent of the initially divisive, atonal 12-Tone Row Technique.

FOLK | CULTURAL MUSIC: BELA BARTOK | "Romanian Folk Dances" | Deutsche Gram. 415 668-1
Celebrated for his String Quartets, he had a lifelong passion for writing/collating Folk-music.

NATIONALISM: AARON COPLAND | "Fanfare for the Common Man" | Turnabout TV 34169
Inspired by speech of a US VP. His works are a significant part of American national psyche.

SERIALISM: KARLHEINZ STOCKHAUSEN | "Kontakte" | Deutsche Grammophon 138 811
A great name in 20|21C music, but his work was a radical departure from traditional tonality.

MUSIQUE CONCRETE: PIERRE SCHAEFFER | "Apostrophe" | Doxy DOZ401
Approach was to "collect" concrete sounds rather than sounds generated by music notation.

ALEOTORIC | CHANCE MUSIC: JOHN CAGE | 4' 33" | Sonoros Records SON-030
Introduced concept "any sounds constitute music". In this case, audience generated sound.

ELECTRONIC MUSIC: EDGARD VARESE | "Poeme Electronique" | CBS Masterworks MP 38773
Electronic work for playback in a pavilion. Created "noises not considered musical".

AVANT-GARDE | EXPERIMENTAL: OLIVER MESSIAEN | "Exotic Birds" | Victor VIC-28044
A Composer/Ornithologist – Messiaen combined his two passions: music + birdsong.

Figure 8. Art Music: sub-genre name, composer, liner-note, composition title, and catalogue data

All Art Music is underpinned by a primacy on expressing meaning over form or beauty. Avant Garde or Experimental Music is a powerful music style with which to generate an emotional response. A standout musical experience is "Threnody for the Victims of Hiroshima" (1960)[24].

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[24] Bannach, A. (2013). *An extended analysis of Krsysztof Penderecki's Threnody to the Victims of Hiroshima.* Retrieved from http://www.anthonybannach.com/uploads/2/1/6/7/21674290/pendereckipaper.pdf

As human-horrors go, instantaneous mass-destruction is the most extreme. Lauded Polish composer Krsysztof Penderecki sought to represent this great human tragedy through a deeply considered work and in a sonic format that aimed to capture this horrendous moment in time. Penderecki realized that relying on traditional forms of music notation and instrumental performance techniques would fall short in expressing his full idea - hence his annotated and graphical score (Figure 9.). This is a remarkable work, and a pivotal composition of the late 20C with the capacity to draw out strong emotional responses in its listeners, regardless of their music grouping or music background. Using 52 string instruments, and the sonic phenomena of *sonorism* (a focus on timbre, texture, and dynamics elements) Penderecki places us "virtually" in Hiroshima, Japan at 8:15am on August 6, 1945.
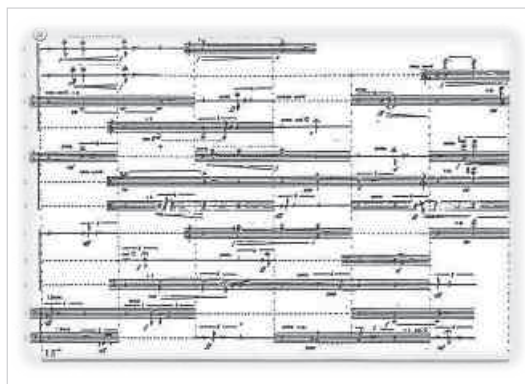
"And here an important question arises, whether in the context of modern music's achievements in the field of construction, harmonics and tone quality, the traditional system of notation is still operative. Undoubtedly, this notational system has been most efficient in the time of Mozart, or even Debussy. In relation to the music of that period, it was the most adequate form (then known) of transmitting the composer's idea to the performer. However, music from that time progressed, while the notational system, which, after all, is a par excellence convention, remained." (Penderecki. Ibid.).

Figure 9. Score Excerpt[25]: "Threnody to the Victims of Hiroshima" (1960)[26] Krsysztof Penderecki.

WORLD MUSIC: This genre-label was first used to define non-Western music in the 1960s. It gained further prominence as a term from the 1980s, and now is applied to "non-English" music. The genre-title's aim appears to bundle the music of the world's cultures (whether indigenous, cultural/folk, cultural/fusion etc) under one heading - ostensibly for the convenience of the music-industry, the media, and the merchandizers (Pachet & Cazaly, 2000)[27]. However, in the last decade, this classification is now seen as controversial and outdated, and at times, a disparaging and patronizing term. But placing the politics of nomenclature aside, the focus here is purely on the music and its broad range of timbres, rhythms, and capacity to trigger emotion or mood.

The indigenous or traditional music of each country has its own genres and sub-genres eg. South Pacific (*Waita* | Love-songs/Lullabies; *Karanga* | Ceremonial; *Moteatea* | Chants - of Maori-New Zealand) or in the Orient (*Hogaku* | 邦楽 | Country Music; *Gagaku* | 雅楽 | Court Music - of Japan). It is when musical "cross-pollination" or fusions of traditional-and-western styles occur that we see bands appear such as *Ladysmith Black Mambazo* (South Africa), *The Gipsy Kings* (France/Spain), *The Chieftains* (Ireland), and *Buena Vista Social Club* (Cuba) grouped as "World Music" when promoted outside their own native country.

Music & Nations: Each of the world's 235 countries or dependencies has its own national music-identity, regional music-identities, and sub/micro-genres. Additionally, there is a fusion or intermingling of genres across borders ("worldbeat"), and a nation's own millennia-old music ("indigenous"). This provides so many permutations and combinations of musical possibility. The tuning systems, tonality/atonality, timbral qualities, and language variance add even more layers to peel-back to try to understand and absorb their music content.

[25] Penderecki, K (1960). *Threnody for the Victims of Hiroshima*. [Score]. Alfred Music. SB00902.

[26] Pang, A (1960, June 25). *Twin Peaks 2017 - The atomic bomb (July 16, 1945)*. [Video]. YouTube. URL https://tinyurl.com/yco7me8x

[27] Pachet, F. and Cazaly, D. (2000, January). *A Taxonomy of musical genres*. Conference: Computer-Assisted Information Retrieval - RIAO 2000, 6th International Conference, France. Proceedings.

Sourcing & Selecting Samples: World Music Festivals (WOMAD[ii]), World Music awards (WOMEX[iii]), World radio (public broadcast stations, web-streaming events), and World Charts (Billboard [iv] World Album Charts), are the most prominent conduits for content and information on current and historical world music artists and music forms. Curating a selection of suitable recordings is challenging, as the genre of World Music is both voluminous and diverse. From steel drums to throat singing to pan-pipes to mbiras, the instrumentation-diversity and timbral variations alone are enormous, as this Mongolian band demonstrates:

> **Wolf Totem (2018)** The HU | Eleven Seven Music ESM-569-1
> Integration of traditional instrumentation, Mongolian throat harmony, and fusion with Heavy Metal.

A strategic approach is to collate a "regional" sampling of tracks for sourcing mood/emotion test instruments in this genre. Using the Olympic Games "five rings" concept as a grouping model and sampling a representative artist/band from each of the Games' "five continents", this shortlist can generate a sufficient variety of soundscapes for *global representation* as well as *indigenous* vs *internationalized* forms. Selections can be refreshed by choosing alternate countries within a region, or solely focusing on a region's sound-world. Figure 10. (below) is an application of a five-continents | five nations | five seminal artists sampling approach ie. two versions from or by the same artist/s are provided for a sonic A|B comparison-test.

[A] *original/native* style vs **[B]** *commercialized/westernized* form ie. the cultural | indigenous identity, followed by its fusion of western popular music (aka "Worldbeat"):

[A] ORIGINAL | NATIVE SOUNDSCAPE

AFRICA   **STH AFRICA | LADYSMITH BLACK MAMBAZO "Shaka Zulu" (1987)** | Warner 9255821
All male a cappella/choral group with repertoire performed in Zulu dialects

ASIA   **JAPAN | YOSHIDA BROTHERS "Ibuki" (1999)** | Victor VZCG-161
Traditional Japanese instrumental music (Tohoku area) - using shamisen (tsugaru-jamisen)

EUROPE   **FRANCE/ANDALUSIA | GIPSY KINGS "Gitana Negra" (1988)** | Sony 88725475882
A fusion of rumba, salsa, and flamenco styles

OCEANIA   **AUSTRALIA | INDIGENOUS MUSIC** From "Yothu Yindi" band's **Arnhem Land Region**
Music of northern-Australian indigenous tribes utilizing traditional instruments

AMERICAS   **BRAZIL | JORGE BEN "Mas Que Nada/Chove Chuva" (1977)** | RCA JD-11092
Fusion of bossa nova, samba, baiao, Musica Popular Brasileira (MPB) ie. Portuguese language music

[B] COMMERCIALIZED | WESTERNIZED FUSION

AFRICA   **SOUTH AFRICA | PAUL SIMON・LBM "Graceland" (1986)** | Warner 1-25447
In partnership with Paul Simon (of Simon & Garfunkel) LBM became internationally known

ASIA   **JAPAN | YOSHIDA BROTHERS "Rising" (2005)** | Sony Records SRCL-5866
Fusion of western and traditional instruments (percussive shamisen with electrophones)

EUROPE   **FRANCE/ANDALUSIA | GIPSY KINGS "Bamboleo" (1987)** | P.E.M. GK 001
Fusion of rumba-flamenca with pop styles

OCEANIA   **AUSTRALIA | YOTHU YINDI "Treaty" (1991)** | Mushroom K10344
Aborigine and non-Aborigine member band fusing indigenous/western sounds and themes

AMERICAS   **BRAZIL | SERGIO MENDES "Mas Que Nada" (1966)** | A&M TOP-1095
Bossa nova, jazz, Latin, funk crossover music strongly influenced by Brazilian rhythms

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Figure 10. World Music test-instrument curated track samples, label data, and video reference.

AOR: The "AOR" acronym can be a little confusing, but it refers to *Adult Oriented Rock* - a subgenre of Rock originating from the late 60's. It is often confused with *Album Oriented Rock* (a radio-broadcast format featuring tracks from *Albums* - in contrast to mainstream-radio that plays *Singles/Hits*), and also with *Arena Oriented Rock* (as its name suggests, highly produced music-and-stage events for stadium shows). Musically, they share some of the same characteristics - album-focused, adult-themed, memorable melodies/hooks/riffs, iconic lead vocalists, and stand-out guitar solos.

Some of Adult Oriented Rock's distinguishing features are: that it shies away from the *Glam Rock* (aka Arena Oriented Rock) spectacle and anthem-type choruses/chants; it is musically more elaborate than the *Soft Rock* (aka White/Safe Rock) conventional/predictable format; and it is non-reliant on Album Oriented Rock's boutique radio-programming format (aka Long-play vs Hit-play) for longevity/appeal. Adult Oriented Rock is about melodic | harmonic | rhythmic | formatic layers of musical sophistication - stylistics borne-of or shared-with the following sub-genres such as *Progressive Rock* ("Jethro Tull"), *Symphonic Rock* ("Electric Light Orchestra"), *Art Rock* ("Pink Floyd"), *Classical Rock* ("Queen").

As a result, the performative standards, studio production benchmarks, and thematic material make this genre a suitably broad test instrument for drawing emotion/mood responses from professional musicians (informed listener), music aficionados (hobbyist listener), and music consumers (generalist listener), as they dovetail with the dynamic of each respondent's listening-profile. However, as with the previous genre discussed - World Music - the catalogue of AOR recordings is similarly immense. Track or album choice requires a process to filter or guide recording selections for appropriate content. For this paper, two industry professionals linked to the author provided a list of their Top-10 most influential AOR albums - from the perspective of their life's work ie. a Grammy-winning Pop Music icon of the 1970s/1980s and a notable AOR Music Journalist and Music Producer.

One Man Band[28]: Leo Sayer (http://www.leosayer.com/) has a five-decade career in the music industry; sales of more than 80 million records globally; and is an award-winning singer-songwriter respected for his deep knowledge of the rock industry. One of Sayer's signature looks was his "Pierrot" character to reflect an inner sad, lonely figure - notable in his ballad "One Man Band". The solo "ballad" is a type of musical Shakespearean soliloquy in which the artist is pouring out their heart in song form - expressing feelings and emotions which may resonate with the listener or research-respondent - particularly an aficionado or fan.

Sayer (L. Sayer, personal communication, April 18, 2020) was tapped for his AOR selections (Figure 11.) as his profile as a music performer and aficionado provided dual perspectives. In addition, he offered interesting backstories on each recording, most notably on the Beach Boys' album "Holland" (1973) which critics decried on its release, though now regarded as a musical masterpiece - and also on album **"Dreamer"** (1974) by soul/blues vocalist Bobby Bland:

> Bobby could neither read nor write. Michael Omartian, the album producer, had to whisper the words of the lyrics into Bobby's ear line-by-line for each song during the recording session. I wrote some of the songs on this album too. And with Larry Carlton and Dean Parks on guitars, and Ed Greene on drums, the artists involved in the Bobby Bland production certainly were the crème-de-la-crème of the 1970s. Omartian was also the person who discovered and produced Christopher Cross.

These types of recording and production insights are just the fodder that music aficionados crave ie. the inside stories by the creators and performers of iconic recordings that provide additional, fresh listening dimensions on the next play. This backstory/knowledge of the source material by a researcher can also be used as a trigger to prepare or draw-out deeper reactions from music aficionados. Understanding the respondent's "culture" (eg. fan/aficionado) is critical to unpacking and synthesizing their emotional responses to content.

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[28] Rawkhead1. (2008, November 24). *One Man Band.* [Video]. YouTube. URL https://youtu.be/dli_cWbS6WY

①	**"Blood On The Tracks" (1973)**	Bob Dylan | Columbia 33235
②	**"After The Gold Rush" (1970)**	Neil Young | Reprise Records RS 6383
③	**"Songs In The Key Of Life" (1976)**	Stevie Wonder | Tamla T13-340C2
④	**"Bop Till You Drop" (1979)**	Ry Cooder | Warner Bros. Records BSK 3358
⑤	**"Ladies Of The Canyon" (1970)**	Joni Mitchell | Reprise Records RS 6376
⑥	**"Dreamer" (1974)**	Bobby Bland | ABC/Dunhill Records DSX-50169
⑦	**"Holland" (1973)**	The Beach Boys | Reprise Records MS 2118
⑧	**"Heavy Weather" (1977)**	Weather Report | Columbia PC 34418
⑨	**"Arc Of A Diver" (1980)**	Steve Winwood | Island Records ILPS 9576
⑩	**"Live" (1975)**	Bob Marley and the Wailers | Island Records ILPS 9376

Figure 11. Leo Sayer - AOR "Top-10" most influential album samples, label data, and video reference

AOR and the Orient: Toshiki Nakada is a music journalist/author, music producer, and record label owner (180+ CDs released), and a recognized AOR authority based in Tokyo, Japan. His magazine AOR AGE (https://www.shinko-music.co.jp/series/aor-age/) is a top-selling music publication. Nakada's other claim-to-fame is as the liner-notes' writer/translator for US & UK albums released in Japan since the 1980s (400+ Albums). He is associated with some of the most recorded and recognized musicians in the industry. In an interview (T. Nakada, personal communication, April 17, 2020) he described the two forms of local AOR music connoisseur:

> In Japan, we tend to divide AOR fans into two groups – the "atmosphere" type and the "data" type. The atmosphere types enjoy and care about the mood. AOR-aired music here is not of a specific genre, but comes from many different styles - jazz, soul, rock, bossa etc. On the other hand, the data types are most interested in the facts: who produced it, who performed the backing, who wrote the lyrics etc. If, for example, they know that a piece is produced by David Foster, or that Steve Lukather is playing guitar on it, they buy it without thinking twice.

Nakada also provided his personal **"TOP 10"** AOR Albums (Figure 12.). He stated that it was a difficult task for him to objectively narrow his choice to "ten", especially after having met, interviewed, and formed friendships with the likes of David Foster, Joseph Williams, and many others over four decades. Of interest was Nakada's final choice on the list **-** Randy Goodrum. Pressed for "just one" album, he found this the most difficult, as Randy's body of work, list of awards - from *Nashville Songwriters Hall of Fame* to *Artist Grammy Awards* - and the respect of his peers, are substantial. An "emotional connection" to an artist can impact objectivity.

①	**"Airplay" (1980)**	Self-titled | RCA Victor AFL1-3099
②	**"Maxus" (1980)**	Self-titled | Warner Bros, Records BSK 3634
③	**"Gaucho" (1984)**	Steely Dan | MCA Records MCA-6102
④	**"Pages" (1981)**	Self-titled | Capitol Records ST-12123
⑤	**"Nightwalker" (1980)**	Gino Vannelli | Arista AL 9539
⑥	**"If That's What It Takes" (1982)**	Michael McDonald | Warner 923703-1
⑦	**"Anywhere You Go" (1985)**	David Pack | Warner Bros. Records 1-25336
⑧	**"Sneaker" (1981)**	Self-titled | Handshake Records FW 37631
⑨	**"Toto IV" (1989)**	Toto | Columbia FC 37728
⑩	**"Caretaker Of Dreams" (1993)**	Randy Goodrum | NOVA 9352-2

Figure 12. Toshiki Nakada - AOR[29] "Top-10" most influential album samples, label data, and video reference.

Sonic Risks: Musically, performatively, and production-wise, iconic albums such as "Kind of Blue", "Brothers In Arms", and "Hotel California" are all excellent works. But their downside is over-exposure due to sonic-familiarity (no element of surprise) or awe-factor (fan-worship) or over-use (mundane/prosaic/cliché music). Known as *habituation effect*, test conditions need

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[29] Nakada, T. (2014). AOR Disc Collection. (800 Discs). Shinko Music. ISBN-13: 978-4401638956

to account for the pre-existing listening diet of respondents. Repetition decreases the impact of stimuli and, as a result, diminishes the emotional response sought in the research.

Related Genre: The genre *Adult Contemporary*, also referred to as *Middle-of-the-Road Music*, *Easy Listening Music*, and *Yacht Rock* (eg. music of Frank Sinatra, Burt Bacharach, Dionne Warwick, Michael Bolton, Adele et al) shares certain AOR features, but differs in construct. It is heavily into romantic or sentimental themes, ballad focused, acoustic instrument driven, and uses synthesized or orchestral backing. It draws from the *Soft Rock* genre, and encompasses rock, pop, soul, and blues music-elements. Its unimposing and inoffensive nature makes it suitable for arena-orientated events to broadcast to background/elevator/call-waiting music. With its softer-textured form, and primacy of lyric-narrative and performer imagery, it has a more subtle impact and likely to stir *memories* and *nostalgia* as core responses.

EXTENDED LISTENING

The rise of the vinyl LP (Long Play: 10~12 tracks | ~45min) and vinyl EP (Extended Play 2~4 tracks | ~15min) in the 1950s, listening to music meant designating time - an extended listening time. These audio products were created to be played in one session and in track-order, rather than a cherry-picking of tracks or creating play-lists. The following eight albums (Figure 13.) are highly respected amongst professional musicians, music connoisseurs, and audiophiles worldwide, and the tracks are drawn from the broad music genres of *Rock, Jazz, Classical, World, Film, Blues, Experimental,* and *Ancient* Era. Each is a "concept album" designed to take the listener on a musical journey - for the listener to give undivided listening-attention to as they would when reading a novel or watching a movie.

ROCK: "Sgt. Pepper's Lonely Hearts Club Band" (1967) - The Beatles (Lennon-McCartney)
One of the earliest Rock Concept Albums, songs segued into each other - not separate tracks.
Capitol Records SMAS 2653 | Psychedelic/Pop Rock

JAZZ: "Maiden Voyage" (1965) - Herbie Hancock
Concept Album with the "ocean" as its theme-source for music/atmospherics.
Blue Note Records BLP 4195 | Hard Bop Jazz

CLASSICAL: "Scheherazade" - Opus 35 (1888) - Nikolai Rimsky-Korsakov
A symphonic poem, based on The Arabian Nights, melding oriental and Russian themes.
Deutsche Gramm. SLPM 139 022 (1967) | Classic/Romantic

WORLD: "Buena Vista Social Club" (1997) - Afro-Cuban All Stars & Ry Cooder (Producer)
A studio album, it was a revival of traditional Cuban ballad/music forms.
World Circuit WCD 050 | Afro-Cuban Jazz

FILM-MUSIC: "Bullitt: Original Motion Picture Soundtrack" (1968) - Lalo Schifrin
Movie music has received the scorn of music critics - yet celebrates the greatest composers.
Warner Bros Seven Arts Records WS 1777 | Smooth/Funk Jazz

BLUES: "It Serve You Right To Suffer" (1966) - John Lee Hooker
John Lee Hooker was partnered with the greatest session-musicians of the time on this album.
His Master's Voice CSD 3542 | Delta Blues/Electric Blues

EXPERIMENTAL: "Eight Lines" (2000) - Steve Reich
Originally composed/performed in 1979, its origins are experimental, serial, avant-garde music.
Nonesuch 7559-79481-2 | Minimalist/Electronic Music

ANCIENT: "Salve Regina" (1987) - Benedictine Monks of the Abbey of Saint-Maurice
Composed in the Middle Ages (11C), it epitomizes traditional, ancient western-religious tonality
Philips 420 879-2 | Gregorian Chant/Medieval

Figure 13. Annotated Concept Album play-list.

Concept albums make for a fresh test instrument model in measuring emotion and mood responses. While vinyl formats may not be as easily accessible, their digital versions are readily available as physical data or streaming/download, and their play-duration has a reasonable time duration. Contemporary artists are exploring even longer-form releases, as they do not face the time/size limitations of vinyl. Drake (Aubrey Drake Graham | Producer, Singer, Songwriter | Rap/Hip Hop Genre) released the album "Scorpion" (2018) with a staggering 25 tracks and listening time of 90 minutes. However, producers and artists believe current listener attention spans do not stretch that far, and do not recommend single-sitting listening session. There is a notable research gap in the evaluation of extended listening experiences vs emotion | mood.

INFORMED LISTENING

Informed listening as it relates to music involves the skills of discriminative and critical analysis - a skillset of professional musicians and music aficionados. Not only do these types of respondents provide cognizant answers to emotion and mood, but they can also explain what they have heard and the music's construct. Regarded as one of the most iconic of movie soundtracks, "Jaws" (1975) leans heavily on the soundscape and motifs created by Stravinsky and Debussy some 70 years before. Almost every adult-aged person would be familiar with the original theme, but only formal tuition or an aficionado would be aware of the music history of the lush compositions that pointed the way for its composer, John Williams.

The ballet "The Rite of Spring" (1913) and the symphonic sketches "La Mer" (1905) both had checkered public launches - rejected by audiences and critics due to their tonality/atonality mix for the times - generating physical violence in during the ballet (The Rite of Spring) and described as "agitated water in a saucer"[30] rather than imagery of the sea in the symphonic performance (La Mer). Today they resonate for both the experienced and amateur listener alike.

"The Rite of Spring | Le Sacre Du Printemps" (1913) - Igor Stravinsky
The ballet soundtrack that caused a riot in the theatre at its opening.
Columbia Masters MS 6319 (1961) | Classical/Neo-Classical

"La Mer | The Sea" (1905) - Claude Debussy
Three-part symphonic sketch, initially not well-received, now one of Debussy's most admired.
CBS Masters 32 11 0056 (1966) | Classical/Neo-Classical

"Jaws: Original Motion Picture Soundtrack" (1975) - John Williams
Film score derived its themes and treatment from the works of both Stravinsky and Debussy.
MCA Records MCA-2087 | Modern Classical/Soundtrack

Figure 14. Informed listeners would be able to detect the compositional characteristics that inspired Williams.

These works had in common the use of sudden dissonant sounds or chords; high-pitched musical shrieks; or an absence of a beat to induce a dream-like state. Blumstein, Bryant, and Kaye (2012)[31] propose that biologically ingrained triggers explain why such sonic treatments stir fear, chaos, and apprehension. The marriage of the music with the visuals in "Jaws" augments the experience. In the Chicago Symphony Orchestra's "Sound & Stories" magazine[32], John Williams described his "Jaws" theme as "grinding away at you, just as a shark would do, instinctual, relentless, unstoppable. I just began playing around with motifs that could be distributed in the orchestra and settled on what I thought was the most powerful thing, which is to say the simplest." The simplest refers to his motif alternating between two

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[30] Branger, J. (2019, January). Un critique musical et musicologue a l'ecoute de son temps: Louis Schneider et Claude Debussy (1895-1934). In *Revue de musicologie*, JSTOR, 2019, 105 (2), pp.317-356.

[31] Blumstein, D., Bryant, G., and Kaye, P. (2012, June 13). The sound of arousal in music is context dependent. In *Animal Behaviour.* The Royal Society Journal.

[32] (n.a.). (2017, June 8). Two notes that changed the film world: John Williams' theme for 'Jaws'. In *CSO Sound & Stories.* [Magazine] Retrieved from https://csosoundsandstories.org/two-notes-that-changed-the-film-world-john-williams-theme-for-jaws/

notes - either an E and F or F and F# - of a semitone distance, which is the smallest interval in western music.

"Fear" is a primal emotion and deeply wired into the biology of humans. The *fight or flight* response is studied in the field of neurobiology and postulates that "context" is a key determinant in response. Studies by Maren, Luan Phan & Liberzon (2013)[33] define contexts as:

> The internal (cognitive and hormonal) and external (environmental and social) backdrop against which psychological processes operate. Context includes perceptions of time, thereby framing the memory of an experience (for recollection, recognition, and familiarity) and shaping future expectations of similar experiences (for anticipation, foresight, and planning). (Ibid.)

Similarly, the music and emotion | mood test instrument stimuli and the profile of the respondent are critical contextual frameworks. Awareness of the social, cultural, and cognitive profile of a respondent is essential to determine how emotion | mood context is encoded in the brain. "Contexts surround and imbue meaning to events" (Maren, Luan Phan & Liberzon, 2013. Ibid.), and these factors will contribute to a respondent's recollection in a test environment. The fear response region of the brain is called the amygdala. It is from here that the emotional salience of any set of stimuli is detected by the brain.

TRACKING LISTENING

The Music Score: As well as "pure listening", "tracking listening" is also a form of music experience that is applicable as a research test instrument. Score reading can enhance the music listening experience - both functional and perceptual - for musicians or students of music. For non-musicians too, "eye" can direct a listener to instrument/s, voice/s, cues, or nuances that the "ear" may miss while listening or were "omitted" from the actual recorded performance. In addition to providing a lens on the technical/creative process in composition, it also removes sonic ambiguity/misunderstanding ie. what is heard vs what is written.

> The music as it is perceived can differ substantially from the music that is notated in the score, or as might be imagined from reading the score. (Deutsch, 2007[34])

Deutsch (2007) identified a diverse range of compositional devices that composers exploit to generate auditory perceptions eg. continuity effects, tone sequences, pitch groupings, timbral groupings, spatial effects, etc. The music scores illustrate these music treatments.

Common Scores: *Piano scores, Jazz Scores, Rock Scores, Ensemble Scores, Choral Scores, Orchestral Scores, Guitar Tablature,* and *Ancient Chant* are the general variations. A score contains all parts, so music can be viewed vertically against other parts as if reading an EXCEL spreadsheet eg. the left-hand "column" lists the instruments, and each "row" has the individual parts. Each "column" shows the music played simultaneously - with the beat aligned. The larger the ensemble, the more rows. Variations in ensemble-size range from dual-lines (piano) to 40+ lines ("Mahler" orchestra). Parts are ordered from highest (top) to lowest (bottom), and bars of music are numbered. Performers receive transcribed parts from the score called sheet music.

The following music excerpts (Figure 15.) form a potential menu of options for application in a test setting - from simple to complex samples of music ensemble type - to integrate a "listening tracking" test instrument into an overall research model. In score form, the music notation allows the respondent to visualize the music they hear. The accompanying YouTube *cues* provide a selection of recognizable works and scores from a range of genres - with a page/bar/note tracking-feature to assist respondents with no or limited music skills in following the various instruments or ensembles.

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[33] Maren, S., Luan Phan, K., and Liberzon, I. (2013, June). The contextual brain: implications for fear conditioning, extinction, and psychopathology. In *Nature reviews. Neuroscience.* 14(6): 417-428.
[34] Deutsch, D. (2007). Music Perception. In *Frontiers in Bioscience*. 12(8-12):4473-82.

MELODY: Horizontally tracing the rise and fall of melody, using a <u>simple</u> and familiar piano-score, is a standard start-point for reading. (Written by Bach for his wife - a beginner pianist):

"Minuet in G Major" (1725) J.S. Bach │ Telarc CD-83693 │ **https://youtu.be/p1gGxpitLO8**

The next work is the complete opposite in difficulty. This extremely <u>complex</u> piano piece is a transcription of a jazz piano improvisation, but the melody is distinct:

"Watermelon Man" (1962) Herbie Hancock │ Blue Note 45-1862 │ **https://youtu.be/VPxdiwrQLYI**

HARMONY: The next stage in score reading is to <u>vertically-widen</u> the eye's view to take in more than one-line at a time: eg. from the movie "Scent of a Woman" (1992) - a string quartet/tango:

"Por Una Cabeza" (1935) Carlos Gardel │ RCA Victor 82858 │ **https://youtu.be/bOPCDg21gi4**

This next track also uses the four members of the string family, but in this case, there are multiple instruments in each of the four sections. This creates a <u>string "chorus" effect</u>.

"Eine Kleine Nachtmusik" (1787) W.A. Mozart │ Deutsche 139 004 │ **https://youtu.be/YqN-5EujyaM**

TABLATURE (TAB): Used from Gregorian chant, European lutes, Blues-Harp/Harmonica to Guitar, "TAB" notation was invented to indicate the <u>finger-positions</u> on a guitar fretboard:

"Stairway to Heaven" (1974) R. Plant │ Atlantic SD-7208 │ **https://youtu.be/vYI4QwthadU**

The following samples move to the next level - <u>tracking large ensembles</u> with more involved polyphony. They integrate all "music families" (brass vs woodwind vs strings vs percussion):

FILM MUSIC SCORE: This is a Full Score "reduction" (compressed score). It also has <u>analysis-cues</u> embedded to explain the composer's ideas and musical-cues:

"The Avenger's Theme" (2012) Alan Silvestri │ Intrada D001759402 │ **https://youtu.be/Z9ojNzsrP3Y**

BIG BAND: In this case, the music's <u>rhythmic patterns are blocked together</u>, so they are easier to see-as-a-whole. Solos stand out on the page more easily:

"The Count" (2014) Tony Guerrero │ RCA Camden CAL 395 │ **https://youtu.be/lTVsPoPX_fc**

ORCHESTRA: Following a full orchestral score is the apex-skill in score reading due to its complex polyphony and wide instrumentation. The key music feature in the following example is "<u>motifs</u>":

"Symphony No.5" (1795) Beethoven │ London Records CS6930 │ **https://youtu.be/NWEVKyEwi4A**

eg. a *motif* is a very-short musical phrase or music fragment that is repeated or inserted in various forms into a composition eg. "Symphony No.5" opening "4 x Notes". Composers embed/disguise these motifs in many ways using compositional devices: *diminution* (shorten each note's length); *augmentation* (elongation of each motif note); *inversion* (turn the motif upside-down); *retrograde* (motif written in reverse order); *retrograde-inversion* (turn motif upside-down & back-to-front); and by spreading/sharing motif across each instrumental section.

Figure 15. Sample score reading test-instrument selection - in ascending order of music/ensemble complexity.

On a "printed" score, without the visual guide of a superimposed music tracking-system, the general technique or approach for beginner score-reading is to: **a)** follow the melody line as a "group or shape" rather than read the "individual" notes. **b)** look for notable "leaps" between notes, or "step-by-step" sequence of notes, or repeated rhythmic "patterns" as *markers*.

MUSIC FOR THE SCREEN

From drowning-out the projector noise in the Silent movie era, to being a critical part of the modern movie experience, music for the screen has found its own voice. This creative artistic genre is ripe with opportunities for examining emotion | mood responses but in a dual-sense impact. However, as with the music creative channel of composer-thru-to-listener discussed earlier, the pathway is now director to composer to viewer. And the level of collaboration in the creative process is more complex, as it involves the creative vision of multiple actors.

Lost in Translation: Whether communication channels are *cultural exchange* (English → Interpreter → Non-English), an *expressive medium* (Book → Director/Composer → Movie), or *sound product* (Composer → Artist/Studio → Receiver), there is always the risk that meaning, nuance, or clarity can be diminished if "translation" (Interpreter | Script | Recording) is sub-par. Many elements were changed in the adaptation of the book to the movie (location, character profiles, backstory, situation etc). As we can see from the localization of the movie's title, transferring English idioms across cultures is not without difficulty either.

> **"Lost In Translation" (2003)**   Director.: Sofia Coppola | Music: Kevin Shields
>
> From a Novel (Set in China) to a Script (Set in Japan) to a Movie (USA/JPN - Global Release)
>
> Music from the Motion Picture | Emperor EMN7068-2

The challenge of "translation", and the struggle to express an "artistic concept" across cultures (ethnic or social) is no more easily demonstrated than in this script excerpt from the movie[35]:

> **DIRECTOR**
> (in Japanese to Translator) The translation is very important, O.K.? The translation.
>
> **TRANSLATOR**
> (in Japanese to Director) Yes, of course. I understand.
>
> **DIRECTOR**
> (in Japanese to Bob) Mr. Bob-san. You are sitting quietly in your study. And then there is a bottle of Suntory whiskey on top of the table. You understand, right? With wholehearted feeling, slowly, look at the camera, tenderly, and as if you are meeting old friends, say the words. As if you are Bogie in 'Casablanca', saying, 'Cheers to you guys',' Suntory time'!
>
> **TRANSLATOR**
> He wants you to turn, look in camera. O.K.?
>
> **BOB**
> That's all he said?
>
> **TRANSLATOR**
> Yes, turn to camera.

> **UK | USA | CANADA | AUSTRALIA | NEW ZEALAND:** Lost In Translation
> **KOREA:** 사랑도 통역이 되나요? - Can love be translated too?
> **TAIWAN:** 愛情，不用翻譯 - Love, no need for translation
> **CHINA | HONG KONG:** 迷失东京 | 迷失東京 - Lost in Tokyo
> **JAPAN:** ロスト・イン・トランスレーション - [Japanese phonetic-pronunciation] Lost In Translation

Figure 16. "Lost In Translation" (2003. Ibid.). Translated movie titles as they appear in North East Asian nations.

Music critics have often unfairly scorned or downplayed the screen composer's position and contribution compared to the traditional classical composer. But since the Golden Age of Film, from Elmer Bernstein's rousing Americana soundtrack "Seven" in "The Magnificent Seven" (1960), to John Williams' leitmotif "Darth Vader's Theme" in the "Stars Wars" (1977), there have been many celebrated scores written that generate a diverse range of emotional responses as stand-alone musical works - without the need for accompanying visuals.

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[35] Coppola, S. (2002, September 2). Lost In Translation. Shooting Draft. [Film Script]. Lost In Translation Inc.

A watershed-moment in film-music occurred in 1985 and resonated globally amongst screen composers. Japanese composer Toru Takemitsu had created a new standard where the music took a pivotal role in the movie's tone. His orchestrations and music treatment for the movie "Ran"[36] were full of complex layers of meaning that both augmented and wrestled with the director's own vision for the film. His music provided viewers a previously hidden dimension - the character's mind. Legendary film director Kurosawa instructed Takemitsu to compose in the style of acclaimed Austrian/Bohemian Gustav Mahler - a 20th Century Neo-Classical composer. The final score matches-to-perfection the dark, mystical visuals of the film. While the music was Mahler-inspired, its sounds/sense are unmistakably Japanese, drawing from its cultural and folk-music. YouTube *cue* below sees score dominate the sound-effects and script.

"Ran" · 乱 (1985) Director.: Akira Kurosawa | Music: Toru Takemitsu
Quasi-remake of "King Lear" set in Japan, composer's music wrestled with the approach of director
Original Movie Soundtrack | Silva Screen SILLP1518 | **https://youtu.be/T4Nb5SiYvQ4**

The shower scene ("The Murder" cue) from "Psycho" (1960) used 78 camera set-ups and took 7 days of shooting for just 45 seconds of final footage. The shower-rose itself was 180cm in diameter - specially made for the low-angle camera shot of the shower-spray. Hitchcock was reportedly so disappointed with the footage of this movie that he binned it after viewing the rushes - until his film-composer, Bernard Herrmann[37], told him he could "rescue" it. Herrmann, using only a string ensemble, created what has now become an iconic film + soundtrack. The impact of the "Herrmann Chord[38]" in this YouTube *cue* below remains spine-chilling today.

"Psycho" (1960) Director: Alfred Hitchcock | Music: Bernard Herrmann
A Neo-Romantic composer who regarded music as a highly personal and emotional form of expression.
Original Movie Soundtrack | Unicorn RHS 336 | **https://youtu.be/0WtDmbr9xyY**

Purposes of Screen Music: The core function of music in film is to assist/enhance the story-telling and emotional connection for the receiver. Its *five key purposes*[39] are ...

①	EMOTION:	Creates and amplifies fear, humour, joy, mystery, sadness, or pity.
②	SUSPENSE:	Prepares us, positions us, manipulates us, explains plot relationships.
③	INFORMATION:	Locates us in social or geo-setting, culture, time, space, or period.
④	MOOD:	Generates atmosphere more effectively/faster than script or images.
⑤	CHARACTER:	Tells us state-of-mind of character not evident in script or images.

Placement of music cues in film follows these *six general patterns* [40] (Figure 17.). Key themes or dramatic scores are the moments when the music's presence is the most striking.

①	DRAMATIC SCORE:	Music reflects visuals. No dialogue. No limits.
②	UNDERSCORE:	Music under dialogue or SFX or incidental music.
③	VISUAL SOURCE:	Music that is part of the scene - radio, live band etc.
④	SCORED SOURCE:	Visual Source is musically developed into the scene.
⑤	THEME/SIGNATURE:	Opening/Closing Music or Leitmotif.
⑥	SONG-SCORE:	Pre-recorded Popular, Retro, or Classic songs.

Figure 17. Music placement-patterns in film.

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[36] Lehrich, C. (2014). Hearing transcendence: distorted iconism in Toru Takemitsu's film music. In *Signs and Society. Representing Transcendence.* Volume 2, Number S1.

[37] Siegel, R. (2000, October 30). *Bernard Herrmann's score to Psycho*. In *The NPR 100*. Retrieved from https://www.npr.org/1000/10/30/1113215/bernard-herrmanns-score-to-psycho

[38] Wrobel, W. (2017, July 8). *Half-diminished Seventh: The Bernard Herrmann Chord*. Retrieved from https://www.filmscorerundowns.net/herrmann/herrmannchord.pdf

[39] May, B. (1995). *Film and Television Music Scoring*. Personal Collection of Brian May. Griffith University. Southport. Queensland.

[40] May, B. (1995). *Arranging and Orchestration*. Personal Collection of Brian May. Griffith University. Southport. Queensland.

Below (Figure 18) are corresponding YouTube *cues* for each placement-pattern above. Track selection for song-score, scored source, or visual source are critical for narrative coherence.

① "**Dances with Wolves**" (1990)   Music: John Barry | **https://youtu.be/ahW9jOS0-pY**
② "**Forrest Gump**" (1994)   Music: Alan Silvestri | **https://youtu.be/nFvASiMTDz0**
③ "**Shine**" (1996)   Music: Nikolai Rimsky-Korsakov | **https://youtu.be/8_p6-cAMr_g**
④ "**Indiana Jones**" (1989)   Music: John Williams | **https://youtu.be/o4lq3SOB8sw**
⑤ "**Star Wars**" (1977)   Music: John Williams | **https://youtu.be/-bzWSJG93P8**
⑥ "**Pulp Fiction**" (1994)   Music: Dick Dale | **https://youtu.be/1hLIXrlpRe8**

Figure 18. Corresponding Music Placement and Music Cues for six film music forms.

The Screen Music genre presents a rich source for exploring music's capacity to elicit emotion/mood in a specialized "context" - how music performs in tandem with visual stimuli.

THE MUSIC VIDEO EXPERIENCE

Another sound-and-visual product is the music video as it adds contextual framework, cultural insight, and an extra-dimension to the music listening experience - regardless of its genre or period. As the reverse process of music-to-film, the music video is film-to-music through a visual-interpretation of the song's meaning or intent married to the original soundtrack. As a result, this dual layer of visual/audio experience facilitates a wider range of perceptions, and possibly a deeper impact into the music itself. But as with screen music, it is a step away from pure "listening" when we introduce "gaze" into the music experience. A music video's visual design is similar to fast-paced television commercials - whose core task is to engage, impress, pitch, and convert a viewer to their product in a very short exposure period. Both a television commercial and music video have a brief window of time to interact and capture the imagination and appeal of the viewer. They do so by combining the grammar of filming (technical features/conventions) with sales-business and creative intent (purposes/formats).

"Sledgehammer" (1986)[41] Director: Peter Gabriel | Composer: Peter Gabriel
A milestone in music video production amongst the music video auteur-director fraternity.
Virgin 207587-8 | **https://youtu.be/OJWJE0x7T4Q**

Music Videos - Origins: An outgrowth of the screen-musical format - but greatly reduced in length and absent of the dialogue - the music video has catered for youth subcultures, varied music tastes, and creative-product narratives since the rise of MTV in 1980 ... but even earlier from song-embedding in films. Artists either develop their own music video *identity* (originality/message) or *follow-the-pack* (stereotypical/stock-treatment). In 125 years of film and 70 years of broadcast, music video has touched each generation and covered every genre. The development of the music video form can be easily traced, as film/sound technical milestones are clear. Below (Figure 19.) is the notable historical periods - paired with iconic music video samples of that time. While the first three periods did not specifically craft stand-alone music/film products, from c.1980 (MTV) onwards, this became the music industry staple. From the 2000's though, the industry took another quantum-leap forward due to the digital age:

1890s THE TALKIES	"**The Jazz Singer" (1927)**	https://youtu.be/Yqk6EJc8PRc
1920s THE SOUNDIES	"**Singing In The Rain" (1952)**	https://youtu.be/w40ushYAaYA
1950s BIRTH OF R'N R	"**Jailhouse Rock" (1957)**	https://youtu.be/MfrC8PAQtlg
1980s MTV	"**Video Killed The Radio Star" (1979)**	https://youtu.be/Iwuy4hHO3YQ
1990s AUTEUR -DIRECTOR	"**Virtual Insanity" (1996)**	https://youtu.be/4JkIs37a2JE
2000s RISE OF INTERNET	"**Fall" (2014)**	https://www.dailymotion.com/video/x2dityg
2010s MOBILE INTERFACE	"**I Feel Like That" (2019)**	https://youtu.be/CZaW0I_X1Po

Figure 19. Historical periods of music and video development from the advent of film to today.

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[41] Gabriel, P. (1993). *Xplora1: Peter Gabriel's Secret World.* [Interactive CD-ROM]. MacPlay.

Figure 20. YouTube still-image from "Fall" (2014)[42]   YouTube "I Feel Like That" (2019)[43] collage

The 1980s brought music video to a new level via MTV. But 2000s delivered a new experiential sensation – global and on-demand. With the rise of the internet, music contents were accessible from *any country* ("Fall" (2014) | Noriyuki Makihara | Japan) and no longer locking people to monitors or televisions, as tablets, phablets, and smartphones giving a more "intimate" experience ie. people were literally holding the artist in their hands ("I Feel Like That" (2019) | Kanye West | *vertical video* format for smartphone). (Figure 20.).

Figure 21. Still-image "Show It 2 Me" (2017)[44] - 360°   YouTube still-image "I Got U" (2014)[45] - MR

Music Videos - Future: The question of "Where to next?" has already been addressed by the music industry creatives. They have taken the concept of "audio-visual" and have re-fashioned it into "visual-audio". An *immersive experience* is the next level of music video development → **MR** (Mixed Reality), **AR** (Augmented Reality), **VR** (Virtual Reality). Google Cardboard eyewear allows 360° VR experience with a smartphone, ("Show It 2 Me"), while various VR headsets allow for intense immersive experiences of music video. (Figure 21.).

Music Videos - Influencer/Auteur Past & Present: In the search for high-quality music video products, an effective route is sourcing the contents of influential creative-directors in the field ie. an auteur/director approach. Some seminal names in the business are (Figure 22.):

> **PAST INFLUENCERS:** McG, David Fincher, Michael Bay, Mary Lambert, Stephen Johnson, Tarsem Singh, Steve Barron, Brian Grant, Weird Al Jankovic, David Mallet.
>
> **PRESENT INFLUENCERS:** Jonathan Glazer, Anton Corbijn, Mark Romanek, Stephane Sednaoui, Spike Jonze, Melina Matsoukas, Sophie Muller, Hiro Murai.

Figure 22. Short-list of global names in music video production.

[42] Makihara, N. (2014, November 19). *Fall.* [Video]. YouTube. URL https://youtu.be/6ZJeKXW8Ewc

[43] West, K. (2019, February 27). *I Feel Like That.* [Video]. YouTube. URL https://youtu.be/CZaW0I_X1Po

[44] Carter, D. (2017, December 19). *Show It 2 Me.* [Video]. YouTube. URL https://youtu.be/SsFa5JhSDH4

[45] Dumont, D. (2014, February 20). *I Got U.* [Video]. YouTube. URL https://youtu.be/FHCYHldJi_g

Music Videos - Formats: Music videos are divided into *three formats*[46] each having its own sub-format too. A popular type since the advent of MTV programming is the Conceptual model, as it combines all three types in one product - performance + story + creative elements.

PERFORMATIVE	**"Green Onions" (1967)** Booker T. & MGs
NARRATIVE	**"Let's Dance" (1983)** David Bowie
CONCEPTUAL	**"Freak On A Leash" (1999)** Korn

The Conceptual music video has no creative limits. However, some clever and celebrated *sub-types* of Performative and Narrative music videos that have maximized their product's impact - through exploring novelty-viral, message-focus, or dream-state elements - are:

CROWD-SOURCE	**"It's A Long Way To The Top" (1975)** AC/DC
CROSSOVER	**"Everyday Is A Winding Road" (1996)** Sheryl Crow
LYRIC	**"Subterranean Homesick Blues" (1965)** Bob Dylan

Music video appears in television and film ("The Monkees" (1965~), "The Beatles" (1964)), in Interactive CD-ROM | DVD form ("Xplora1" (1993)~ Peter Gabriel, "Voodoo Lounge" (1994) - Rolling Stones), and in long-form + mini-movie + super-screen formats:

LONG-FORM (24-HR)	**"Happy" (2013)** Pharrell Williams
MINI MOVIE/MUSICAL	**"Thriller" (1983)** Michael Jackson
SUPER SCREEN	**"Shine A Light" (2008)** Rolling Stones

The above three samples are particularly impactful - a combination of extended duration, visual spectacle, and intense soundtracks. Musically excellent, they have also been produced by iconic film directors eg. Scorsese, Landis. Some further stylistic themes and variations:

WOMEN IN MUSIC	**"A Kind Of Sorrow" (2018)** A-Lin
WORLD MUSIC	**"Jai Ho!" (2009)** A.R. Rahman
GUERRILLA	**"Carpool Karaoke" (2015)** Stevie Wonder & James Corden

Music Videos - Purposes: The oft-held view is that music videos are for "entertainment" or "marketing". However, there are *four forms* (Di Stasio, M., 1996. Ibid), with the "art" focus and the notion of (mental) "manipulation" not generally recognized as significant purposes of the product. This is an effective genre as a test instrument for emotion | mood response.

ART	**"Dark Side Of The Moon" (1973)** Pink Floyd
ENTERTAINMENT	**"It's Oh So Quiet" (1988)** Bjork
MARKETING	**"Uh Huh - Pepsi" (1991)** Ray Charles
MANIPULATION	**"This Is America" (2018)** Donald Glover

MUSIC LIVE

Up to this point in the paper, the discussion of music formats and emotion | mood research has centred on "music and playback" ie. listener as opposed to audience. Clinical measurement is logically most effective when collected in a controlled environment with a control group. Yet the natural experience of music interaction occurs in the home, public transport, vehicular transport, hospitality venues, and entertainment venues - with the latter two being "live music" contexts. In Liu, Liu & Yang's (2014)[47] examination of music listening behaviour in order to:

> understand the interrelationship among the personal, situational, and musical factors of music listening … as the dataset is characterized by the great diversity of real-life listening contexts where people and music interact.

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[46] Di Stasio, M. (1996). Lights, camera, action. In *Queensland Journal of Music Education.* 4(1). 24-31.
[47] Liu, J., S. Liu and Y. Yang (2014). LJ2M dataset: Toward better understanding of music listening behavior and user mood. *2014 IEEE International Conference on Multimedia and Expo (ICME)*, Chengdu, 2014, pp. 1-6.

… they sought to evaluate the interaction between context and content. While they focused on internet and multimedia consumption, the live environment of "listening contexts where people and music interact" (Liu et al, 2014) is the premium experience of music engagement. While every listener has their favourite genres or artists, all are "wowed" by the virtuoso. Magical performances are recognized by all, and their appreciation transcends subjective favourites. We define a true "virtuoso" not merely in terms of dexterity and motor skills (Furuya, S., Oku, T., Miyazaki, F. et al., 2015)[48], but by the way they transport us and transfix us. Their effortless giftedness makes us focus on the "art". Dexterity and motor skills are just tools-of-the-trade.

Two sample YouTube *cues* follow (Figure 23.): Itzhak Perlman and Luciano Pavarotti - both virtuosi, both playing to live audiences, and both performing highly complex musical works:

> **Itzhak Perlman - Classical Violinist**
> **"Danse Espagnole" (1982)**   Manuel de Falla | Angel Records R 124603
>
> **Luciano Pavarotti - Operatic Tenor**
> **"Nessun Dorma" (1990)**   Giacomo Puccini | DECCA 430 433-1

Figure 23. The primacy of artist/audience emotional connection through live performance.

Itzhak Perlman: This work, "Danse Espagnole", is an excerpt from an opera ("La Vida Breve") by Manuel de Falla (1913). Being a "dance", it moves at a frenetic pace, and is a fusion of Spanish melodic, harmonic, rhythmic, and folk-music characteristics. The pure energy and sensuality in the piece are unmistakable, and it remains the feature-song in this opera.

Featuring Perlman at "In Performance at the White House"[49] with Japanese pianist, Ken Noda, the audience have already witnessed a large program of the music from Mozart and Chopin in the company of then-US President Reagan and his guests. The final piece is "Danse Espagnole". A number of aspects stand out both prior to and during the performance itself - the "pre-performance" banter - relaxing/entertaining this audience of dignitaries; but instilling in them an element of "quasi-fear" (*"These are props. We don't know any of these …"*) as though he is not prepared for this finale and will be "sight-reading" it unprepared. His clever and disarming style belies his true artistry. While it is all part of his witty schtick, the emotional journey he takes his audience on, from humour-tinged-doubt to tears-of-joy, is crafted to draw his listeners in to focus more deeply on the music itself. And we see his own wry smile throughout the video-performance as he enjoys the audience's wonderment.

Luciano Pavarotti: The finale song "Nessun Dorma"[50] ("Let no one sleep") is an aria written in a tenor's *tessitura* range (most comfortable vocal-range) from the opera "Turandot" (Giacomo Puccini, 1926), and globally familiar for many reasons - not the least being its performance by Pavarotti - who stipulated that this song would close any performance he was contracted to.

Whether live or in a studio recording setting, it is the tenor himself who leads the performance in this aria ie. forcing the conductor/orchestra to follow him - with sustained-notes, pauses, tempo-changes etc. Its composer, Puccini, did not envisage such a performance dynamic, but it has evolved into this performance-style with the modern operatic tenors. We hear two distinct melodic parts: conjunct-melody (scale-like steps) by the tenor, and disjunct-melody (large leaps) by the orchestra. There is much to de-construct and analyze but here is a key item ... The final word sung "Vincero" ("I will win" ie. syllabically sung as "Vin-ce-ro"), was written one way by Puccini but performed in another by Pavarotti. Pavarotti has sustained the second-last

[48] Furuya, S., Oku, T., Miyazaki, F. *et al.* (2015). Secrets of virtuoso: neuromuscular attributes of motor virtuosity in expert musicians. In *Nature. Sci Rep* 5, 15750.

[49] Nodame26 (2007, October 20). *Itzhak Perlman Manuel de Falla Danse Espagnole*. [Video]. YouTube. URL https://youtu.be/Z4ayc6Fb3hI

[50] Warner Classics. (2016, June 7). *Luciano Pavarotti sings "Nessun dorma" from Turandot. (The Three Tenors in Concert 1994). [*Video]. YouTube. URL https://youtu.be/cWc7vYjgnTs

note "B4" to heighten the tension (with resultant "frisson" effect) - though originally scored by Puccini as an "attacked" (>) semi-quaver (1/8-note) in duration and style.

Music connoisseurs and audiophiles strive to purchase or listen to the best recorded version, the best recording formats, the best playback equipment, and the best speakers in an effort to create a room-environment where, with eyes-shut, they can imagine the artist or band in the room with them. At the end of the day, music's ultimate context for enjoyment is "live". Whether intimate clubs, live houses, concert halls, outdoor events, or stadium performances, the challenge is to devise a methodology to map emotional response in a live event setting, as the various levels of euphoria (dependent on venue size) exceed that of a controlled listening environment, controlled time, and controlled content. Listening context is critical.

SOUND ENGINEERING

The Studio Perspective: Audiophiles, music connoisseurs, or general listeners rarely get to meet or hear from the audio people who track, mix, and master the recordings they listen to. Given that test instruments used in research are reliant on the product of a sound engineer's creative and technical decision-making - both a subjective and objective process - investigating their approach to manipulating and crafting recorded sound gives insights on "focused listening". Control room equipment and acoustics are critical factors in sonic production.

Figure 24[51]. Red Bull Studios, Tokyo showing SSL 4040 G+ Console | Amphion Two18 Studio Monitors.

Lee Popa (https://www.discogs.com/artist/105416-Lee-Popa) is a celebrated US producer, studio/live-engineer, and a major figure in late-1980's *Industrial Rock*. He has worked with many of the iconic artists in the industry such as Queen, Red Hot Chili Peppers, The Rolling Stones, Beyonce, Whitney Houston, Aretha Franklin, Andre Bocelli et al; and is associated with the major record labels such as Sony/Epic, Warner Brothers, Universals, Verve, and many others; has significant experience in arena concert-audio (c.6000 live-gigs | venue-sizes of 80,000+); and is credited with producing 100 studio-recordings, including platinum-sellers.

The following is a summary-interview (L. Popa, personal communication, April 28, 2020) with the author, and his process in working with soundtracks and control-room evaluation:

> As I have travelled the world and have been asked to mix under many different conditions and situations, I need to listen carefully to tune or find issues in the sound system. This is the first thing I do with any sound system I sit in front of - whether a large PA system in a venue or two speakers in a studio. This is the order in which I play my tracks, and specifically what I listen-in for ... (Lee Popa, 2020)

① **"Madman Across The Water" (1971)** Elton John | DJLPH420 Records | This song is super-dynamic. I doubt that they had any compression on the final mix other than keeping it under control, so it did not clip. Here I am checking out the transient response.

② **"Ain't That A Kick In The Head" (1960)** Dean Martin | Capitol Records 4420 | Tons of brass tells you where the treble is. From his remastered record, the vocal is loud here the band is super stereo-mix in an awesome studio by the real professionals of our industry. I swear you can hear the saliva in his mouth when he was singing!

③ **"Straight Outta Compton" (1988)** NWA | Ruthless Records SL 57102 | Right after the intro, "what you are about to witness is the strength of street knowledge", there is a drum hit. That drum hit tells me

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[51] Di Stasio, M. (2019). Red Bull Studios. [Photo]. Facebook. https://tinyurl.com/RedBullAmphionTokyo

how slow or fast the transient response is, or the quickness of the speaker. It also tells me how long the low-end will resonate in the room. So, I only use the first 8~10 seconds of the track.

④ **"Graceland" (1986)** Paul Simon | Warner Bros. Records 1-25447 | This superbly mixed song is quite involved, and the vocals way-up-front make it easy to listen to the music and get lost in the song.

⑤ **"Crazy" (1990)** Seal | ZZT ZANG 8 | There is some analogue sub-bass in this track, and the song is excellent within itself. But this tells me if there is some compression or loading in the lower end.

⑥ **"Avalon" (1982)** Roxy Music | Polydor 2302 | Bryan Ferry's voice on this track is unlike most vocalists, so the lower-mid of it is clear, then you are going in the right direction.

⑦ **"Everybody Wants To Rule The World" (1985)** Tears For Fears | IDEA9 | This is a beautiful, smooth track at a nice tempo, and has a lot of information in it. I listen through the frequency ranges of the upper-mid. I can then tell if the high-end is out of focus with the low-end.

⑧ **"Tunnel Of Love" (1987)** Bruce Springsteen | Columbia OC 40999 | Another well-mixed track that once-again giving me a lot of information across all the frequency-bandwidth. It has a great breakdown in it, and you can listen to the reverb in your room and for how long the decay is. Even though it is your house or your listening room, how long that music hangs around is what causes the trouble.

⑨ **"Time" (2001)** Pink Floyd | EMI 7243 | When you are sitting centrally in front of the speakers, the opening cash register and money sound sets up my stereo imaging. If PAs or speakers are adjusted a little too wide or not triangular, you will hear if imaging is correct or not.

⑩ **"Shine On You Crazy Diamond 1" (1992)** Pink Floyd | EMI CDS780557 | I turn this one all the way up its balance is so lovely when the drum fill comes in. That's how you can tell really how great your speakers are. The guitar takes care of that 1 kHz to 4 kHz range.

"Focused Listening" is a listening mode that will be discussed later in this paper. However, it refers to "audio-manipulation" - covering mixing engineers, mastering engineers, broadcast engineers - where an audio product requires capture/balance/edit/post-production skills.

DEFINING EMOTION & MOOD

The states of emotion and mood are related but distinct entities. Ekman & Davidson (1994)[52] proposed five key-point differences: *duration, provocation, modulation, expression,* and *awareness* - separated by response-speed and self-control (Figure 25.). Lane, Beedie, and Terry (2005)[53] identified seven distinctions: *cause, duration, intentionality, control, experience, consequences,* and *function.* They also expressed that the interchangeability of these two words was common as their meanings were often cloudy. However, they did state that "it is incumbent on psychologists to attempt to clarify the exact nature of emotion and mood, their relationship with one another and respective relationships with other psychological phenomena".

Figure 25. Mood vs Emotions (Ekman, 1994. Ibid.)

[52] Ekman, P. & Davidson, R. (1994). *The nature of emotion: fundamental questions*. Oxford University Press. USA.

[53] Lane, A, Beedie, C., and Terry, P. (2005, September). Distinctions between emotion and mood. In *Cognition and emotion.* 19(6).

Emotion: Evaluating emotional responses as they relate to music requires defining the form and scope that constitutes a reaction. Seminal researchers in the field of cognitive emotion, Ortony, Clore, and Collins (1988)[54], define emotions as "affective reactions to significant psychological situations" and "affective reactions that are implicit, automatic, and subcortical, as well as explicit, conscious, and deliberative". Their appraisal system, the "OCC Model", presents a template (Figure 26.) that can be applied to the examination of music and emotion:

> Emotional reactions differ in both quality and quantity. A specific emotion reflects the specific nature of the situation it represents. Emotions are therefore psychological events with multiple facets. (Ortony et al. Ibid.).
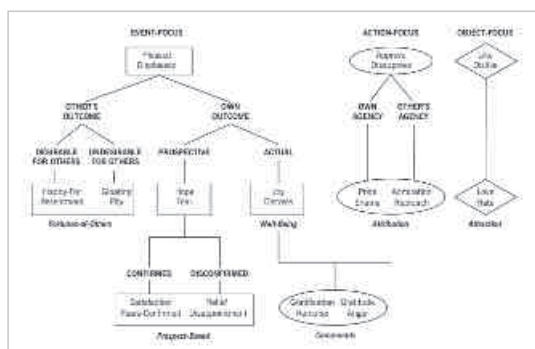

Figure 26. The OCC (Ortony, Clore, Collins) emotion appraisal model specifies three kinds of affective reactions (in rectangular, oval, or diamond boxes), and qualified by attributes of situations (**bold** type), to form 22 emotions grouped into six families (*italic* type). (Ortony, A., Clore, G., and Collins, A. (1988). (Ibid.).

It should be noted when researching in this field that there is no universally agreed-upon theory of emotion. There are two streams of thought: *discrete emotion* (6 core forms of biologically determined emotions)[55] and *dimensional* (a mixture of 6 basic forms)[56]. This paper included both the Ekman and OCC (Ortony, Clore, and Collins) models as reference points to address the central question of "How does music evoke emotions in a listener?"

Mood: Psychologist Robert Thayer's an "8-Mood Model" (Thayer, 1978) [57] (Figure 27.) mapped the human-mood from its extremes of stress (happiness ←→ sadness) and extremes of energy (↑ excitement-to-calmness ↓). Applying selected *Popular Music* YouTube *cues* to "mood" points, an indicative sample of song *stress* or *energy* per quadrant can be viewed:
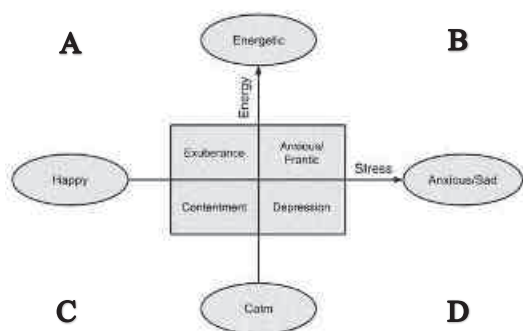
A. "Happy" (2013) Pharrell Williams | Columbia 44105528 | **https://youtu.be/ZbZSe6N_BXs**

B. "This Is The New" (2003) Marilyn Manson | Interscope Records | **https://youtu.be/u21aTl7lmHw**

C. "Don't Worry Be Happy" (1988) B. McFerrin | Manhattan SPRO04087 **https://youtu.be/d-diB65scQU**

D. "Hurt" (2002) Johnny Cash | American MRNR023972 **https://youtu.be/8AHCfZTRGiI**

Figure 27. Stylized version of Thayer's 8-Mood Model (Ibid.) with parallel music-samples.

[54] Ortony, A., Clore, G. and Collins, A. (1988). *The cognitive structure of emotions.* New York: Cambridge University Press.

[55] Colombetti, G. (2009, August). From affect programs to dynamical discrete emotions. In *Philosophical Psychology*. 22(4):407-425.

[56] Reisenzein, R. (2000). Wundt's three-dimensional theory of emotion. In Balzer, W., Sneed, J., and Moulines, C. (eds.). *Structuralist Knowledge Representation: Paradigmatic Examples.* Rodopi. Pp75-219.

[57] Thayer R. (1978). Toward a psychological theory of multidimensional activation (arousal). In *Motivation and emotion* 2:1–34.

There is a shifting trend in music-classification - *genre* (music-identity) to *mood* (self-identity). However, it is driven by two factors i) *commercial* interests (promotion and merchandizing rationale) due to the immense digital catalogue of recorded music, and ii) a user's desire for a *personalized* (on demand, easy-to-retrieve) listening library. Now, mood/theme is equal to genre/index, and mood/theme metadata is being extracted from music tracks to generate real-world music needs.[58]

MOOD	INTENSITY	TIMBRE	PITCH	TEMPO
HAPPY	MEDIUM	MEDIUM	VERY HIGH	VERY HIGH
EXUBERANT	HIGH	MEDIUM	HIGH	HIGH
EXCITED	VERY HIGH	MEDIUM	MEDIUM	HIGH
ANXIETY/TERROR	HIGH	VERY HIGH	LOW	VERY HIGH
SADNESS	MEDIUM	VERY LOW	VERY LOW	LOW
DEPRESSION	LOW	LOW	LOW	LOW
CALM	VERY LOW	VERY LOW	MEDIUM	LOW
CONTENTMENT	LOW	LOW	HIGH	LOW

Figure 28. Thayer's Mood types/levels vs music elements. (Bhat et al, 2014)[59].

THE MIND OF THE LISTENER

An examination of the current literature and research in this field indicates that the primary question asked in the quest for gaining insights into the place of music and its association with the emotion and mood has been: Does music itself *induce* emotional responses or do emotional responses stem from factors such as cultural transmission, specific learning environment, environmental conditioning or other associated effects? A substantial number of studies have been conducted to *interpret* human psychological responses and *measure* physiological activity during music listening. Resulting data from both fields has been examined to look for convergence. Music response is linked to *arousal* - a cause-and-affect process with a build-up of tension and release within the music and within the listener (bradycardia vs tachycardia - heart-rate response to stimuli); and *valence* - positive and negative reactions that are expressed in words, facial expressions, and gesture (micro/macro-expressions or brain-imaging).
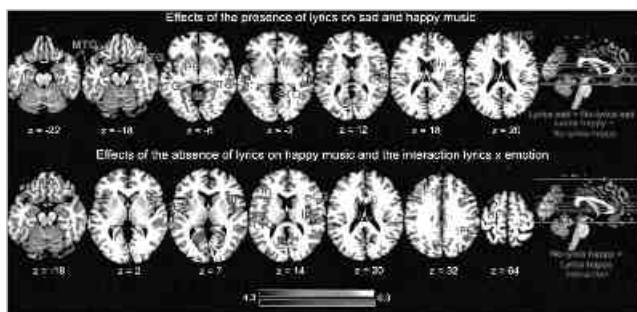

Figure 29. Effects of presence or absence: lyrics x emotion (Brattico, 2011. Ibid.).

Brattico et al (2011)[60], Harrer (1977)[61], Schaefer (2017)[62], and Zatorre et al. (2005)[63] used various neuro-imaging techniques (Figure 29.) in controlled and monitored environments; with informants chosen from a cross-section of age-groups and cultures; and with music samples

[58] Bischoff, K. Firan, C., Paiu, R., Nedjl, W., Laurier, C., & Sordo M. (2009, October 26-30). *Music mood and theme classification - a hybrid approach*. [Conference]. ISMIT 2009. Kobe.

[59] Bhat, A., S. Prasad, N., & Mohan D., M. (2014). *An efficient classification algorithm for music mood detection in western and hindi music using audio feature extraction*. 2014 Fifth International Conference on Signal and Image Processing, pp. 359-364.

[60] Brattico, E., Alluri, V., Bogert, B., Jacobsen, T., Vartiainen, N., Nieminen, S., and Tervaniemi, M. (2011, December 1). A functional MRI study of happy and sad emotions in music with and without lyrics. In *Frontiers of Psychology*. Retrieved from https://doi.org/10.3389/fpsyg.2011.00308

[61] Harrer, G. & Harrer H. (1977). Music, emotion, and autonomic function. In M. Critchley and R.A. Henson (Eds.). *Music and the Brain: Studies in the neurology of Music.* London: William Heinemann Medical Books Ltd.

[62] Schaefer, H. (2017). Music-evoked emotions - current studies. In *Frontiers of Neuroscience*. 11:600.

[63] Zatorre, R.J. (2005). *Functional neuro-imaging: applications to music and auditory cognitive processing*. [Lecture Notes]. Montreal Neurological Institute, McGill University.

either self-chosen or test instruments sourced from a range of genres and styles to map and analyze brain function given specific stimuli. Neuro-imaging findings produced measurable phenomena clearly mapping the brain responding to different music stimuli in different regions of the brain; music with/without lyrics generating different levels of emotional intensity; the auditory cortex processing music separately from lyrics; lyrics acting as a key differential in creating emotion and mood; and music with sad lyrics generating sadder emotional responses, while instrumental music generating happier emotional responses. In (Schaefer, 2017. Ibid.):

> Some pieces of music will invite an aesthetic attitude of the listener due to perceptual inputs by sensory impressions, due to more knowledge-based cognitive inputs, or due to emotional inputs. Some criteria that may underlie listeners' aesthetic judgments of music are suggested such as beauty, wittiness, originality, taste, sublimity, expression, complexity, use as art, artistic skill, emotion arousal, message, representation, and artistic intention. Certain criteria such as expression, emotional arousal, originality, skill, message, or beauty were considered as more important than others and different listeners tend to focus on different criteria. With its multi-level framework of everyday emotions and aesthetic judgment, the study might help to explain the occurrence of mixed emotions such as bitter-sweet combinations of joy and melancholy.

The sociologist methodology approach of Eco, (1977)[64], Frith (1983)[65], and Snow (1986)[66] places music within a social/cultural/semiotic framework. Eco et al argue that a musical work (emitter) cannot be described independently from the listener (receiver) due to its diversity of interpretations and perceptions and suggest that measurement aimed to capture meaning is inaccurate as music is perceived by a certain subject in a certain social and cultural context. However, researchers such as Tagg (1987, Ibid.) see this methodology as problematic:

> Traditional musicology has tended to stay clear of viewing music as a symbolic system whose structures are considered as either references to or as interpretations, reflections, reconstructions or re-creations of experiences which are not necessarily intrinsically musical. This is, in short, a problem of musical semiotics.

According to the seminal music-and-emotion researcher Meyer (1956)[67]:

> There are particular elements (referred to as the "seven elements") at interplay within a musical piece which determines the experience of "musical emotions". The greater the build-up of suspense or tension, the greater the emotional release upon resolution.

Meyer argues that in music, emotion equates to arousal within the music and in the listener (measured clinically and termed as bradycardic or tachycardia - changes in heart rate in response to external stimuli). He also implies that conscious insight (eg. a musically trained listener) in this process reduces the emotional effect of music and vice-versa.

In Jansma & de Vries (1995)[68], the core issue of "does music induce emotion in the listener, or do we project emotion to music?" is explored, and they claim:

> It is the latter opinion that is supported most frequently in music psychology research. Various studies demonstrate that a variety of physiological and psychological changes occur when listening to music, although it is not yet clear how these changes are brought about, related directly to musical qualities.

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[64] Eco, U. (1976). *A theory of semiotics.* Bloomington & London. Indiana University Press.

[65] Frith, S. (1983). *Sound effects. Youth, leisure and the politics of rock-'n-roll.* London. Constable.

[66] Snow, R.P. (1987, June). Youth, rock 'n roll and electronic media. In *Youth & Society.* 18(4), 326-343.

[67] Meyer, L. B. (1956). *Emotion and meaning in music.* [Magazine]. Chicago: Chicago Press. New ConneXion (1998) - Journal of Conscious Evolution.

[68] Jansma, M. & Vries, B. de (1995). *Muziek en emotie* (pp.204-222). In: Evers, Jansma, Mak, De Vries (Eds). Muziekpsychologie. Assen: Van Gorcum.

Waterman (1992)[69] tested both trained and untrained listeners, and found that they differed in their qualitative responses, but not quantitatively in emotional responses:

> Both explicit and implicit effects were evident in the qualitative data, with variation in both being greatest amongst untrained listeners. Performers exhibited both explicit and implicit effects. Explicit effects were more evident when referring to their own performance, and implicit effects were more evident in responses to the performance of the other instrumentalist.

Cognition, Influence & Meaning: Firstly, "cognition" is defined as the meaning-processing and meaning-processed system of a conscious mind - more than simply a state-of-mind (Mandler, 1984)[70]. The issue of "cognitive penetrability" (Pylyshyn, 1989)[71], or to what degree a cognitive process such as music can consciously influence a listener's perception, is at the heart of the psychological debate of the effect of music:

> We sometimes use the term "rational" in speaking of cognitive processes or cognitive influences. This term is meant to indicate that in characterizing such processes we need to refer to what the beliefs are about - to their semantics … (cognitive penetration) is an influence that is coherent or quasi-rational when the meaning of the representation is taken into account. " (Pylyshyn, 1989. Ibid).

THE LISTENER CONTEXT

How a listener "listens" - as a lifestyle activity or as a research informant - is shaped by both psychological factors and contextual factors. Current studies seem to suggest that music may mean different things for different people at different times and in different situations. When clinical trials are conducted to gather either scientific or sociological data, the respondent's *profile* (musician, aficionado, or general consumer), *orientation* (pre-interview state of restiveness) and *acrophase* (state of arousal or valence) are key metrics for considerations.

The importance of respondent profiling (music background context) has been discussed earlier in this paper. From here, we look at the contextual aspects that build a full profile of a listener, and identify them under the 5W + H lens of *"Who?, When ?, Where?, What?, Why?, How?"*.

A. Listener Profile - The "Who"
Nationality, Region, Socio-Economic, Ethnicity, Time, Gender, Age, Personal/Health Factors

B. Listening Form - The "Where"
Live vs Recording, Speaker vs Headphone, Home vs Venue vs Transit, Playback Format/s

C. Listening Orientation - The "When"
State of Rest/Acrophase (Arousal/Circadian Rhythm), AM vs PM, Work vs Leisure vs Health

D. Listening Menu – The "What"
The Elements of Music. Genre vs Sub-Genre vs Micro-Genre. Music vs Audio-Video vs Visual-Audio

E. Listening Purpose/Function - The "Why"
Why are you listening? Social, Emotional, Cognitive, or Arousal? Other ?

F. Listening Modes - The "How"
Cause-based (learn/feel), Semantic-focus (interpret/critique), Ambient-type (background/atmosphere)

Figure 30. Application of 5W + H to determine listening situational macro-variables.

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[69] Waterman, M. G. (1992). Emotion in Music: Towards a new methodology for the investigation of appreciation. In *International Journal of Psychology*, 27, (3/4),189.

[70] Mandler, G. (1984). *Mind and body: Psychology of emotions and stress*. New York: Norton.

[71] Pylyshyn, Z. W. (1989). Computating in cognitive science. In M. I. Posner (Ed.), *Foundations of cognitive science*. Cambridge, MA: MIT Press.

Based on these six metrics above (Figure 30.), there are a substantial number of situational macro-variables to form a profile of a listener; their listening locations; their physiological status at the time of listening; their preferred music forms; and purpose/function for listening. This reinforces the view that emotion/mood responses are impacted upon by *context* and of the need for wider test-group fields.

LISTENING MODE

Huron, D. (1999) [72] in the reference list below (Figure 31.), defines the key music listening *modes*. For example, an "aficionado" such as a hardcore audiophile could be described as a *fault listener*, while an apex-listener such as recording engineer could be described as a *focused listener*. While both are hyper-critical listeners, the primacy of their listening mode purposes are quite different.

Allusive listening	Relates moments or features to similar moments or features in other music.
Directed listening	Selective attention to an element of complex texture, excluding all others.
Distance listening	Characterized by memorizing the work by segmentation or recapitulation.
Distracted listening	Pays no conscious attention to the music and is possibly unaware of it.
Ecstatic listening	Pleasurable sense from favourite music – a sensation of shivers/frisson.
Emotional listening	Engenders feelings of sorrow, joy, love etc from current times or the past.
Fault listening	Mentally lists faults and problems: Audiophile/gear; Conductor/ensemble.
Feature listening	Focus is identifying features: motif, distinctive rhythm, instrumentation.
Focused listening	Listener's career is audio-manipulation focused: engineer, broadcaster.
Identity listening	The "What is…" listener: What's the instrument? Who's the composer?
Innovation listening	Vigilant listening to identify significant musical novelty or features.
Kinesthetic listening	Compulsion to move, to tap, to dance, or to conduct to the music.
Lyric listening	Attention to catching/singing-along with the lyrics and feeling the meaning.
Memory Scan listening	Knows by memory. Answers questions by mentally F-FWD through music.
Metaphysical listening	Not attentive to the music but thinking of questions related to it.
Performance listening	Conductors, musicians, or vocalists internally recreate gestures.
Programmatic listening	Imagines certain situations or scenes: rolling waves, mountain vistas.
Reminiscent listening	Remembrance of emotions experienced from past events.
Retentive listening	Listens to remember what is being heard eg. ear training.
Signal listening	A "listening-in-readiness" - state of a listener waiting for a cue or sign.
Sing-along listening	Presupposes that the listener is already familiar with the work.
Tangential listening	Engaged in thoughts traced to the music, but largely tangential to it.

Figure 31. Abridged description of the variety of Listening Modes**. (Huron, 1999. Ibid.).

A listener's preferred or automatic *mode* of listening to any given piece of music is a variable driven by either cause-based (learn/feel), semantic-focus (interpret/critique), or ambient-type (background/atmosphere) factors. And regardless of guided instructions given to the research participant by the researcher, the listener may naturally revert to their default "pattern" of consumption during the exercise - whether self-testing or under laboratory conditions.

The mode-list above is an effective diagnostic tool to determine, via a post-listening interview process, the particular form their listening experiences took. Combined with the listener *context* profile points, a clearer picture emerges as to which music-type evokes a critical response at a particular moment and under what listening conditions.

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[72] Huron, D. (1999). *Music cognition handbook: A glossary of terms.* Ohio State University. Retrieved from http://csml.som.ohio-state.edu/Music838/glossary.html

MUSIC & COGNITIVE/PERCEPTUAL ENHANCEMENT ATTEMPTS

The following is a selection of three historical music | psychology case which gained global attention or notoriety, and where music products were proposed as functional tools or applied as effectors of behaviour.

The Mozart Effect: The therapeutic powers of music have long been considered to enhance certain cognitive abilities and stimulate higher brain functions. Mathematics and chess are also credited with this same capacity. In an article appearing in Neuroscience Letters (1995) entitled "Listening to Mozart enhances spatial temporal reasoning: towards a neurophysiological basis", it was reported that 10 minutes of Mozart's "Sonata for Two Pianos" K.448 (1784) resulted in an 8~9 point enhancement on a spatial IQ test. The "Mozart effect" became known to the world via a series of books and recordings by Don Campbell - the trademark holder of the name "Mozart Effect".

> **"Sonata for Two Pianos K.448" (1784)** W.A. Mozart | Vox STPL 510.780

Campbell popularized the notion that listening to Mozart (particularly his piano concerti) will temporarily increase a person's IQ and could produce other beneficial effects on cerebral function. He recommended playing selected classical music to infants, in the expectation that it would benefit their mental growth. Schools reportedly played Mozart over PA systems, and even allowed students to wear portable listening devices prior to exams. In 1998, the governor of Georgia[73] was so impressed that he announced that every child born in Georgia, USA would receive a classical music CD. An abstract from the original researchers is printed below:

> Motivated by predictions of a structured neuronal model of the cortex, we performed a behavioral experiment which showed that listening to a Mozart piano sonata produced significant short-term enhancement of spatial-temporal reasoning in college students. Here we present results from an experiment which replicates these findings and shows that (i) 'repetitive' music does not enhance reasoning; (ii) a taped short story does not enhance reasoning; and (iii) short-term memory is not enhanced. We propose experiments designed to explore the neurophysiological bases of this causal enhancement of spatial-temporal reasoning by music and begin to search for quantitative measures of further higher cognitive effects of music. (Rauscher, 1995)[74]

However, this is a disputed set of research results. The "Mozart effect" was challenged by researchers Steele et al (1999)[75]:

> The results show that listening to the Mozart sonata produced no differential improvement in spatial reasoning in any experiment. The sonata had no effect on performance, as revealed by analyses for main effects and several interactions, and for individual improvement from the pretest. When SAS scores were translated into IQ-point equivalents, listening to Mozart produced a 3-point increase relative to silence in one experiment and a 4-point decrease in the other experiment Conversion of the Mozart and silence comparisons into a measure of effect size indicated that the music had little impact. A requiem may therefore be in order.

and in Jones & Zigler (2002)[76]:

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[73] Sack, K. (1998, January 15). *Georgia's Governor Seeks Musical Start for Babies.* New York Times. Section A. Page 12.

[74] Rauscher, F., Shaw, G., and Ky, K. (1995, February 6). Listening to Mozart enhances spatial-temporal reasoning: towards a neurophysiological basis. In *Neuroscience Letters.* Volume 185, Issue 1, Pages 44-47.

[75] Steele, K., Dalla Bella, S., Peretz, I., Dunlop, T., Dawe, L. A., Humphrey, G., Shannon, R., Kirby Jr., J., & Olmstead, C. (1999). Prelude or requiem for the 'Mozart effect'? In *Nature,* 400, 827.

[76] Jones, S. and Zigler, E. (2002, May~June). The Mozart effect: Not learning from history. In *Journal of Applied Developmental Psychology.* Volume 23, Issue 3, Pages 355-372.

This paper critiques the links between recent reports on the impact of early experience on the developing brain and proposed policies and interventions for young children. Using the "Mozart effect" as a contemporary example, as well as several examples from history, the case is made that brain research is being misappropriated to the service of misguided, "quick fix" solutions to more complicated, systemic issues. The paper concludes with a brief summary of research that, by contrast, illustrates the substantive contribution of high quality, intensive, multi-domain interventions to early cognitive and social development.

"Mozart effect" researcher Frances Rauscher[77] herself has disclaimed this idea:

Our results on the effects of listening to Mozart's Sonata for Two Pianos in D Major K. 448 on spatial–temporal task performance have generated much interest but several misconceptions, many of which are reflected in attempts to replicate the research. The comments by Chabris and Steele et al. echo the most common of these: that listening to Mozart enhances intelligence. We made no such claim. The effect is limited to spatial–temporal tasks involving mental imagery and temporal ordering. Second, it is frequently suggested or stated that exposure to the right kind of music in childhood has a lasting, beneficial effect. On programs like these, I don't think it can hurt. I'm all for exposing children to wonderful cultural experiences. But I do think the money could be better spent on music education programs.

However, some studies and claims continue to support the "Mozart effect", with a recent announcement published by the European College of Neuropsychopharmacology (2020)[78]:

A new comprehensive analysis on the effect of Mozart's music on epilepsy has confirmed that listening to his piano music can reduce the frequency of epilepsy attacks. The results of this comprehensive meta-analysis (a study of studies), which may overturn current skepticism about the effect, are presented at the ECNP congress after recent publication in a peer-reviewed journal. They found that listening to Mozart, especially on a daily basis, led to a significant reduction in epileptic seizures, and also to a reduced frequency of abnormal brain activities in epileptic patients (called interictal epileptiform discharges, which are commonly seen in epileptic patients). These effects occurred after a single listening session and were maintained after a prolonged period of treatment.

But in closer examination of the claims, critics noted that "This is a review of research, and not original research." (Solender, 2020. Ibid.) and indicated that while non-invasive techniques for therapeutic practice were strongly desired, deeper and more consistent studies were needed.

Wagner & Music as Propaganda: Music has been re-packaged for use as political motivation or manipulation. Music-appropriation for inclusion at political events continues today, however, artist have more control over its usage. US President Donald Trump was blocked by artists and bands such as Adele, Rihanna, R.E.M., Aerosmith, Neil Young, Elton John, Earth Wind & Fire, Rolling Stones, Queen et al in using their tracks for his political rallies or events[79].

The 19th Century music of Richard Wagner was a significant propaganda tool used by the Germans in WW2[80]. Wagner's (and Anton Bruckner's) works were the only allowable music to be broadcast out of radios in German homes during the war period. Its nationalistic themes

[77] Goode, E. (1999, August 3). *Mozart For Baby? Some Say, Maybe Not*. New York Times. Section F. Page 1.
[78] (n.a.). (2010, September 11). Is the Mozart effect real? New analysis indicates that music can help epilepsy. In *Medical Xpress*. Retrieved from https://medicalxpress.com/news/2020-09-mozart-effect-real-analysis-music.html
[79] Solender, A. (2020, June 28). All the Artists who have told Trump to stop using their Songs at his Rallies. In *Forbes*. [Magazine]. Retrieved from https://www.forbes.com/sites/andrewsolender/2020/06/28/all-the-artists-who-have-told-trump-to-stop-using-their-songs-at-his-rallies/
[80] Neuschwander, D. (2012, December). Music in the Third Reich. In *Music Offerings*. 3(2):93-108.

and martial feel suited the Nazi war machine's 'beat'. Richard Wagner himself (1813~ 883) was considered anti-Semitic and hence was a 'good-fit' for the 3rd Reich's imagery and 'genocidal agenda'.

> **"Ride of the Valkyries" (1890)** Richard Wagner | Columbia MS 7141

His music was used extensively by Joseph Goebbels' propaganda machine to exploit the Aryan race myth - even though Wagner died 50 years prior to the emergence of Adolf Hitler and the Nazi movement. Yet there is no evidence that Wagner included overt political or anti-Semitic ideas within his operatic and orchestral works, though he was well-known for expressing his antisemitic criticisms in the forms of essays and books - though reportedly fueled by his anger with wealthy German-Jews not willing to invest in his productions.

> It's all there, in Wagner's boasting, his constant lecturing, his desire to deliver monologues on every possible subject, an unspeakable immodesty - all that a role model for Hitler - certainly there is plenty of 'Hitler' in Wagner. (Mann, T., 1949)[81].

Wagner is credited with being a musical innovator, transforming musical thought, and pointing the way to greater 'emotion' and 'meaning' in music. But the deep and dark legacy of the Nazi partnership with the music of Wagner continues today - including the sustained boycott of Wagner's works in Israel[82]. The psychological impact of Wagner's music is profound. "Wagner the man" and the "Nazi Propaganda machine" are inseparable in the Jewish psyche. His music was re-interpreted/re-packaged for use as mental manipulation and coercion of the German populace. It was either a repurposing of his music and something Wagner did not imagine would be actuated from his writing, or specifically intended. Critics believe the latter:

> There are pre- and subconscious processes that enter into his work, whereby more is expressed than its creator intended. (Micha Brumlik, 2017)[83]

"Paul is Dead": Much was made of the image of a barefoot Paul McCartney on the cover of The Beatles' "Abbey Road" (1969). The rumour circulated that Paul had died, while in fact he was on holidays. Urban legend stated that the vinyl album also had a feature that if you wound the record backwards after the last track, with the needle still in the groove, you could hear the words "Paul is dead" on a loop. The marketing arm of the music industry has always sought fresh angles to get an edge - mostly through tricks-of-the-trade in the studio such as subliminal sounds (sound/messages recorded at higher frequencies/speed picked up by the subconscious) and backmasking (deliberate sound/message recorded in reverse onto a track). However, an infamous event in Rock history occurred in 1985 which reverberated across the music industry:

December 23, 1985: Raymond Belknap (18) and James Vance (20), after six hours drinking, smoking marijuana, and listening to the album "Stained Class", each man took a shotgun and killed or maimed himself.

> **"Better By You, Better Than Me" (1978)** Judas Priest | CBS S6077

In 1990, the trial of Judas Priest (1990)[84], the parents' Lawsuit Claim (Vance v. Judas Priest 1990, 31) stated that British Heavy Metal band Judas Priest had hidden subliminal messages into the album "Stained Class" in their cover-version of the Spooky Tooth song "Better By

[81] Mann. T. and Adorno, T. (2006). *Correspondence 1943-1955: Theodor W. Adorno & Thomas Mann*. Polity. Retrieved from http://www.the-wagnerian.com/2016/08/a-letter-from-thomas-mann-to-theodor.html

[82] Biran, J. (2020, January 28). Richard Wagner's troublesome history in Israel. In *Jerusalem Post*. Retrieved from https://www.jpost.com/Israel-News/Culture/Richard-Wagners-troublesome-history-in-Israel-615645

[83] Brumlik, M. (2017, July 28). *Hitler and his Bayreuth*. [Symposium]. Retrieved from https://www.bayreuther-festspiele.de/programm/diskurs-bayreuth/archiv-diskurs-2017/

[84] Moore, T. (1996, January). Scientific consensus and expert testimony: Lessons from the Judas Priest trial. In *Skeptical Enquirer*. 20.6.

You, Better Than Me", thereby influencing the suicide pact. Expressions such as "try suicide", "do it", and "let's be dead" were claimed to be the triggers for their fatal actions. The key finding of the Court was:

> The scientific research presented does not establish that subliminal stimuli, even if perceived, may precipitate conduct of this magnitude." (Justice J. Whitehead:) (Ibid).

But it was a wake-up call to society and the music industry - especially the *Shock Rock* and *Metal* bands sub-genre. Soon the ubiquitous "Disclaimer" statements appeared on all album releases. Psychologists usually attribute the causes to:

> **Subliminal Message:** A message, either auditory or visual, presented below the normal limits of human auditory or visual perception.
> **Pareidolia:** Psychological phenomenon where the mind responds to a stimulus (image/sound) perceiving a familiar pattern where none exists.
> **The Observer-Expectancy Effect:** Perception can be influenced by expectation, habituation, imprinting, prejudices, predispositions, or priming.

In contrast, Brown & Volgsten (2006. Ibid.) argue that music is indeed powerful at manipulating social behaviour, and this is embedded in us from infancy through to adulthood via rituals (social gatherings, religious ceremonies, political rallies), and it is an "emotive manipulator". The Judas Priest "lyric" carries the message with the music underscoring its tone and its emotional intensity.

MUSIC & PHYSIOLOGICAL/PSYCHOLOGICAL TRIGGERS

An approach combining Music Psychology, particularly *Psychoacoustics* (how we perceive sound), and Music Appreciation, particularly *Back-Story* (music's creative/performative elements and background) is critical to determine human physiological/psychological triggers.
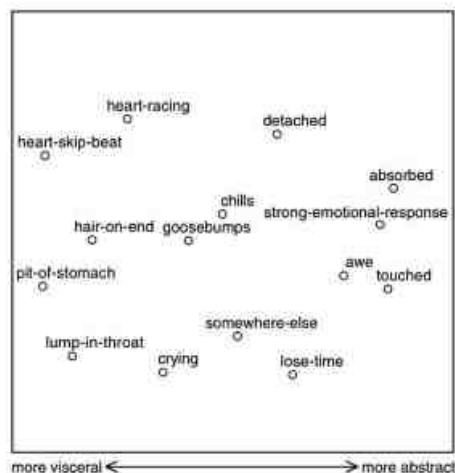

Figure 32. Aesthetic Experience Scale (Sachs, 2016)[85]

This chart plots 15 human emotional responses against 2 x axes. The horizontal axis represents the degree of *visceral vs abstract* response, and the *v*ertical axis represents *human heart rate* between rest and hyper-excited states during the viewing of a diverse range of film. While *acrophase* (the mood prior to testing), *habituation* (conditioned through repetition), and *novelty* (the first-time exposure to test-instrument) play a part in the heart-rate response, the plot-points also take into account the concept of mixed-emotions eg. "chills". A similar test (Kim et al., 2011)[86] for a mood classification model tested for responses based on Hevner's adjective circle and Russell's circumflex model of emotion (Sachs, 2016.Ibid.).

However, do we all feel chills from the same stimuli at the same time?

> Humans uniquely appreciate aesthetics, experiencing pleasurable responses to complex stimuli that confer no clear intrinsic value for survival. However, substantial variability exists in the frequency and specificity of aesthetic responses. While pleasure from aesthetics is attributed to the neural circuitry for reward, what accounts

[85] Sachs, M., Ellis, R., Schlaug, G., and Loui, P. (2016, March 16). Brain connectivity reflects human aesthetic responses to music. In *Social Cognitive and Affective Neuroscience*. Vol.0, No.0. Oxford.
[86] Kim, J., Lee, S., Kim, S., and Yoo, W. (2011, February 13-16). *Music mood classification model based on arousal-valence values*. Retrieved from http://www.icact.org/upload/2011/0386/20110386_finalpaper.pdf

for individual differences in aesthetic reward sensitivity remains unclear. (Sachs et al, 2016. Ibid).

Muzak: a broad term used to name/bundle *music in a public space* and originally trademarked in 1926, is now owned and rebranded as MOOD: or Mood Media (https://moodmedia.com). This ubiquitous *background music* is likely the precursor to today's music relaxation and new-age therapy movement, and a globally shared aesthetic experience. Designed to be passive, people are generally unaware or unaffected by its presence ie. habituated. Impact registers subliminally as music with a metre of 60~70bpm (heartrate at rest); below 60 dB (conversation level); and positive playlists (curated music genres) places it in "stealth" mode. Its purposes and effects have been widely studied[87] and their results implemented in functional situations[88]. Market researchers have found that if in-store music is reduced from 100bpm to 60bpm, the speed of the average shopping trolley also slows down, increasing shopper-duration in-store and increasing the number of purchases made by 30~40% (Milliman, 1982. Ibid).

Designed to be 'passive', the success of Muzak lies in the fact that it is not supposed to be noticed (termed "Distracted Listening"). The target response by the music creator is in fact for the listener not to listen, to be unaware and unaffected by it - but in a psychological sense the music is registering subliminally ie. to *be somewhere else* or *lose time* as above (Figure 32).

Extending that aesthetic experience to consciously consumed music products, the following recordings, with accompanying YouTube *cues*, are renowned for evoking the physical response of "frisson" (goosebumps). Each sample has a different sound-palette, a unique timbral quality, and contrasting music genre:

Example #1: Audio/Visual samples - Movie soundtrack - Score vs Song-score.

> **"The Ecstasy of Gold" (1966)** Ennio Morricone - from Original Motion Picture Soundtrack.
> In this music-cue, Morricone's stated express-purpose was to create a chills/goose-bump effect.
> From "The Good, The Bad And The Ugly" | UA Records UAS5172 | **https://youtu.be/IlE5_NadMdQ**
>
> **"Stuck In The Middle With You" (1972)** Stealers Wheels (Band) - Single/EP.
> Quentin Tarantino heavily uses visual-source + song-score (live + existing popular-music) in his films.
> From "Reservoir Dogs" (1992) | MCA Records MCAD-10541 | **https://youtu.be/U9rIBE0KM-w**

Example #2: Audio samples - Live performance - Rock vs Classical.

> **"Seven Days" (1993)** Sting | A&M Label 31454-0075-2 | **https://youtu.be/EV0rJ6rvWbw**
> From "Ten Summoner's Tales", with 5/4 metre | Reggae groove | Broadway Musical chord-patterns, 17 x Grammy-winner Sting's aim was to place his musicians in a performance situation totally out of their comfort-zone.
>
> **"Duo des Fleurs" (2017)** Sabine Devieilhe | Warner B075QX4RB2 | **https://youtu.be/C1ZL5AxmK_A**
> From the soundstage recording of "Mirages", operatic coloratura-soprano Sabine Devieilhe is a Grammy-winning artist and showcasing her signature opera role of "Lakme" with soprano Marianne Crebassa and full orchestra.

Physiological and Psychological responses: The three most notable physiological reactions to psychological and psychoacoustic phenomena are *frisson* (pleasure), *tension* (discomfort), and *chills* (mixed emotions). Selecting music samples based on Tagg's (ibid.) trichotomy of genre streams (art | folk | popular), below are soundtracks with accompanying YouTube *cues* that would be particularly suitable for test instrument selection - **Classical** *(art music),* **Jazz** *(folk music),* **Soul** (*popular music*):

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[87] Plourde, L. (2017, January). Sonic air-conditioning: Muzak as affect management for office workers in Japan. In *The Senses and Society*. 12(1):18-34.

[88] Milliman, E. (1982). Using background music to affect the behavior of supermarket shoppers. In *The Journal of Marketing*. Vol.46, No.3 (Summer). Retrieved from http://www.jstor.org/stable/1251706

Example #3: Frisson - the goosebump phenomena or "Ecstatic Listening" mode.

> **"Fantasia on a theme of Thomas Tallis" (1910)** Vaughan Williams - "Frisson" at its best.
> This used 2 x String Orchestras, separated by distance, yet with one conductor, in a cathedral.
> Argo ZRG 696 | **https://youtu.be/ihx5LCF1yJY**

Example #4: Tension - a tightening of muscles or "Performance Listening" mode.

> **"Giant Steps" (1960)** John Coltrane - The "most feared" song in jazz.
> Pianist Tommy Flanagan's impro really struggled with Coltrane's chord progressions.
> Atlantic SD 1311 | **https://youtu.be/30FTr6G53VU**

Example #5: Chills - a shiver sensation or "Ecstatic and Emotional Listening" modes.

> **"I Heard It Through The Grapevine" (1968)** Marvin Gaye - Popular Music before Auto-Tune
> *A cappella* version (vocal-stem only) shows the vocal-artistry of one Soul's greatest singers.
> Tamla T 54176 | **https://youtu.be/87FjkqtK67o**

How A Composer Make Us "Feel": Composers have a comprehensive knowledge of all music styles. They exploit our pre-conceived or conditioned notions of mood, atmosphere, or feelings. They then harness compositional devices, instrumentation characteristics, and arranging techniques to push the emotion of the moment. This YouTube *cue* is a piano-composition of "Playing Love" from the key piano solo in a movie, and a pivotal point in the storyline itself ...

> **"Playing Love" (1998)**[89] Ennio Morricone
> Morricone was an iconic composer in both classical and film-music spheres.
> Sony Classical SK 66767 | **https://youtu.be/DTogQjE9d1w**

The overall music theme of this work is "Unrequited Love". The focal character, the pianist in the movie ('1900'), is recording a piece while on an ocean-liner, inspired by a beautiful young woman on the ship he has seen and adores from afar, but has never had the courage to meet. This composition is shaped in the "form" of:

Scherzando → Espressivo → Dolce → Grave | Playfulness → Desire → Tenderness → Sadness

It is a representation of a dream-scenario in 1900's mind ... eg. music mimicking his grand-entrance full of braggadocio; to words of flattery/desire; through to his inner romantic feelings; and then ending with a tone of self-realization that "Alas, it will never be ..." emotion. The composition is music-painting his internal thoughts that he cannot express externally.

In 1996, during an interview recorded with the late Brian May [90] (internationally known Australian screen composer: Mad Max 1 & 2, Patrick, Gallipoli, Harlequin, Dr Giggles, Nightmare on Elm St: Freddy's Dead et al), and who worked under Bernard Hermann and Nelson Riddle, he was asked how he 'created'. This is a brief excerpt into his creative process:

> I create thickness, weight, and density in sound through various instrument combinations, musical effects or elements, and borrow from composing styles such as Expressionist, Impressionist, or Classicism. For example, when I want to create a sense of loneliness, I write for a solo English Horn (Cor Anglais). When I require a

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[89] Tornatore, F. & Tornatore, G. (1998). *The Legend of 1900.* [Motion Picture]. Italy. Sciarlo Medusa Film.
[90] May, Brian. "Film Music Composing". Interview by Michael Di Stasio. Griffith University, Gold Coast. April 1994. Public Lecture.

dark mood, I choose Violas playing bass notes. For a military feel I write Brass fanfares. For 'royalty' I compose close-harmony parts for French Horn, and when I write for shock-value, then high-sustained notes on Strings gives the message.

Music Therapy: Any discussion about music and emotions would not be complete without reference to the 'new age' world of Music Therapy. The proliferation of music relaxation and therapy recordings, likely originating from Muzak in the 1920's and the *Minimalist Music* movement in the 1960's, may give further insights into the 'how' and 'why' of music's impact.

With themes such as: Music for Healing; Music to 'de-stress' you; Music for Relaxation; Music for Inspiration; Music to transport you; and Music for Mood, they borrow music and sounds from all styles and genres, and include nature/earth sounds, ethnic instruments (eg. Indonesian 'gamelan' and its reputed ability to 'heal' via its sound vibrations), and of course, sophisticated electronic sounds and vocals.

> John Sozra says he is a sound artist and that he approaches the time and space of music much like an abstract painter approaches canvas. The music ranges from perky, 'up' tempo to warm, rich spaces of sound to 'snuggle into'; from trance-inducing repetitive patterns to memorable melodies. (Stone, 1998)[91].

Perception/Sensory phenomena: A left-field consideration in respondent assessment is the phenomena of the Mondegreen Effect[92] (mishearing/misinterpretation) and McGurk Effect[93] (mixed auditory/visual signals). How audio can play illusions and how the eye can affect what you hear, are forms of confirmation bias. Misheard lyrics or where visual sources produce clearer information than the audio sources can lead to confusion. In addition, an inability to identify timbres in music[94] can affect perception of music emotion. These psycho/neural responses are a response characteristic to track but can be pre-emptively solved or minimized by ensuring test instrument media of high resolution - both audio and visual.

DISCUSSION

Currently, research into identifying and understanding the specific *musical quality* that produces the physiological and psychological conditions for an emotion/mood response is generating imprecise results. This is largely to do with the temporal nature of music itself. In other artforms such as painting or sculpture, the image is static and remains present. Only the duration of the viewer's time spent with the object varies, while the sound and/or words of a song quickly pass leaving only fleeting evidence in the listener's mind. No studies have revealed specifically 'why' music is effective in modifying behaviour or why it stimulates physiological responses. Nor have they identified the fundamental musical essence as to 'how' or what specific 'property' of music achieves this or any effect.

Most of the experimental research techniques used in the measuring of emotion and music have also come under criticism for their theoretical and methodological approach, and as a result, their findings have been subject to review or are inconclusive. For example, those who subscribe to the 'music induces response' argument may fail to account for the fact that in another location, at a different time, and in a different mood, the song may evoke something else entirely for the listener. But perhaps the most profound hole in the analysis phase seems to be that the following question appears to be omitted in the process of investigative trials … "What emotion do you want to feel when you listen to this music?" As a result, *listening context* and *listening mode* are critical to use as a template to understand the phenomena.

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[91] Sozra, John. (1998). *Canvas of the Mind: CD Review.* Interview by Lee Stone. ConneXion Magazine. USA.

[92] Connor, S. (2009, February 14). *Earslips: Of mishearings and Mondegreens.* Columbia University. Retrieved from http://www.steveconnor.com/earslips/

[93] McGurk, H., and MacDonald, J. (1976). Hearing lips and seeing voices. In *Nature.* 264 (5588):746-748.

[94] Hailstone, J., Omar, R., Warren, J. et al. (2009, November 1). It's not what you play, it's how you play it: Timbre affects perception of emotion in music. In *Quarterly Journal of Experiential Psychology*. Sage.

It remains an ongoing challenge to discover this *music-singularity* and develop a general theoretical framework explaining emotion/mood effects. We know that it occurs but deriving conclusions as to what that core ingredient of music is remains elusive. This seems to be due to a shortfall in the methodologies used in exposing the listener to the multiplicity of musical parameters: recognizing the impact that transient life-mood states have on listeners asked to respond to (emotional) stimuli in a clinical trial; and finding a framework to synthesize these experiences to find a convergence in human response. A song replayed in a different location, at a different time, with the listener in a different mood-set may evoke an entirely different response, and why integrating listening *context* and *mode* into a research plan is critical.

Reflecting on the many music cues included in this paper, and their core purpose for inclusion:

Researchers, in their hunt for test instruments in this field, have by-and-large fallen back on the standard menu of music choices rather than emotionally evocative content, as well as testing for base emotions rather than mixed emotions or amplified emotional scenarios. In addition, the music is simply "played" with scant information presented about it to the participant - no backstory, no insights as to what was in the mind of the composer, no framework for what may transpire in the piece. The strategy has always been through "surprise" in measuring arousal or valence, and assuming the listener has or has not any knowledge of the tracks used. Invariably, these test-instrument tracks are short (an average of 8~10 music samples of 30 seconds duration each - as reported in Eerola & Vuoskoski, 2012. Ibid.).

A strategic approach would be to curate an innovative test instrument set: *longer selections* (full music cue) with background analysis of the composition provided ("Playing Love" (1998) Ennio Morricone) to evaluate the "romantic" quotient; *extended play* (full "concept" LP) of an entire album just as the artists intended it to be listened to ("Sgt Pepper's Lonely Hearts Club Band" (1967) The Beatles); *epic tragedy* (experimental music cue) with its back story explained ("Threnody to the Victims of Hiroshima" (1960) Krsysztof Penderecki) and a virtual sense of horror; *dystopian dream* (audio/visual cue) of ultra-violence ("Stuck In The Middle With You" (1972) Stealers Wheels) to push emotive/shock buttons; *physiological response* (frisson cue) generating a palpable physical reaction ("Duo des Fleurs" (2017) Sabine Devieilhe & Marianne Crebassa); *live event* (musician and audience interaction) to be in a sea of like-minded feelings ("Danse Espagnole" (1982) Itzhak Perlman). Such an approach not only triggers emotion/mood response but also stirs more intense comment and feedback from the respondent, as the material makes a "connection". This is a way forward.

CONCLUSION

As this was a theoretical paper, its aim was to identify the gaps in current music and emotion/mood research design and implementation, and to propose recommendations for future research processes. However, it was abundantly clear from the outset that researchers were seeking real-world responses to internalized feelings from participants immersed in artificial environments with little personal connection to the test instruments used. With test subjects drawn by convenience rather than streamed via music-consumption background, measurement of resultant responses is too generalized. Rationale for the selection of test instruments was a further follow-the-pack approach with the dominance of classical music, and some adjunct genres, as the source material. The stimuli selected to elicit emotional responses needs to match the reaction-model the researcher believes will generate that emotion/mood.

In addition to the need to develop curated, purpose-designed music stimuli, and to source a representative cross-section of listener profiles for testing, a critical feature for inclusion in the process is listening-location variance ie. from laboratory to home to mall to commuting to vehicular to venue - rather than static clinical environments. An atmosphere or location context conducive to extracting a personal response has generally been omitted from research practice - unless the participant has completed a self-evaluation out of the laboratory. The emotional intensity of music engagement also measured outside of the clinical environment may provide deeper and more focused responses and insights.

Along with the importance of source material and listening environments is the quality of the transmitted sound. From the perspective of an audiophile or music connoisseur, asked to participate in a study, and listening to music through consumer-level equipment, this has a negative impact on their response - likely frustrated or distracted by the sub-sonic quality. Audio quality perception or reception can have a direct impact upon the listening experience and emotional response - whether analogue or digital, live or recorded, standard or high-resolution formats. However, regardless of the participant profile, thought should go towards sound playback formats and equipment that brings the participant as close to possible to having the artist/s in the room with them - maximizing the emotional arousal and valence level of the music, and thereby unleashing its full sonic spectrum.

Whether scientific, sociological, or theoretical research in this field, the respondent's *profile* (musician, aficionado, or general consumer), *orientation* (pre-interview state of restiveness) and *acrophase* (state of arousal or valence) are critical to ascertain. This *listening context* data pre/during/post testing provides the background for preparation, implementation, and analysis of the research project. But of even deeper importance is to determine the *listening mode* or "how" the respondents are listening - *causal* (to learn or feel), *semantic* (to interpret or critique), and *ambient* (for background or atmosphere). These data fields of context and mode can then act as the template for measuring emotion/mood. It also eliminates the risk of bias or the Hawthorne effect (McCambridge et al, 2014)[95] where participation in research, particularly activities that probe inner personal feelings, have effects and consequences when the participant is aware of being studied.

There is an abundance of music and emotion/mood studies, with a large majority following a predominantly Classical Music | Lab/Self Testing | Easy-access Respondent research model. The need for a renewed approach, to avoid well-worn pathways leading to inconclusive or broad findings, is evident. The template of *systematic musicology* which encompasses all music disciplines, and a *mixed method* research format which integrates quantitative/qualitative investigative methods, would form a unified model to better examine the physiological, psychological, biological, neurological, and metaphysical determinants of emotion/mood in music, or in particular, "how does music evoke or induce emotion?"

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[i] 5W+1H (aka 5W+2H, 6W+H, 6W+2H et al.) is an investigative question-method (who, what, when, where, why, and how) derived from a Rudyard Kipling poem "The Elephant's Child" (Kipling, R. (1902).

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[iii] WOMEX: Worldwide Music Expo. Retrieved from https://www.womex.com

[iv] BILLBOARD: Billboard-Hollywood Reporter Media Group Retrieved from https://www.billboard.com