

From the Song to the Space: Investigating Emotional Responses to Corresponding Works of Music and Architecture

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Abstract

The initial hypothesis of the investigation was that music and architecture are perceived varying despite proclaimed similarities in their creative processes; the perception of neither is free of existing human associations. Thus, even if a piece of architecture is derived from a piece of music, it might not elicit a similar pattern of responses as the piece of music. In reviewing the results to the survey, the thrust was on analyzing the parent emotions of responses for matches, opposites and dyads, rather than locating absolute sameness of the primary emotions recorded by participants. To this end, the primary emotion responses were substituted with their parent emotions to conduct further exploratory analysis on the basis of parent emotions. The results also suggested that finding a match in parent emotion for a song-space unit was as likely as a conflict. The influence of biases on the results cannot be discounted.

Overall, the research suggested the possibility of similarities in the responses to corresponding music and architecture, though the chances of finding varying and often completely opposing responses are also present.

Key words –

Compositional drawings ,Fundamental elements , Dynamics , Emotional response , Abstraction

The origin of a question

Was Goethe onto something or was it mere fancy when he proclaimed “architecture is frozen music”? This study originated from a similar line of questioning and developed into an experiment that examined the propositions of existing research that frameworks for architectural design may be developed from music (e.g.: Morimoto 2016, Felix et al. 2016).

Existing literatures focus on creation

Previous scholarship has focused heavily on exploring the relationship between music and architecture from the point of view of creation – a notion whose origins may be traced to the period of Greek and Roman Antiquity. In his essay *Architecture Becomes Music*, Charles Jencks says that ‘an underlying code’ of mathematical and geometric laws was used to generate both musical and architectural compositions in the Greek and Roman empires. Music and architecture both drew from the idea of harmonic ratios in a trend that extended from 13th century Europe until the Renaissance. In the Modern Era and in contemporary practice, attention is frequently brought to the architectural design process of 20th century architect and composer Iannis Xenakis, which drew from musical compositional exercises for his orchestral piece *Metasis* (Morimoto 2016), Daniel Libeskind’s use of

“compositional drawings” in the design process of the extension to the Berlin Museum (Capanna 2009), as well as Steven Holl’s *Stretto House*, whose design borrows from the musical concept of the ‘stretto’ (Morimoto 2016).

The less-explored user-angle

Research that explores the relationship between the music and architecture from the viewpoint of user-perception is not as vast as its creative counterpart, and is limited to the 20th century and beyond.

Modernist architect Le Corbusier’s understanding of the architecture-music link, described in his work *The Modulor*, stands out in his emphasis on the perceptive rather than compositional viewpoint (Gonçalves et al. 2015). Architectural historian Charles Jencks speaks of the differences in architecture and music when examined from the point of view of perception – “... a symphony... cannot, ordinarily, be sped up or slowed down by the perceiver; or read backwards as architecture can be from the exit; or top-down as with a skyscraper” (Jencks 2013).

The present research

It was these possibilities of similarities or, indeed, differences in the *perception* of music and architecture

that piqued my interest, and motivated the line of enquiry in my research. The experiment conducted towards this research involved finding spatial parallels to the song “Do Me A Favour” by Arctic Monkeys in the building of RV College of Architecture (RVCA), Bangalore, and invited participants to record their responses to both the music and the architecture. By identifying whether corresponding segments of the song and building elicited corresponding responses, the research attempted to answer the question — do music and architecture elicit similar emotional responses in observers on the basis of comparable elements (rhythm and pitch) and organising principles (texture and dynamics)?

The initial hypothesis was that music and architecture are perceived varyingly despite proclaimed similarities in their creative processes; the perception of neither is free of existing human associations. Thus, even if a piece of architecture is derived from a piece of music, it might not elicit a similar pattern of responses as the piece of music.

Methods

Variety in ranges of musical and architectural expression formed key reasons for the selection of the song ‘Do Me a Favour’ and the RVCA building, respectively, as this opened up opportunities for the generation of distinct emotional responses. The RVCA building was additionally selected for the sample group it provided – students of the college who are familiar with the spaces due to regular use. Twenty eighth-semester students of RVCA were invited to participate in the study.

The challenge of the experiment lay in analysing the song and drawing from it architectural parallels in the RVCA building, as these would be the “objects” that the participants would react to.

Parameters for analysis of the song were determined by studying existing literature on musical theory. The fundamental musical parameters so selected were pitch and rhythm, while the organising musical principles of texture and dynamics were used to draw architectural parallels.

The Parameters Explained

The Fundamental Elements

- *Rhythm*
Rhythm, the time relation between sounds (Titon et al.), is strongly linked to the perception of movement and speed in music. Existing scholarship often compares the length of intervals between sounds in music to the spacing

of built elements (Klochko et al. 2017; Morimoto 2016).

In this study, rhythm referred to the rhythm produced by the percussion elements only, and was related to architecture in the way of horizontal movement through a space and the spacing of elements (both in the vertical and horizontal planes) along the horizontal axis. A uniform beat manifested in architecture as regularly spaced elements with small protrusions out of the plane in which they lay, or blank surfaces such as walls or floors. A non-uniform beat manifested as irregularly spaced elements with small protrusions, or regularly spaced elements with large protrusions.

- *Pitch*
Musical pitch refers to how high or low a sound is (Titon et al.) Prior research has revealed that higher pitch is associated with higher heights in spaces (Eitan, 2013).
In this study, pitch was related to height in terms of vertical movement through a space — a rising pitch in the song corresponds to upwards vertical movement and vice-versa.

The Organising Principles

In musical compositions, these are mechanisms used to organise the basic elements of rhythm and pitch. In this study, these helped identify areas of emphasis, so as to clarify often contrasting layers of elements, and draw architectural parallels.

- *Texture*
Musical texture refers to the layering of melodies. In ‘Do Me A Favour’, the melodies are primarily arranged in polyphony, with the occasional use of homophony and comprise a bass melody, a vocal melody and several guitar melodies. The second organising principle of dynamics helps clarify these overlapping melodies.
- *Dynamics*
Dynamics in music are markings that indicate sound intensity and areas of emphasis (Morimoto, 2016). In this study, dynamics helped identify what elements were in focus when the multiple melodies listed under “texture” were layered simultaneously. Then, only the elements which were emphasised were carried forward to be translated into architecture.

Song segment		1. Introduction		2. First Verse			3. Interlude	
Rhythm	Percussion elements	Bass, low tom, floor tom		Bass, low tom, floor tom			Bass, low tom, floor tom	
	Pitch	Low		Low			Low	
	Nature (Uniform/ Non-uniform)	Uniform		Uniform			Uniform	
Pitch	Source of melody	Bass	Guitar	Bass	Vocals	Guitar	Bass	Guitar
	Octave	Base octave (lower half)	Base octave	Base octave (lower half)	Base and -1 octave	Base octave	Base octave (lower half)	Base and +1 octave
	Nature of melody	Rising monophonic riff	Stable homophonic note	Rising monophonic riff	A sudden initial rise and then lowering	Stable homophonic note	Rising	Lowering homophonic riff
Texture		Homophony		Polyphony			Polyphony	
Dynamics - elements of emphasis		1) The uniform beat of the three low-pitched drums in unison 2) The louder and higher-pitched guitar note played at the end of the low bass riff, signifying the hierarchy of the higher pitch, and the start of the melody which will follow this pitch		The vocals find focus as the newly added element			Homophonic guitar riff	
Architectural parallel in the RVCA building		Corridor between exhibition and thesis rooms Linear movement through a volume with a low height, little lighting and blank walls, ending in a space with cut-outs suggesting a larger volume, with daylight streaming in from above. The transition from dark to light, and a smaller to a larger volume emphasises the ending volume much like the loud and higher-pitched guitar note stands in contrast to the low bass riff.		Under The Library The space reflects the modulation of pitch of the newly-added vocal melody in this section of the song. An initial brightness and largeness of volume is followed by a downward descent beneath the library, and further into the kund, echoing the initial sudden rise and subsequent lowering of the pitch of the vocals.			Seminar Hall Downward vertical movement takes place from the entry of the hall to the stage, corresponding to the lowering pitch of the guitar riff. The layered panelling which follows the primary form of the shell, reflects the homophonic layering of the guitar riff.	
Song-space unit (SSU) so formed		SSU1		SSU2			SSU3	

Table 1. Translation of Do Me a Favour to architecture

An octave is the interval between any musical pitch and another musical pitch with half or double of the frequency of the former note's frequency

Source: Author

Song Segment		4. Second Verse			5. Chorus				6. Second Interlude		
Rhythm	Percussion elements	Bass drum, low tom, floor tom	Tambourine	Snare	Bass drum, low tom, floor tom	Tambourine	Snare	Crash cymbals	Bass drum, low tom, floor tom	Tambourine	Crash cymbals
	Pitch	Low	High	Middle	Low	High	Middle	High	Low	High	High
	Nature (uniform/non-uniform)	Uniform	Uniform	Non-uniform	Uniform	Uniform	Non-uniform	Uniform	Uniform	Uniform	Uniform
Pitch	Source of melody	Bass	Guitar	Vocals	Bass	Guitar	Vocals		Guitar 1	Guitar 2	Vocals
	Octave	Base octave (lower half)	Base and +1 octave	Base octave	Base octave	Base	Base octave		Base and +1 octave	Base octave (lower half)	Base and -1
	Nature of melody	Rising	Lowering homophonic riff	Starting mid-octave, rising to upper half, ending in the lower half of the octave	Rising and lowering	Rising and lowering, ending in upper half of octave	Starting at mid-octave, rises to upper half, ending in the lower half of the octave		Lowering homophonic riff	Lowering and rising monophonic guitar notes	Lowering
Texture	Polyphony			Polyphony				Homophony	Monophony		
Dynamics - elements of emphasis	<p>1) Non-uniform rhythm of the snare, due to its pitch</p> <p>2) The emphasis of the guitar riff at intervals</p> <p>3) The vocals, due to their moderate loudness</p>			<p>1) The uniform rhythm</p> <p>2) The sudden use of the crash cymbal and absence of the vocal melody for the starting and ending bars brings emphasis to the initial and ending rising guitars</p> <p>3) The new vocal melody signifying the chorus as an important piece in the song</p>				<p>1) The removing of the tambourine after four bars, before the complete stopping of all percussion after another four bars, each transition on beat with and emphasised by the guitar riff</p> <p>2) The lowering homophonic guitar riff, emphasised due to the absence of all other melody</p> <p>3) The lowering of the vocal melody is prominent in the absence of percussion and the long spaces between the guitar notes</p> <p>4) The change of melody and absence of rhythm establishing this as an important piece in the song.</p>			
Architectural parallel in the RVCA building	<p>Second floor corridor</p> <p>Horizontal movement takes place through this space, starting beside an open to sky terrace and ending in a relatively dark vestibule beside the lifts. The initial largeness and brightness of volume and brightness leading to the darker space reflects the rise and fall of the pitch of the vocals. The large protruding beams at regular intervals, and the narrow wall faces created by numerous cut-outs reflect the emphasis of the guitar riffs and the irregularity of the rhythm.</p>			<p>Entry hall at the basement level</p> <p>The initial rise of the pitch of the guitar melody timed to the loud crash cymbal, is reflected in the sudden transition from the smaller vestibule to the triple-height space of entry hall. The rising steps reflect the uniform beat and the rising guitar riff which is highlighted by the absence of the vocal melody in places. The triple-height volume of the space establishes it as important in the hierarchy of the building, much as the changed vocal melody signifies the chorus as a key section of the song.</p>				<p>Stairwell and triple-height court between studios</p> <p>Downward vertical movement takes place through the stairwell corresponding to the lowering pitches of both the guitar riff and the vocal melody. The ceasing of movement once reaching the lowest level and the period of no movement within the court is much like ceasing of rhythm and the verse devoid of rhythm in this section of the song. The large volume signifies the hierarchy of this space in the building, and this section in the song</p>			
Song-space unit (SSU) so formed	SSU4			SSU5				SSU6			

Table 2: Translation of Do Me a Favour to architecture

Song segment		7. Third Verse			8. Break and final chorus					9. Outro	
Rhythm	Percussion elements	Bass drum, low tom, floor tom	Tambourine		Bass drum	Snare	Tambourine	Foot high hat	Crash cymbals	Bass drum, low tom, floor tom	Tambourine
	Pitch	Low	High		Low	Middle	High	High	High	Low	High
	Nature (uniform/non-uniform)	Uniform	Uniform		Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Pitch	Source of melody	Bass	Guitar	Vocal	Guitar		Bass	Vocals		Guitar	
	Octave	Base and -1 octave	Base and +1 octave	Base octave	Base and +1 octave		Base octave (lower half)	Base and +1 octave		Base and +1 Octave	
	Nature of melody	Lowering and rising	Lowering homophonic riff	Rising and then lowering	Initially a monophonic melody comprising single stretching notes, and then a polyphonic melody of closer-spaced notes, rising to a climax		Rising monophonic riff	Rising		Lowering homophonic riff followed by a homophonic note held at the highest and lowest pitches of the base octave	
Texture		Polyphony			Polyphony					Homophony	
Dynamics - elements of emphasis		1) The rising and lowering vocals are emphasised due to their loudness and the percussion which resumes on beat with the vocals			1) The five synchronised percussion instruments playing in unison emphasises the uniform beat 2) The break without any vocals, and the absence of vocals in parts of the chorus bring focus to the rising guitar melody					The single homophonic note is highlighted by the duration for which it is held	
Architectural parallel in the RVCA building		Pavilion Rising steps from beneath the library lead to the large and bright open-to-sky space of the pavilion, from which movement takes place into the darker and smaller vestibule that forms the backstage entry to the multi-purpose hall. This reflects the rising and lowering pitch of the vocal melody.			Open Air Theatre (OAT) The steps of the OAT are ascended to match the rising guitar. The loudness of the five percussion instruments in tandem is reflected by the large tread of the steps of OAT, while the uniformity of the beat is found in the equal spacing of the steps. The largest volume (with no roof) in the college is a nod to this loudest, highest-pitched portion of the song.					Bridge The open to sky linear space on the top-most floor of the RVCA building reflects the single high-pitched note held for a long stretch	
Song-space unit (SSU) so formed		SSU7			SSU8					SSU9	

Table 3. Translation of Do Me a Favour to architecture

Source: Author

Analysing and Translating each section of the song

For the purpose of analysis, the song was divided into segments, each of which was translated into a space in the RVCA building. The basis for division of the song into sections was the common grouping of rhythmic elements, vocal melodies and bass and guitar riffs. Tables 1, 2 and 3 describe the segment-wise analysis and translation.

Developing the survey

The survey comprised two parts. In the first, participants were asked to respond to spaces in the RVCA building depicted as plans and images; in the second, they responded to musical sections of ‘Do me a Favour’. In both parts, participants recorded their emotional responses by selecting from a common list of primary emotions propounded by Robert Plutchik (1980).

Emotional model adopted for the survey and analysis

The range of emotions presented in the survey are based on Robert Plutchik’s Psychoevolutionary Theory of Emotions (1980). Plutchik’s model propounds eight parent emotions, each of which contains within it primary emotions that are variations in intensity of the parent emotion. These allowed for a framework of analysis that recognised varying degrees and kinds of similarity of emotions — suitable to the subjective nature of music and architecture themselves.

Results and Discussion

In reviewing the results to the survey, the thrust was on analysing the parent emotions of responses for matches,

opposites and dyads, rather than locating absolute sameness of the primary emotions recorded by participants. To this end, the primary emotion responses were substituted with their parent emotions to conduct further exploratory analysis on the basis of parent emotions.

Primary emotion analysis

The average percentage of matching primary emotion pairs across all nine song-space units was found to be 8.33%.

Parent emotion analysis

Matches :

The average percentage of matching parent emotion pairs across all nine song-space units was observed to be 15% — nearly twice as much as primary emotion matches (Figure 2)

The average percentage of conflicts in parent emotion pairs was 16.67% — just surpassing that of matches (Figure 3)

Dyad:

Figure 4 depicts the cumulative percentages of primary, secondary and tertiary dyads. Primary dyads, which may be considered closest in nature to matches, occurred on average nearly twice as often as matches — 24.44%. Secondary and tertiary dyads, which are less apt to be likened to matches, were on average observed at 16.66% and 26.66% respectively.



Figure 1. Plutchik's dyads and opposites (Visualisation by Drews, 2007)

Source: Author

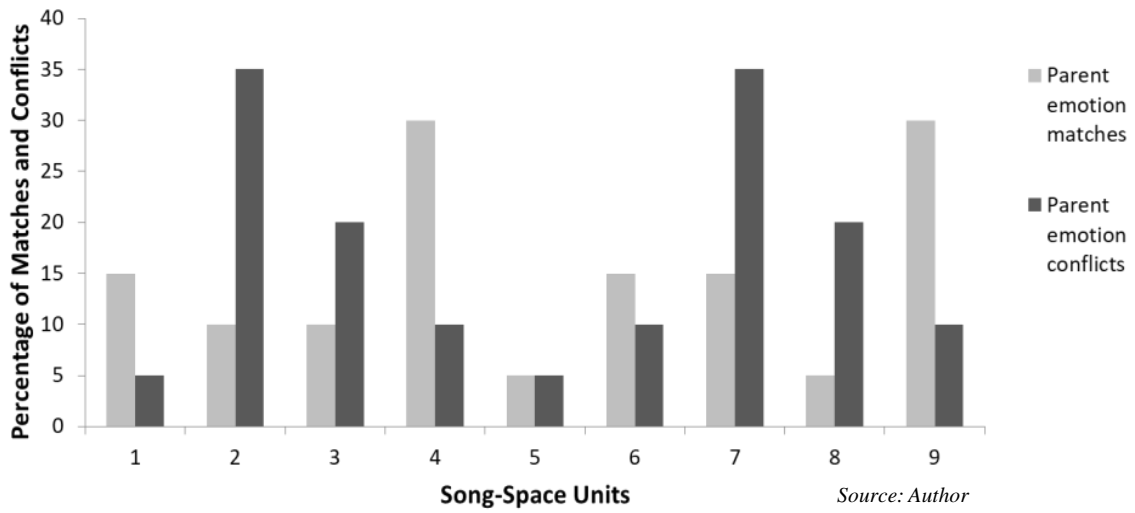


Figure 2. Primary emotion matches and emotion group matches

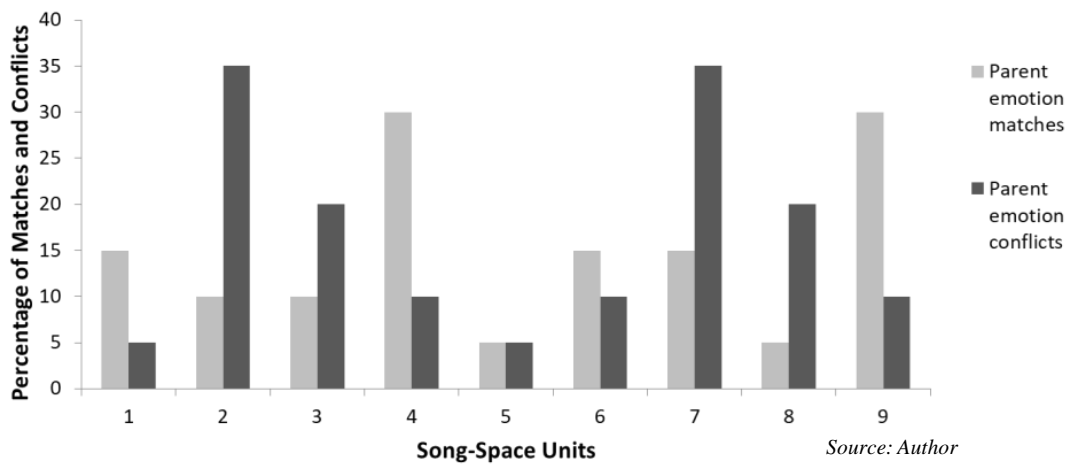


Figure 3. Parent emotion conflicts and matches

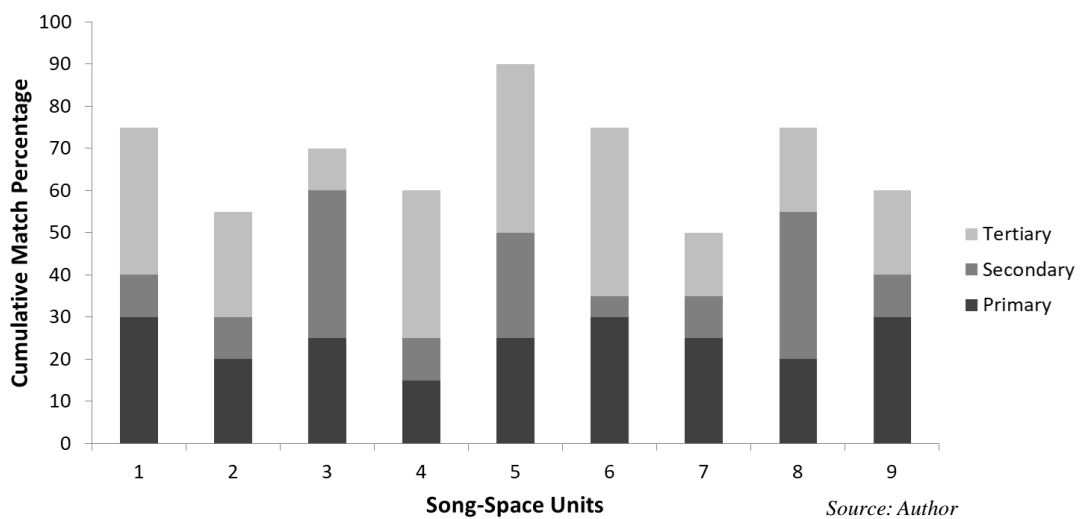


Figure 4. Cumulative percentages of primary, secondary, and tertiary dyads

Personal bias in emotional responses to the architecture

When asked to specify the number of questions in part one of the survey, for which they believed that their emotional responses were unbiased or independent of their existing associations to the RVCA building, the majority of participants (65%) felt that their emotional responses for 4-6 of the total (9) questions were unbiased. A smaller portion (25%) felt that their responses to 3 of the questions were unbiased, while the smallest percentage (10%) felt that their responses to 7-9 of the total questions were unbiased.

When asked if emotional responses can ever be unbiased when an individual is familiar with a building that an overwhelming 70% of respondents disagreed, while only 30% agreed

When asked if emotional responses can be unbiased when an individual is instead not at all familiar with a building, 75% of the participants agreed while only 25% disagreed.

Inferences

This study had sought to investigate the possibility of music and architecture eliciting similar emotional responses in observers on the basis of a fixed set of comparable parameters.

When the cumulative percentage of parent emotion matches and primary dyads were considered, an average occurrence of 39.44% was observed, suggesting that a significant portion of participants responded to corresponding song segments and spaces with varying intensities of the same parent emotion, or with parent emotions that are often experienced together, according to Plutchik's model. The results also suggested that finding a match in parent emotion for a song-space unit was as likely as a conflict. The influence of biases on the results cannot be discounted.

References

- [1] Worlds of Music: An Introduction to the Music of the World's Peoples (Titon et al., 2016); Morimoto's (2016) dissertation Music And Architecture: Notes On Experiencing The Convergence Of Music And The Built Environment
- [2] A beat in which the intervals between the sounds are equal
- [3] A beat in which the spacing of intervals between sounds is not equal
- [4] two or more entirely distinct melodies occurring at the same time
- [5] two or more complementary or harmonic melodies performed at the same time
- [6] Dyads are of three kinds – primary dyads (comprising primary emotions that are often felt together), secondary dyads (sometimes felt together) and tertiary dyads (seldom felt together).

It is important to recognise the limitations in these interpretations –

- The prevailing public health scenario prevented participants from experiencing the spaces of RVCA in-person resulting in a reliance on perhaps inaccurate memory.
- The use of dynamics to translate only those musical elements of the song identified as prominent might have led to a reduction in complexity of the resulting architectural translation.
- The use of an existing building in which to find spatial parallels to music might have limited the scope of accurate translation.
- The abstraction of Do Me a Favour and the RVCA building into discrete segments and spaces – while integral to ensuring specificity of responses, might be in opposition to the essential continuity of any piece of music or architecture.

Overall, the research suggested the possibility of similarities in the responses to corresponding music and architecture, though the chances of finding varying and often completely opposing responses are also present. Future studies may be able to overcome the limitations of the current findings and determine if similar responses to music and architecture stem from intense rather than mild emotions.