



# European Journal of Educational Research

Volume 8, Issue 1, 123 - 139.

ISSN: 2165-8714

<http://www.eu-jer.com/>

## Visualizing Music as a Basic Design Assignment in Architectural Education

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*Received: October 11 2018 • Revised: November 22, 2018 • Accepted: December 5, 2018*

**Abstract:** The different aspects of architectural design and music that act in support of one another have governed the inspiration and utilization of music in design education. This paper describes a Basic Design Studio assignment that involves visualizing music by organizing linear and planar units using basic design principles, with the aim of contributing to the transformation of conceptual thinking to physical formation by the integration of domain material taught in basic design courses. Dealing with music as a design tool, the study relates the perceptual and structural analogy between music and design and discusses its contribution to basic design achievements. The visual expression of the products and the manner in which it relates to appropriate basic design principles and elements qualities are evaluated in the context of organization, abstraction and uniqueness. The assignment given to the students to conduct this evaluation strengthened their ability to transform abstract thinking into physical representation, helped them to understand multidimensional thinking and how to engage in creative thinking, contributed to their architectural education and improved their study skills by giving them experience in coordinating design elements, principles and materials, all of which served to stimulate improvisation and reflection of emotions. From the results of this study, it is recommended that music, which has similar approaches and principles to those of architectural design, can be used as a tool in design and architectural education to support different phases of the creation and expression process.

**Keywords:** *Visual composition, basic design, music, architecture, design tool.*

**To cite this article:** Gur, M., & Sen, E. (2019). Visualizing Music as a basic design assignment in architectural education. *European Journal of Educational Research*, 8(1), 123-139. doi: 10.12973/eu-jer.8.1.123

### Introduction

#### *Design and Music as Similar Compositions*

Perception of the world involves a myriad of interconnecting sensory experiences (Maze, 2002). Sound and space form a critical couple in everyday environment and mutually reinforce one another in our perception. Space and sound are inextricably linked in human beings' experience of what it is to exist in the world. However, human beings are not simply passive preceptors of either sound or space, but in fact active creators of both (Ripley, 2007, p.2). As artistic enterprises, music and design coincide in terms of the elements that make up their processes and the ensuing emergence of a product. Schopenhauer argued that all arts are inspired by music, while Johann Wolfgang von Goethe was quoted as saying "I call architecture frozen music", and Iannis Xenakis expressed the great linkage between music and architecture (Tayyebi, 2013). Musicians utilize their talents in music to translate emotion into an audible form, while architects translate emotion into a visual form through the act of producing sketches or creating 3D models (Rao, 2014). Art of music consists of a composer as a producer of a work as specified by his sense, type of dominating emotion, a listener who receives the composer's message and has a different aural sense and a work that contains melodies and wave frequencies carrying the composer's sentimental feelings, a mixture relating to rhythm, harmony, unity and variety. Likewise, the architectural design process has similar components as a designer, a user and architectural work (Dewidar et al., 2008). The basic requirements of music are melody, rhythm and harmony, while the elements that make up the musical composition are sound, rhythm, tempo and rotundity (Okatan, 2012, Cuhadar, 2008). The literature on this subject features various studies on the similarity between design and musical composition and on the groupings concerning the elements. The architectural and musical works resemble each other as they contain mixtures of rhythm, unity, variety and harmony (Dewidar et al., 2008).

In the evaluation of design products, the concept of "composition" is at the fore, and the elements of design, the organization of these elements, and the product outcome are evaluated in the context of visual composition. The design product is visual, while the product of the art of music is an auditory composition. The image that appears in the mind

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as a result of conceptual thinking is transformed into a visual expression through design principles and elements, with the product outcome becoming a visual composition. The fact that the different layers and melody emerging in the mind in the art of music are auditory and that the different layers and images in the art of design are visual makes these two artistic pursuits similar in terms of process, that is, both take place in an abstract plane and evolve into a composition able to be perceived through sensory organs.

The potential for improving perceptual and conceptual abilities in the creative arts is limitless as musical education has been proven to improve the cognitive development of students in other disciplines (Maze, 2001). Pasin (2008) indicates that there are five types of analogies between music and architectural design as functional, structural, metaphorical, inspirational and perceptual. Functional analogy is about the association of music with acoustical or architectural setting in specific buildings. Structural analogy refers to a multi-dimensional type through mathematical orders, which is the formal structure and the design language shared by the two disciplines built by Platonic and Pythagorean thoughts and utilized by the Renaissance architects or Bela Bartok and Le Corbusier in the 20th century to organize the architectural elements. Metaphorical analogy between music and architecture is about the depictions of spatial composition as the Schopenhauer's definition as "Architecture is frozen music" or Hugo's depiction of the cathedral in Notre-Dame De Paris as "a vast symphony in stone". The fourth type of analogy which is inspirational, considers the similarities between the creativity processes of the composer and the architect. The perceptual analogy between music and architecture can be about architectural form, expressive form or technical elements of architecture (Pasin, 2008).

Schillinger (1946) reconciled the principles constituting design and music, evaluating the principles informing musical composition as rhythm, melody, pitch-scales, harmony, timbre and orchestration, and those of visual design as line and color. The concepts constituting the organization of design include proportion, harmony, repetition, rhythm, contrast, and pattern (Gurer, 1998, Pentak and Lauer, 2014). These coincide with musical composition elements, and the designer is responsible for deciding on how to apply these elements and principles to create a composition. Terms like rhythm, texture, harmony, and proportion can refer to both architecture and music, with the difference being that the rhythm in music is a sound pattern related to the beat, while visual rhythm is a design principle based on repetition of the same or similar elements (Rao, 2014, Pentak and Lauer, 2014). Ornamentation, scale, color, texture, layering, narrative and context can be drawn between music and architecture as structural members (Maze, 2002). While the musical pattern consists of generated sound layers and rhythms by different instruments, the architectural pattern relates to materials, gaps, forms, structure and rhythm. Harmony is the balance of sounds, or the elements that make up the composition, whereas proportion is the relationship of these elements in design, or the distance between notes and intervals in music. Dynamism can be observed both in music as well as in the structure of a building (Rao, 2014). Concepts like rhythm, measure, harmony, and composition are common to music and architecture and serve as fundamental components in the act of creation. Composers and designers both use the universal creation tools of rhythm, measure, harmony and composition. The musicality in design, or the presence of structure and form in the composition, serve to closely unite the two disciplines of design and music (Ustun and Kalayci, 2017). The interrelationship between architecture and music that unfolds in the process of architectural design assumes an inspiring identity, one that helps to shape the design process over time in the generation of solutions to design problems. Dewidar et al. (2008) indicate that presently, architectural spaces that are created through virtual reality by the unknown architects behind computer scenes have taken the place of successful architecture formations that contain musical symphonies designed by the architects that have high sensitive taste, strong observation and deep culture. But it is also seen that the design process and creative thinking are enriched by digital technology in certain studies through visualizing music in architectural education. The representation of the design process inspired by musical improvisations as live actions (by videos) on computer screens, digital space models, digital music models which are discussed in the next chapter, inspire design process or digital object models that are created through a further abstraction and gain qualification (Neiman, 2006, Neiman, 2009, Maze, 2001, Maze, 2002, Pasin, 2008, Kuloglu, 2015).

Design process is a cognitive process that becomes subjective in emotion-imagination, information, understanding, connecting, awareness and synthesizing phases (Ozgencil Yildirim, 2003, p. 39). As architecture, perception of relationships between different parts is a skill essential to the practice of musicianship. It is beneficial to use music as a tool in design studios with regards to comprise a whole by fictionalizing different components and parts alongside the perception and graphic expression of the environment by interconnecting sensory experiences (Maze, 2001, Maze, 2002). Pou (2012) indicates that architects who design not only the building, but also the scenery can be the "songwriters seeking a melody", dependent on the details or functional requirements of buildings. It is logical to assume that collaborative ventures between music and architecture as the allied arts which use a shared vocabularies of compositions and mathematics will continue. Through an analysis of the processes used by architects and composers to develop these works, it is possible to gain a deeper insight into the nature of collaboration and to extrapolate the potential for applications across other disciplinary boundaries (Lutz, 2005). Spiritual or formal, different methods followed in design education contribute to production of unique ideas, connection of different parts, development of analysis-synthesis competence of students (Onur and Zorlu, 2017, p.546-552). In this framework, it is necessary in architectural education to ensure that the students can organize different layers together and fictionalize the relationships between them. It is important to produce methods that support connecting different layers from abstract

to concrete, to develop the imagination devoted to stimulate the creative design process and the creative thinking by experiences in the studio. At this point, the methods with respect to conducting design education in the studio gain importance.

In design, which is an interpretational and dynamic system, students try to understand the connections between information layers together with the studio instructors (Aridag and Kos, 2015, p.104). The educator has a responsibility to investigate and discover with the student, while providing the guidance and encouragement to ask questions and explore new ways of knowing the surrounding world. The student and educator together should expand intellect, process, intuition, and learn to hone perceptual tools by questioning givens, doubting constraints, and challenging assumptions (Maze, 2002).

It can be seen in the literature that, using music and the analogies between musical and design compositions as a tool in architectural education provide benefit with regards to a contextual and conceptual thinking system, abstraction and synthesizing phases to comprise a whole. In this context, experimental work which involved visualizing music by organizing linear and planar units using the basic design elements and design principles and the learning outcomes are described in the study. Four music tracks that have different rhythms, instruments and that involve and reflect diverse emotions were selected by the students to be visualized through the organization of the elements and principles in order to reflect the composition, emotion, structures of the musical pieces. The aim of the study is to investigate the impact of the design work on design education in terms of students' ability to reflect the dominant elements of musical compositions through sensual, emotional and intuitively analyses based on their perceptual differences and explanandums onto visual compositions.

#### *Music in Design Education and the Basic Design Studio*

The act of designing involves certain skills, such as the ability to generate ideas, evaluate alternatives, make decisions and take action, all of which must be learned. Architectural design is a studio-based process, where the act of designing is learned and practiced to integrate domain material taught in courses into the design studio experience (Gross and Do, 1997). Three basic aspects of design education are learning and practising new skills, such as visualization and representation, learning a new language and to think architecturally as indicated by Ledewitz (1985).

Music and architectural design resemble each other in terms of stimulating coordination. Analyzing music can help to support creativity, cognitive thinking, and coordination of design elements in architectural education by addressing abstract imagery. The importance of development of creativity in architectural design education and process is emphasized in different studies (Ozgencil Yildirim, 2003, p.36, Aridag and Aslan, 2012, p.58, Soliman, 2017, p.205, Royalty, 2018, p.138). Especially in the first year of architectural education, it is crucial to develop the design skills and creativity (Aridag and Aslan, 2012, p.50). In the act of designing, the fact that there are different aspects of architectural design and music that overlap with each other within the framework of various relationships suggests that music can influence and benefit architectural education. The musical composition principles described by Schillinger (1946) coincide with the principles applied in basic design education. Basic Design Studio 1, whose process operates along the lines of conceptual scenario and its visual expression, has quite a fundamental place in design education. In basic design, the approach starts at the concrete level, proceeds to the abstract level, where ideas are generated, and then returns to the concrete level via cognitive thinking (Sarioglu Erdogdu, 2016). The various purposes behind the basic design educational curriculum is to teach students to use the basic language of design and to inform them on how to construct relationships among design constructs and to construct relationships with the environment through design (Besgen et al., 2014). Design elements, such as scale, measurement, form, texture, visual perception, repetition, harmony and contrast, design principles, and 2D and 3D spatial concepts gain significance in basic design education programs within the framework of empowerment of visual expression and creativity (Gurer, 1998). These elemental concepts, which are also applied in the composition of music, show that music can contribute to the educational environments of basic design studios. Basic design studio which is implemented as a freshmen year studio in architectural education is essential in developing students' mindsets by constituting a particular design language and skills to be internalized and used by the designers lifelong. The studio which includes various mental and sensual skills is indicated as a venue for self-exploration of the design student while transforming a non-visual composition into a design project. In this context, the investigation of the relationships between music and architecture is accepted as a form of thinking in design process through forms of art, design and the opportunity of a symbiosis development. The establishment of interactions between visual and non-visual as aural, design students usually can be provided with a thinking system that enables them to perceive and analyse the designed environment multi-dimensionally (Pasin, 2008). By the reason that the interaction that is created by the images in studio environment supports creative thinking by new experiences, studio have the characteristics of the "heart" of education (Ozgencil Yildirim, 2003, p.38). Experimental learning is an important part of design education (Soliman, 2017, p.207). In this framework, developing the achievement of connecting should place a particular importance in studio education with the aim of fictionalising the parts as a whole (Ozgencil Yildirim, 2003, p.39).

Based on the achievements that are targeted for the students, in architectural education, various works and workshops related to the design process and products have been carried within the framework of music composition, where the

concepts and principles serve as elements of inspiration or as design tools. Using music as a tool in fundamental design studio is beneficial to introduce and encourage different ways of exploring the built and natural world. In this context, perception of the relationships between different parts is essential for architecture and musicianship. This basic design and interpretive skills without “jumping directly to buildings” is the fundamental understanding of formal relationships, connections, layering, hierarchies and space-time in an architectural education (Maze, 2002). In an interdisciplinary study examining the relationship between geometry, architecture, and music that was conducted by Leopold (2005) and involved students of architecture, mathematics, and music composition, it was concluded that a consistent relationship existed between these fields. Furthermore, a study carried out by Kuloglu (2015) on designing an abstract space in the form of a cube by using basic design elements according to the interpretation of music showed that the elements most applied in space design were “scale/proportion”, “rhythm/repetition” and “movement/motion. It is significant, for the purposes of this study, that the elements most used in the spatial design were selected from among those that stand out in both fields, confirming, in effect, that music can be used as a tool in spatial design (Kuloglu, 2015). Results from a workshop on music and architecture organized by the MS Ramaiah Institute of Technology and the School of Architecture, where the focus was on visualizing the image of raga, a melodic framework, in different color schemes, showed that the workshop stimulated innovative thinking and creative ideas (Rao, 2014).

As stated above, basic design studio is essential for developing creativity and for composing a design language and a thinking system as a freshmen year studio in architectural education. The project built by Bennett Neiman called *Bebop Spaces* is a series of architectural improvisations that gets evolved by different stages in design studio. It is inspired by *Leap Frog*, by Charlie Parker and Dizzy Gillespie that involves spontaneous expression of links, connections, joints and transitions in the musical composition (Neiman, 2007). By using the musical idea as a tool to motivate improvisation, concepts or schemas are designed through the process by the designers that are expressed in different ways according to different stages of the project. Neiman (2007) indicates the musical piece as a conversation or an argument that is complex. The improvisations designed in *Bebop Spaces* Project start with the construction of a simple tracing that translates the bit-mapped information of the source image into vectors. Then, the lines are extended in horizontal or vertical orientations with the aim of adjusting and refining of certain elements in various ways. This stage is expressed as a search for logical arrangements and articulation of objects to define spatial structure within the structure. The drawing at this stage consists of hybrid shapes, curves, angles, squares and rectangles that can overlap (Neiman, 2009). The next step of the project is to create chromatic endings that involves to colour selected elements and regions. These numerous experiments test orientation constants and variables with the exploration of figure and ground (Neiman, 2007). Different colors represent subliminal systems that can be metaphoric or organizational while chromatic improvisations imply the depth as an expression of three-dimensionality (Neiman, 2009). This study support the thinking system of the students to define primary, secondary and tertiary parts. Neiman (2007) states that this is an abstract representation of an encoded space that reflects the relationships among the elements and reciprocal notions of plans and sections. Another phase of the project is the *Bebop Spaces* video that attempts to describe the tonality of the process through the actions. Here, the designer performs a live demonstration of the drawings they created. This process of the project allows the designer to extract forms and spaces from two-dimensional drawings to three-dimensional implications. *Bebop Spaces* is an accumulative construction process that is a spontaneous improvisation as a design process that include similar rules with an analogous studio for the students in initial basis (Neiman, 2007). *Bebop* Constructions support architectural imagination and creativity through experiments, discoveries, manipulations, interpretations and communications (Neiman, 2009).

Another work that is developed through the contribution of music to architectural education is about studying a traditional Irish music that aims to make the students gain a holistic cultural and architectural understanding (Maze, 2001). This is for fundamental design studio students similar to the *Bebop Spaces* Project. Maze (2001) describes the traditional Irish music as ancient, melodic, diatonic, highly rhythmic and constantly evolving with little harmonies. The aim of the study is the compositional translation of the musical form to create a relatively different form. This translation necessitates the content to be read, scrutinized, and reconceived and allows the student to translate their perceptions into abstract forms. The process of the project starts with the analysis of the musical form and the understanding of the structure through abstraction. The transformation from music to architecture is realized through a decoding system to make the students to discern the space following the melody. The tunes or notes or overlaps in the melody that align a structural grid are transformed into architecture by the relationships in the space that can express this structural grid or the deviation from it in the drawing. In the third phase of the study students were asked to analyze the drawing in order to extrude or interpret it into third dimension by using negative and positive heights for elements. Following this process, the students constructed their spatial transformations that form the “tune armatures” digitally and ascribed material thickness to elements. Through this process the built armatures become volumetric. Maze (2001) indicates that this process allow students to study how spaces connect and flow and continue to design between disparate layers. He also states that the design remains in an abstract, conceptual stage and encourages the avoidance of default architectural elements being imported into the design (Maze, 2001). In another study by Maze (2002) he explains the assignment processes in four categories and strategies. One of them is cultural context that the students learn the cultural meaning by analyzing the music and then draw upon their analyses into cultural heritage with the aim of designing an Institute of Traditional Music. In another strategy that forms the

conceptual context, students experience the music sonically and limit their perceptions to recordings. Through the process two-dimensional representations were studied by sketching what they heard. In this process that aim to make the students learn that conceptual structure of the music is apparent in the abstractions and this can be a basis for architectural project, the students constructed their analyses into three-dimensional abstractions. This process made the students to use graphic expression to use non-visual experience. In another strategy called tectonic context, students understood the instruments as artifacts in order to design a studio or workshop for an instrument maker by interpreting the architectural elements. In the fourth strategy called the spatial context, the aim is to create a spatial abstraction of music that can be experienced as a piece of architecture and the process involves analysis, abstraction and design similar to other studies. This process follows the climbs and descends in the melody and the relationships in the space express the structural grid. This strategy called spatial context by Maze in 2002 is about the work he explained in 2001 that end with three-dimensional digital models. The students learn to prioritize the systems and different layers in the music to use it consistently throughout the development of a project (Maze, 2002). This achievement is similar to the Bebop Spaces project by Neiman in terms of developing a project.

Another project based on sound and space analogy conducted in basic design studio is different from the previous ones with regards to addressing not only architecture students, but also interior architecture, industrial design and communication design students (Pasin, 2008). Steps of the projects are group analysis, two-dimensional abstraction of the musical sound and designing a three-dimensional assemblage for an interior space. The sub-topics of the assignment are structure-theme, rhythm-repetition, harmony-melody-pitch, intensity and timbre. It is seen that two-dimensional abstractions which aim to make the students organize the visual elements of design were made by regular geometric shapes and linear elements on a sturdy board. The relations between the elements came up as unity, dominance, linearity, symmetry, visual balance, variety, dynamism or transformation. Three-dimensional assemblage by industrially produced materials were produced for an interior space which is a level of further abstraction in the final stage. In his research study, through the assessment of Pasin (2008) it can be seen that the selected works eliminated some characteristics of the musical sound step by step from the analysis to three-dimensional product design. He states that this project of sound-object-space contributed to abstract thinking, stimulated creativity, improved problem-solving and provided a mode of design communication (Pasin, 2008).

In the research studies on this subject, music has been shown to have an inspiring role in collaborative works carried out with students from architecture and other disciplines in universities. Music has also been shown to play a strong supporting role in cultivating creative and abstract thinking, facilitating the process of developing original products, and promoting group work and an inter-disciplinary structure within the process of education. It can be seen that the projects or assignments usually address fundamental design studio students, particularly architecture students. But different design areas can be brought together as Leopold (2005) and Pasin (2008) did in their works and this can feed the mutual benefit environment. It is also analysed that the design processes usually involve two-dimensional abstraction after the analysis of a musical sound and three-dimensional abstraction or alternative design decisions follow this step until the end of the process. These studies improve the abstract and creative thinking, contribute to define and pick the primary elements, support to work with different layers, problem-solving and attainment of a comprehensive conceptual and contextual new thinking system. A greater number and variety of studies, however, still need to be conducted and analysed on this subject in order to monitor the contribution of sound and space analogies to design education.

## **Methodology**

### *Research Goal*

This study describes a Basic Design Studio 1 project assignment, given to students enrolled in the Department of Architecture of Uludag University in Turkey, which involved visualizing music by organizing linear and planar units using the basic design elements and principles of color, rhythm, anomaly, pattern, similarity, repetition, hierarchy, and contrast. The aim of the study, wherein the students' projects were evaluated according to the visual abstraction, transformation and representation of music through linear and planar elements, was to investigate the relations and similarities of principles governing musical and design compositions within the framework of basic design elements and principles, to allow students implement the theoretical information into visual expression and to investigate the impact of the project on design education in terms of the students' ability to reflect abstract thinking by using appropriate design elements, principles and materials onto a visual composition. To be more specific, the assignment given as part of the study involved visualizing music as a physical construct by organizing abstract images from the transformation of aural expression using basic design principles. The evaluations of the assignments were made by paying regard to the reflection of the conceptual structure, prominent instruments, changing process as descents and ascents or perceptual and structural analogies of the music through the aim and individual tendencies of the students in the abstractions. The tendencies and individual perception differences of the students about which characteristics of the music become prominent (as the process, structure, instruments, melodies, rhythm etc.) and the achievement of the assignments about reflecting their aim by using appropriate design elements and principles were essential for the evaluation process. As can be seen in the next chapters, students aimed to transform the music into visual plane by the

different structures, changing processes, rhythms and instruments and / or dominant characteristics of the musical tracks through their analyses.

The hope is that this study will contribute to improving architectural education and the creative thinking process, with regard to the transformation of conceptual thinking to physical formation through the integration of domain material taught in basic design courses. The targeted learning acquisitions for the students enrolled in Basic Design 1 Studio included understanding of application of basic design principles / concepts, improvement of research skills, generation of creative solutions to problems and development of multidimensional thinking skills, learning and application of basic presentation techniques, strengthening of visual representation, development of empathy and verbal and written communication skills, and ability to reflect design principles onto the design.

#### *The structure of the music tracks selected for the research*

The song, Sheva, employs a number of different instruments, but it is mostly dominated by those from the percussion and wind families. Sheva had the fastest rhythm among the selected music, although it starts with a slow tempo in the first few seconds. This dynamic rhythm is accompanied by a variable, fast and fluid melody. The song titled, Rock Prelude, has a dynamic rhythm, and different instruments are used, with the dominant element being a dynamic, sharp violin rhythm accompanied by a continuous drum rhythm. Electric-guitar sounds come to the fore at times, creating metallic tones. In this song, which is generally characterized by its fast rhythm, the melody accompanying the rhythm has a fluid characteristic that is sometimes differentiated. In one part of the song, the rhythm slows down, and the violin alone becomes dominant.

Comptine d'un autre été- l'après-midi is a lyrical piece of music, where the piano is dominant. Although the rhythm of the structure of the music, formed by the piano strokes, features minor differences, it generally follows certain repetitions. Along with the rhythm creating the background to the music, the changes in melody are dominant in the process and sensation of the music. The song, Diferente, starts out with a calm rhythm, accompanied by the piano, the accordion and the sound artist, before it picks up in tempo. Starting at the 110th second, the music rhythm accelerates with the addition of different instruments, like the violin, guitar, and drums, after which a melody dominated by the accordion emerges. This electro-tango style music ends with the same rhythm, in a polyphonic manner, when different instruments are engaged at certain intervals.

#### *Data Collection and Analyzing of Data: The scope and organization of the project on visualizing music*

The assignment given to the 160 participants who were enrolled in the Basic Design 1 Studio offered by Uludag University Department of Architecture was evaluated according to the relations between music and design composition in the direction of the targeted aims, expectations and acquisitions of the ultimate products developed by the participants. In the research, it was expected that the participants represent visually, as an outcome of design, the process of audio tracks, from the beginning to the end, and the sense of music, by applying basic design principles and organizing linear and planar units. The pieces of music selected for the research were Comptine d'un Autre ete - L'après-Midi (Yann Tiersen), Rock Prelude (David Garrett), Sheva (Goran Bregovic) and Diferente (Gotan Project). The students themselves were responsible for selecting one of these four pieces, each of which involved different characteristics, to study.

At the end of the semester, the students and the supervisors listened to the music selections one time to analyze their different characteristics and the general organization of the pieces. Within this framework, a seminar was given on the design-guiding elements of interpretation of the tones constituting the organization of music, differences in rhythms and processes, sensations, and instruments, and a road-map was drawn up for the students. Evaluation of the final product developed by the participants included an analysis, based on basic design principles, of the transition of the musical composition into a visual composition. In the analysis of the music compositions, the different rhythms, the lyrical, static or dynamic structure of the tracks, repetitions, acceleration / deceleration / pauses, dominance levels of different instruments, differentiated / differentiating rhythms and the effects of notes, tone and volume levels of instruments were taken into consideration. The main goal to be achieved within the scope of the assignment was to reflect the process and the sensation of the music as an inspirational, structural, perceptual and conceptual analogy through the elements that constitute the organization of the design by applying basic design principles in the visual expression. In this context, the participants needed to transform the organization of a music piece into a visual expression through abstraction and interpretation using the design elements (forms, planes, different types of lines) and basic design principles that overlapped with music.

Regarding music as a design composition, the rhythms, which converge/change in the framework of music design, instruments, and sounds are flexible and have the potential to be transformed into a multi-layered design. In the process of transforming musical compositions into visual designs, on top of accommodating the harmonization of rhythms, including those that are variable, to certain principles, the aim was to reflect the layered condition created by the sounds accompanying the melody and tones into visual expression. No restrictions were placed on the choice of materials for enhancing the soft or metallic tunes in the music, the sharp or soft transitions, and the expression of sensation. On this subject, students and advisors worked together to put forward proposals, as the material that the

students would use in the visual expression of the music was important in the assessment of the work. The final products developed were evaluated in the following manner: 1) analysis of the music in the context of the elements forming musical design, 2) representation as a visual composition of the analyzed design by means of abstraction, 3) transformation of the design of music and its sensation, through appropriate design elements and basic design principles, into a visual representation, 4) correspondence of the organization and sensation of the music to pattern, color, dimensions, organization and material selection of elements within the visual unity. The evaluation and discussion of visual transformations can correspond to the strategy of conceptual context that is stated by Maze (2002) by the students' representation of their aural perceptions. The way of visual transformations for discussion can also be related to inspirational, perceptual and structural analogies between the analogy types that Pasin (2008) indicates by the representation process of the musical composition as a visual composition and representation of the perceptual analogy and structure of the music by expressive design elements, principles and materials that constitute the technical dimension of the work. In this framework, the research, which deals with music as a design tool, relates the similarities of music and design by evaluating the ultimate products and is discussed in terms of its contribution to the targeted basic design acquisitions.

*Results on the basis of the ultimate outcomes for the visual expression of music*

The assignments that are evaluated in the research were chosen according to the representation of the musical tracks by using appropriate design elements to reflect the structure, changing process, rhythms, instruments and emotions of the analyzed musical pieces with regards to the targeted achievements of the Basic Design students. Also it attached importance that the assignments which are discussed here are different from each other with regards to their approach to the transformation of aural perception to visual composition through the elements and principles they used. It is aimed for the study to provide an opportunity to study different subjects of basic design lessons that are learned in different weeks related to each other, and to implement this theoretic information by abstraction and transformation of music into visual representations through a conceptual approach.



*Figure 1. Visual representations of Sheva*

In Figure 1 showing the visual representation of Sheva, which starts with a calm rhythm before becoming quite upbeat and dynamic in later parts, colors, linear and planar forms were used to reflect the changing rhythm and instruments that become dynamic after the calm start. In this context, the students reflected the unification of the rhythm of music and different instruments by changing colors. After representing the calm rhythm, in the first few seconds of the song, with linear forms, the lines transform into triangular forms for the representation of the shifting rhythm. The fast, variable and fluid melody in the music design is reflected by triangles accompanied with squares. The linear rhythms between the different forms reflect the rising tempo or different combinations of the fast rhythm. There are certain moments in the music where the dominance of the percussions is replaced by wind instruments, which is done for the purpose of anomaly, as shown by the dynamic curvilinearity of metallic chord, and of connecting two fast rhythms to each other. The harmonious use of colors, linear and planar forms and rhythms in the composition reflects the dynamic and moving organization of the musical composition.

The second work on the right in Figure 1 is similar to the composition on the left in terms of the combined use of planar, dynamic forms, but differs in the sense of showing visual representation through forms and colors. The calm beginning to the structure of the music is expressed by the implementation of large and small white rectangular forms unified with the background, while in later moments of the music, where the rhythm quickens, the structure is expressed by a variety of neutral and warm colors. The fluidity of the colors and forms reflects the fluidity and integration of the music and the succession of the different instruments in sequence.



Figure 2. Visual representations of Sheva

The work on the left in Figure 2 aims to reflect the calm rhythm and heavy melody at the beginning of the music in dark curvilinear linear forms. Cavernous volumetric forms, which feature a variety of warm colors and create dynamic perception by getting higher, compared to others, at certain parts of the work, reflect the acceleration of the rhythm and the melody in the following section and the sensation of the music. The fact that all the colors are on the same scale in the composition brings clarity to the work, while the initial curvilinear form, which has a single color, and the volumetric forms, which have color diversity, serve to visualize the music's dynamic rhythm, fluid melody and multi-instrumental structure.

The diversity of materials in the work on the right in Figure 2 on the expression of the song, Sheva, is remarkable. At the beginning of the music piece, the softness of the discontinuous melody is represented by the pink lines done with wool, while the black linear forms, which reflect the continuity, express the dynamic rhythm that is generally continuous with the acceleration of the music. The acceleration of rhythm is sometimes reflected with the complexity created by different melodies and instruments, while the repetitions of rhythms and anomalies are reflected with purple and black wool. The changing rhythm towards the end of the music, the rising melody, and the different instruments are reflected in colored linear bars, with the green wire at the end of the composition representing the distinct sound that the end produces.

The common point of the visual transformations of Sheva is their representation of the structural analogy. Color and changing forms are the dominant design elements used that can be stated as consistent attitudes of the designers and the organization of the visual compositions seem to reflect the structural analogy between aural and visual expressions.

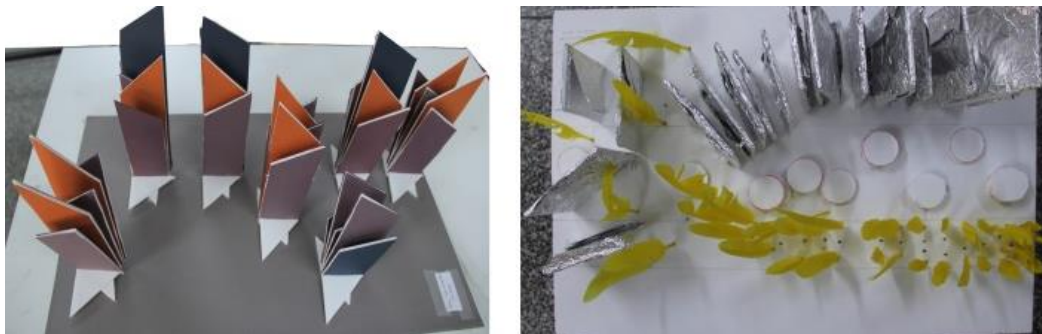


Figure 3. Some of the visual representations of Rock Prelude

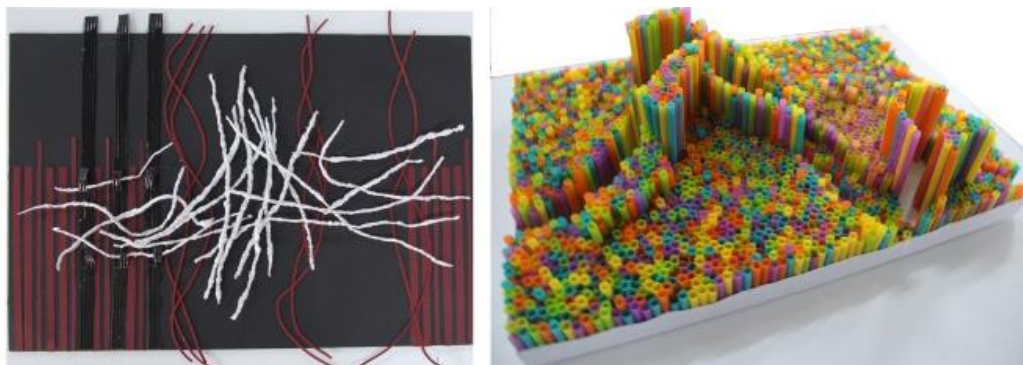


Figure 4. Some of the visual representations of Rock Prelude



In the work on the left shown in Figure 3, the students chose to use sharp planar forms and metallic colors for the visual expression of the Rock Prelude music piece, which has a dynamic and sharp rhythm. The vibrant organization created by the colors of the forms made from cardboard and their pointed-end forms and directional differences emphasize the dynamic and metallic sound structure of the music. The change of color and size of the forms serve to indicate that the music accelerates and becomes stronger, and the rhythmic situation created by the organizational form represents the intensity of the sound and the polyphonic parts of the melody. The color and dimensional differences reflect the changes in melody, while the shortest form at the bottom part, which serves to create anomaly, reflects the part of the song distinguished by a sharp violin sound. This assignment reached the goals of the work through the organization of gradationally changing scales of the planar forms, organization of the spaces between them, usage of the cardboard to represent dominance of sharp violin rhythm accompanied by a continuous drum rhythm. The decision of using the principle of anomaly supports the visual composition representing the electric-guitar sounds that come to the fore at times and create metallic tones which are transformed into metallic colors and rigid cardboard planar forms.

The work on the right in Figure 3, represents the character of the instruments through the use of certain materials. For the rhythm within the song, each instrument in each section is reflected in its own rhythm and melody. The static and stable rhythm produced by the drum is expressed with a circular form, the soft sound and sharp melody produced by the violin in the music piece is represented with a yellow feather, while the metallic sound of the electro-guitar is represented with aluminum foil. This study creates the visual transformation through disintegration of different rhythms and instruments in the process of the music. The students used the characteristics of the materials and the colors to represent different parts and this is a positive approach in order to meet the expectations of the assignment for the basic design studio. However, it can be said that after disintegrating different parts, the students formed a visual composition that form a wholeness as in the musical composition in which different instruments and rhythms come to the fore at times to form a holistic musical composition that reflect changing emotions.

In the work on the left in Figure 4, only the linear forms are used and the changing characteristics, directions, colors and organization of them represent the musical construct. The different instruments, their changing dominations, rhythms and melodies were expressed by the colors, characters and materials of the lines. The drums, which constitute the dominant rhythm for the piece, are represented by red cardboard strips and fluted red strings, while the sound of the electric guitar, which functions as anomaly, is represented by black stripes, and the melody created once the sound of the violin emerges, is expressed with aluminum foil material. The changes in the melody and rhythm of the violin are represented by the directional difference of curvilinear lines. This assignment is chosen for its simple approach that enriches the transformation of aural composition to visual composition by expressing a lot with less using the line.

In the work on the right in Figure 4, to reflect the dynamic theme of the music, only pipettes were used as a remarkable material decision that is linear, colorful and allows studying with different heights. It is also remarkable that this decision enabled the composition to express a lot by one material at a time as they were the most suitable material in terms of their different heights and wide color scale. The music's dynamic rhythm is highlighted with vivid colors, the violin's dominant melody is represented by the increase in the height of the pipette, and a void space which represent the short interruption in the music is expressed in the form of a curved line that penetrates the composition to give it a three-dimensional effect.



*Figure 5. Assignments of the visual representations of Rock Prelude*



Figure 6. Assignments of the visual representations of Rock Prelude

In Figure 5, for the left side work, the polyphony of the music is represented with corrugated cardboard, the dominant drum rhythm with rising/declining black circles, and the violin sound with purple linear elements. This study represented the transitive process of the music in which the dominations of the instruments, the rhythm of violin and drums and the melody change by the different characteristics of linear elements with only a type of planar element that is circle. The choice of circle support the aim of expressing the contrast in the music with straight lines visually. At the beginning of the music, the dominance of the drum is represented with the black circles positioned in the upper layer, while once the violin becomes dominant as the music progresses, this is represented by the passing of the purple linear elements to the upper layer. The differences in size and spacing of lines and circles reflect the change in music. The transition to the dominance of the electric guitar is visualized by the vertical red short line elements that break the purple lines, and the dark pink waves, which are subtle, represent the piano forming the background of the music.

In the work on the right in Figure 5, the color as a strong element stands out. The drum rhythm in the musical background is expressed with linear elements visually, while the violin sound is represented with planes, and the hierarchical change in the plane dimensions represent the ascending and descending melodies. The sounds produced by the electric-guitars, which create different dynamics of sound in the music, are interpreted as anomalies in the works. In the work where the dynamic structure of the music is expressed by the orange background, the sharp empty space reflects the process wherein the rhythm is cut off.

In the work on the left in Figure 6, the rhythmic lines with yellow color stand out while the black repetitive linear elements which represent the interruption and the change rhythm in music as anomaly are also remarkable. These lines are used to represent the rhythm of the drum, while colored and curled pipettes represent the dynamic and fluid violin melody. For the brief span of time in which the rhythm changes in a certain part of the song, the design principle of anomaly through the direction and color changes in the linear elements. The colorful and curled pipettes representing the fluidity creates a contrast to the rhythmic straight lines and the principles of contrast and anomaly strengthen the expression in the visual transformation.

In the work on the right in Figure 6, representing the characteristic of the music with the association of metallic materials created a strong visual analogy comparing to other representations of Rock Prelude. The rhythm of the drum is represented with a staple, the sharp and dominant violin sound is expressed with a yellow-colored wire, while the fluid melody of cello is represented with a rope. While the drum rhythm is reflected by the straight and clear lines, the curvilinear lines spreading throughout the composition represent the variable violin and cello melody. The string instruments that come to the fore at the interruption to the music's rhythm is interpreted as an anomaly and is shown by the curvilinear lines in the visual composition. The students used natural characteristics of the materials in visual transformation instead of color and achieved the targeted acquisitions of basic design studio by the simplicity that enriches the composition.

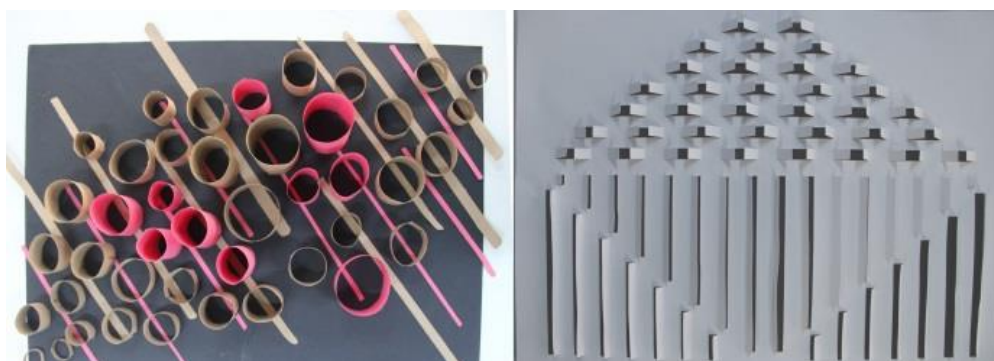


Figure 7. Some of the visual representations of L'apres Midi



Figure 8. Some of the visual representations of *L'après Midi*

In the assignments shown in Figure 7 and 8, which are the visual representation of *L'après Midi*, the linear tendencies of the students are remarkable in direct proportion to the certain repetitions that can be described as monotony in the structure of the music. In the work on the left seen in Figure 7, the linear elements visualize the piano rhythm which repeats throughout the song and serves to form the background. The frames at the upper layer of lines in the shape of a circle reflect the melody added to the background of the music, while the circles of different heights and radii represent the changes in melodies. In this work, where brown circles represent thicker sounds and pink ones, thinner sounds, the reason for the formal contrast between the linear elements and the circles is the variability of the melody in response to the monotony of the music in the background. The choice of circle is a positive decision in order to reflect the fluidity of music, while the pastel colors that are used are related to the lyric structure of the music.

The work on the right in Figure 7 stands out by its clarity and simplicity in color usage and expressing the structure of the aural composition by the subtractions of forms. In the work which uses an analytical approach to represent the layers of the music, the process and the feeling the piece arouses are visualized in a clear and simple language using an. While the general character of the composition reflects the consecutive rhythm forming the background, the different linear voids created between the two layers within the framework of the similarity principle represent the soft transition between the different notes in the melody.

The work on the left in Figure 8 visualizes the music entirely through the relations between the linear elements. The usage of straight lines in the background to represent the repetitive rhythms in the music and the colorful vertical, swollen lines representing the changing, fluid melody are evaluated as positive decisions. The lyrical dominant rhythm of the music which has a more stable structure, is expressed by the light pink tone. The soft but variable melody, the up-and-down movement in the sounds, and the feeling that the music gives are represented through the use of more vivid colors. Due to the lyric structure of the music, the colors are used in lighter tones, the movement of the colored linear forms on the background representing the melody visualizes the connection of the sounds in the composition. The way in which the linear forms come together in the composition reflects the layered structure of the music. In the assignment, the organization of lines to represent the layers in the music and the use of colours to represent the lyric structure, variable melody with up-and-down movement reflected the prospering implementation of the theoretic design lessons.

In the work on the right in Figure 8, the structure of the music is designed through the layers in visual transformation. The layered manner reflecting the structure of the music, the consecutive and lyric rhythm forming the background is represented in curvilinear lines running along the whole surface. Due to the simple structure of the music, in the composition, where only linear elements are used, the melody changing at certain intervals is visualized with the varying dimensions, colors and materials of the lines in the sections between the vertical lines so as to reflect the progressive rhythm. In this work, the structure of the music is represented through layered rhythms, and the hierarchy becomes evident. This assignment is chosen to be discussed in the article by the reason that the layers strengthen the expression, the curvilinear lines in the background represent the lyrical rhythm played by piano, the short-colorful and faulted lines represent the descents and ascents in the fluid melody in the layered visual composition reflecting the aural composition by appropriate design elements.



Figure 9. A visual representation of *Diferente*

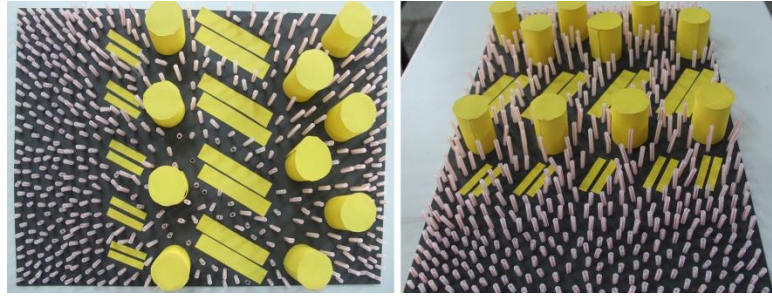


Figure 10. A visual representation of Diferente

The work in Figure 9, where different parts of the Argentine tango dance rhythm of Diferente are represented, the changes in rhythms unfold through the diversity of the instruments and the differences in the dominance of the instruments throughout the piece. In this work, where black sand is used as a lower layer to visualize the sound of the maracas, the predominance of black and red is related to the emotions that the music generates. The rhythmic acceleration that occurs as the music progresses is indicated by the upward movement of the different materials from the bottom of the composition. The red curved lines reflect the melody and rhythm of the music, while the red stringed bag reflects the parts where the accordion is more dominant. The visual expression in this assignment is found successful and discussed by the reason that the potential of the colour is supported by the potentials of different materials, the orientation and organization of the elements represent the calm rhythm by the piano, the acceleration of the rhythm afterwards and the polyphonic structure of the music with the melody played by the accordion. In the work in Figure 10, the active rhythm forming the background of the music is remarkable that is transmitted with pipettes. Another remarkable component of the visual composition is representation of the dynamism of rhythm with the yellow color as a different layer on the background. The rhythm changes are visualized through the height differences of the pipettes, while the melody that begins after a certain point in the music and the changes in melody are represented in yellow planar and volumetric forms that appear in the right part of the composition. The common features of visual transformations of Diferente are the representation of different layers and the changing melody that become distinct in terms of the elements and principles used for expression.

### Discussion

It can be seen that the visual expression of the Sheva piece, the dynamic structure of the music, the presence of different instruments and sounds, the melody's fluidity and the varying levels of dominance of the instruments are represented. In this framework, different colors, dynamic planar-volumetric forms or curvilinear forms come to the fore. In the completed works, the rhythmic and variable structure of the music manifested itself in the rhythmic organization of planes, in the similarity and repetitions between colors and forms, and in the pursuit of harmony or contrast in colors, these related principles were used together in different elements to strengthen the composition. In all the works examined, the changing-repetitive rhythms and melodies in the music were visualized with rhythm, anomaly, harmony and contrast principles by different forms and characteristics of them.

The common features of the works on the visual expression of Rock Prelude, which is a multi-voice piece of music, with a dynamic rhythm, is the progression of the violin's dominant melody within the framework of the reflection of the ongoing rhythm or dynamism. In some parts of the works, a sharp structure of rhythms and sharp spots in the form of eloquent electric guitar tones were reflected in the order of the repetition of forms, gradation and spacing, and the use of materials with a metallic texture or colors. The repeated rhythm and interruption in one part were expressed as anomalies in the organization of forms. When a dynamic theme was mainly projected, the dominant element became color, with it operating as the deciding factor in material choice. In addition to the rhythm and dynamism, the fluid or rhythmic melody of the violin was reflected in the works. Color was used to reflect hierarchy between elements, or as a contrasting element in compositions, and was the main factor in selecting materials and texture. The dominance of melody in the music led to the use of contrast principles in different forms of the organization of the compositions, and according to the structure of the rhythm of the music, proportion, hierarchy, gradation, anomaly and contrast principles emerged.

In the visual expression of the Comptine d'un Autre ete - L'après-Midi, the notable element in all the works was the reflection of the rhythm and melody, which served to provide a multi-layered rhythm to the background of the music. This rhythm in the background was expressed entirely by linear elements, while soft curvilinear lines, circular forms, voids and color characteristics in the organization of linear or planar forms represented the lyric melody. The ascending and descending notes in the variable melody is reflected in the sharp-deep sounds of the music, and this was expressed in the visual composition as differentiation of color tones, voids, differentiated sizes and ranges of forms. In the compositions, where a layered structure was dominant, color, rhythm, hierarchy, repetition, proportion, spacing and grading were used as design elements or principles. In the representation of the Diferente song, the rhythm and

melody, dominated by the sound of the accordion and accelerating with the inclusion of different instruments, starting at the 110th second, were represented in the visual compositions as layered structures. The sensation produced by the electro-tango-style of music brought forth the use of color in warm tones as an effective element. In addition, the acceleration of the rhythm at certain stages was represented by the combination of layers and the increase in size, number and height of forms.

The fact that the works representing the same music have similar approaches demonstrates the corresponding dimensions of music and design as shown in Table 1. In the visual transformations of the music tracks, inspirational, perceptual and structural analogies between the analogy types that Pasin (2008) indicates are tried to be represented by the students in terms of their aural perception. Firstly, different layers and overlaps in the structures of the music tracks, the instruments used that can be dominant or remain in the background in different parts of the musical composition, the changing rhythms, tunes, melodies or interruptions in music are analysed in the musical pieces at the beginning of the process. This phase provided the students to read, scrutinize, and reconceive their aural perceptions of the music tracks in order to compose the abstraction overlapping with the description of Maze (2001). In the second phase of the assignments, the structures and compositions of the music with the aforementioned components are visually transformed by design elements as linear and planar forms, colors, volumes by the principles of scale-proportion, rhythm-repetition, anomaly, contrast, harmony etc. The choice of the materials also strengthened the visual expression by representation of analogies.

The outcomes and the results of the evaluation of the outcomes show that the visual transformations of the tracks are in common in terms of expressing similar components of musical composition in a similar manner. This can be indicated as dynamic rhythms are expressed through variety of colors, scales and forms, different layers are expressed through sections, different planar or/and linear forms and contrast-harmony, interruptions or changing dominations are expressed through contrast and anomaly, the characteristics of the instruments and the melody brought the principle and expression of fluidity in the abstractions. It can be stated that one of the music tracks (L'apres Midi) is substantially abstracted through linear forms and soft colors different from the other studies by the reason that it has certain repetitions with a constant rhythm and lyrical structure. This is another indicator of the common visual codes between the music and visual that emerge from the abstraction of the analogy instinctually.

Table 1. The forthcoming characteristics and components of the music tracks and visual expressions

<b>MUSIC TRACKS</b>	<b>Analysis of the structure</b>	<b>Elements</b>	<b>Principles</b>	<b>Unique materials</b>
<b>Sheva</b>	Calm at the start, dynamic afterwards Changing dynamic rhythms Different layers Polyphonic and fluid melody	Usually planar forms Linear forms for changing rhythms	Color Scale Similarity-repetition Rhythm Fluidity	Wool for fluidity
<b>Rock Prelude</b>	Dynamic Fast rhythm Continuous rhythm with an interruption Dominant instruments / Polyphonic Different layers	Cornered planar forms Linear forms	Gradation Scales Color Anomaly Similarity-repetition	Copper wire, aluminum folio for metallic sounds Colorful pipettes for dynamism Feather for violin
<b>L'apres Midi</b>	Lyrical Dominant instrument Certain repetitions Calm rhythm	Linear forms substantially	Gradation Soft colors Scales Contrast Similarity-repetition	-
<b>Diferente</b>	Calm at the start, dynamic afterwards Changing dynamic rhythms Different layers Dominant instruments / Polyphonic Fluid melody	Linear forms Planar forms	Similarity-repetition Color Rhythm Fluidity	Sand and colored wire as contextual analogy

In the basic design assignment related to the transformation of different works of music to visual representation, four different types of music were first interpreted and abstracted conceptually and structurally before being transformed into a visual composition according to the creativity of the students. When examining the different organization and structure of the selected music pieces, it can be seen that in some of the pieces, rhythm and the changes within the rhythm play a dominant role, while in others, the use of instruments and melody come to the fore. It is here that the differences in perceptions are reflected in the compositions based on individual differences and tendencies. In the basic design assignment -Visualization of Music-, it was found that linear, planar or volumetric forms constituted the visual composition in the abstraction of music as an auditory composition, and that color and texture were used as fundamental elements, in their visual representation. Moreover, it was observed that linear, planar or volumetric forms were determined based on their compatibility with rhythm, sound, melody and instruments in the music, and that their dimensions, colors and organizations were designed according to how well they were able to represent the processes in the music or the totality. In the direction of organization and the sensation from the music, rhythm, anomaly, repetition-similarity, harmony or contrast, proportion, hierarchy, gradation, and spacings were used as design principles in musical compositions in the organization of elements. In the works where the character of the instruments was reflected in the materials, it was seen that the color, form, and texture of the materials were used to express the soft, hard or electronic, and metallic resonance, and to reflect the feeling of the music. In the compositions that transformed auditory perception into visual expressions with material decisions, the result of the absence of material restriction enriches the expression in the design.

In the assignment, the transformation of music, as an auditory composition, where the melody or the structure is formed by the rhythm, to a visual representation, by applying principles such as rhythm, anomaly, repetition-similarity, harmony, contrast, and proportion, indicate that the musical composition principles mentioned by Schillinger (1946), namely, rhythm, pitch-scales, and harmony, are in common with the design principles, and that design principles extend far beyond simply lines and colors. However, the use of color and line as significant elements in visual representations highlights the priority of these principles in design. The frequent use of principles like scale, proportion, rhythm, and repetition in visual representation corresponds with the results reported in the study by Kuloglu (2015). All the principles and layered representations that came to the fore in the research serve to indicate that concepts such as repetition, rhythm, contrast, proportion, harmony, and pattern, which are mentioned in the literature as being corresponding principles in the organization of visual and musical composition, are in fact common to music and design compositions, that both compositions form layered situations, and that the designer has the role of being the decision-maker and creator in the organization of principles (Gurer, 1998, Pentak and Lauer, 2014, Ustun and Kalayci, 2017). The analyses and visual translations of the primary or secondary layers and dominant elements in the musical compositions visually contributed to the thinking system of the students to define primary, secondary and tertiary parts in the abstraction process as indicated by Neiman (2007) in the Bebop Spaces project. The assignment discussed supported the design process that necessitates understanding, connecting, awareness and synthesizing phases as Ozgencil Yildirim (2003) stated by fictionalising these parts as a whole.

The basic design assignment -visualizing music- supports different studies showing that music can be an inspiring factor and utilized in design education (Leopold, 2005, Neiman, 2006, Neiman, 2009, Maze, 2001, Maze, 2002, Pasin, 2008, Rao, 2014, Kuloglu, 2015). The abstraction of music, conceptually and organizationally, and the transformation of music into a visual representation, contributed to the transformation of conceptual thinking to physical formation by abstraction and creative thinking through different phases in the direction of the aims of basic design studio. The use of basic design principles/concepts in visual representation supports education in the sense of integration of domain material into basic design courses. In strengthening the representation of music, the decision-making process in material selection improved research skills, furthermore, performing the research, as a group project, contributed to the empirical approach. Finally, by having the students evaluate the different stages of the process, determine and organize the elements and principles constituting the composition, select material and comprehensively create organization with that selection, think multi-dimensionally, learn and practice basic presentation techniques, and strengthen visual representation, this study contributed valuable data and knowledge to design education practices. The assignment of visualizing music contributed to basic design studio which is essential to develop creativity, to compose a thinking system and design language and skills to be internalized and used lifelong for freshmen year studio in architectural education supporting the opinions of Bennett Neiman (2007, 2009) and Pasin (2008). The process of this assignment becomes different from some studies explained in the literature in terms of it does not go through a phase of architectural space design as in the studies of Maze and Pasin. The aims of the basic design studio for freshmen in which this assignment is conducted, are to support creative thinking, abstract thinking, to contribute to the investigation and definition of primary elements, to constitute a comprehensive and contextual thinking system by combining different areas of design and art through keeping away from "jumping to" architectural elements in basic design studio. The works discussed in this study achieved the studio goals with unique representations. However, it should be claimed that through using the music as a tool for abstract thinking, this visual abstractions can be the base for following three-dimensional spatial studies in order to produce decisions for spaces and support architectural design and education.

## Conclusion and Recommendations

The similarities of musical and design compositions, the components of their structures and the analogies between them indicate that the disciplines resemble each other and create a mutual benefit. It is conclusive that using music as a tool in design education studios, is productive in terms of awareness of primary or secondary elements, working with different layers in design process, perception of the environment through a different thinking system and synthesizing phases to comprise a whole by the analysis and abstraction of the layers, instruments, melody, tunes in the musical composition as can be seen in different studies.

The basic design assignment aimed at visualizing music in this study involved the transformation of an abstract interpretation of music to a visual representation. Design and music are similar compositions in the sense that they both involve obtaining a final product at the end of the act of creating and both require a creative process, where original products are developed as layered structures formed with similar principles. The aim of the assignment which involved visualization of music by organizing abstract images from the transformation of aural expression were to investigate the relations and similarities of principles governing musical and design compositions within the framework of basic design principles, to provide the transfer of the theoretical information into a visual product by using appropriate design elements and to investigate the impact of the project on design education in terms of the students' ability to reflect abstract thinking onto a visual composition. The students transformed the music into visual planes by the different structures, changing processes, rhythms and instruments and / or dominant characteristics of the musical tracks through their analyses and the abstraction process. The structures and compositions of the music are visually transformed by design elements as linear and planar forms, colors, volumes by the principles of scale-proportion, rhythm-repetition, anomaly, contrast and harmony with the contribution of the materials which strengthened the visual expression by analogical approach. The research is conducted through the evaluation of the outcomes by paying regard to the reflection of the perceived compositional components of the music through the aim and individual tendencies of the students in the abstractions by using appropriate design elements and principles were essential for the evaluation process. Although all of the discussed outcomes have their own unique expressions that should be provided, it is also seen that similar characteristics of different tracks are corresponded to similar design principles showing that the theoretical information is implemented successfully. This achievement is important regarding studio targets and design education. The perceptual differences and individual tendencies supported the unique characteristics of visual abstractions. The outcomes discussed in this study achieved the goals of the assignment in terms of representing the perceived structure of the music through appropriate design elements, principles and material analogies, successful transfer of the theoretical information into a visual product and abstraction levels that have unique characteristics.

The works involving the visual expression of music contributed to the ability of students to transform abstract thinking into physical representation through the analysis process that required the scrutinizing, reconceiving, dividing into pieces and recombining different characteristics and compositions of the music tracks again. The process allowed students in understanding multidimensional and creative thinking with an open-minded and empathic approach, contributed to architectural education and study skills through the coordination of design elements, principles and materials for the purpose of composing a larger whole, and stimulated improvisation and the reflection of emotions.

According to the results obtained from this basic design research related to the visualization of music, the use of music in basic design and architecture education as an inspiring and an orienting tool has been shown to be an effective intervention in terms of facilitating the creative thinking of students, establishing connections between abstract and concrete planes, transforming theoretical knowledge into practice, and showing that the similarities in the organization of related disciplines support different stages of creation and representation. In addition to the contribution of music to design education, the implementations made as groups support the empirical approach during the education stage, the creation of synergy with team cooperation, and the process in which positive opinions generate stronger ideas, which in turn develops the students' ability to create harmony and improve their educational inventory at the stage of preparation for professional life.

The basic design studio which is important for freshmen bear the responsibility of introducing, informing and associating different areas and disciplines of art and design. This basic design assignment in this study included two phases of the analysis of the musical structure and three-dimensional visual transformation of the music tracks without developing architectural suggestions and ideas parallel to this approach. Although the assignment in this study conducted through a perspective that keeps away from architectural elements, this research brought the thought of new projects that can be fictionalized through different phases combining basic design and architectural design through the contribution of music to design education. Relating music and education leads to a delighted and comprehensive conceptual and contextual new thinking system and the expression of thinking systems and ideas can be analogous and digital. In this context, different variety of studies can be conducted through different approaches in terms of the targeted learning outcomes as creativity, team work or digital coding in design education. In order to develop the spatial thinking system and professional life, analogous expression can be transformed into digital codes through computer programs and metaphoric approach alongside structural analogy can be widely used. It can be seen that today in the digital age in which we live in, both the creation of musical composition and architectural design are

substantially supported by digital technologies, decoding systems can be used to design spaces following the melody and digital models can be created through abstraction of music. Through this perspective, different varieties of studies can be suggested that involve the abstraction and two and three dimensional expressions of aural perception through decoding programmes that bring the design elements as linear, planar, volumetric forms, different background and form relationships, metaphoric layers and the principles as contrast, rhythm, color, harmony and anomaly in order to support the contribution of basic design studio to architectural education and the skill development of students.

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