

Creativity and conceptual blending in high-school student improvisations of film music

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Abstract

The aim of the present study is to investigate the cognitive strategies employed in common by the members of two groups of high-school students while contributing to the group improvisation of a musical accompaniment to a silent short film. To analyze and interpret the data collected both from the students' own testimonies about their creative thinking during the improvisation and from the performances themselves, the methodological perspective of Conceptual Blending Theory (CBT) is adopted. The research findings showed that all students directed their attention to the overall affect of the film as a dynamic process and responded musically to it by manipulating the musical parameters along the trajectory of an analogously dynamic process. The present study hopes to add to ongoing research efforts to offer empirical backing to CBT, while answering to the call for more education in musical creativity in general and in relation to film music in particular.

Keywords: Conceptual Blending Theory, sonic analogs, film music, creativity

Introduction

Ever since its earliest formulations (Fauconnier & Turner, 1996; 1998), Conceptual Blending Theory (CBT) placed creativity at the focal point of its attention, setting off to explain the cognitive processes involved in the construction of novel concepts. At the same time, it was this exact claim that attracted most criticism (e.g. Brandt & Brandt, 2005). The objections raised mainly pertained to the fact that most applications of the theory essentially tried to explain the cognitive operations involved in the emergence of novel concepts *post hoc*, that is, through reverse engineering the operations involved in interpreting a finished product rather than the heuristics involved in its actual production (Rohrer, 2005). On the other hand, an appeal to support the theory with empirical data was made from early on (e.g. Gibbs, 2000).

The present study comes to add to the growing literature that implicitly responds to both aforementioned concerns. Its aim is to investigate the cognitive strategies employed in common by the members of two groups of high-school students while contributing to the group improvisation of a musical accompaniment to a silent short film. To do so, it relies on qualitative data drawn both from the students' own testimonies about their creative thinking during the improvisation, as expressed in the discussions that followed the performances, and from the performances themselves. The study begins with a presentation of its theoretical background that will provide the methodological framework for the analysis of the students' verbal and musical responses. The subsequent description of the method employed to conduct the research precedes the presentation of the results and their analysis. The paper closes with a brief discussion of the study's limitations, its contribution to the related research field, and its ramifications for educational practice.

Theoretical background

CBT was formulated by Gilles Fauconnier and Mark Turner (2002) to describe a basic cognitive process that leads to the emergence of new meanings, guarantees "global insight," and facilitates the conceptual condensation that is necessary for coping with diffuse meaning and the function of memory. Conceptual blending plays a fundamental role in constructing meaning in a wide array of applications, from everyday life and the arts to the sciences and

the humanities. The basic cognitive function of conceptual blending is the partial correlation of two or more mental spaces (input spaces) and the selective projection of data from these spaces into a new blended space, in which an emergent structure is dynamically developed (Diagram 1). The partial correlation of the two inputs is facilitated and constrained by a fourth space (generic space), which represents the common conceptual structure of the two inputs. These four mental spaces, each one containing elements that are organized into conceptual packages by frames available from long-term memory (Fauconnier, 2010), constitute a Conceptual Integration Network (CIN).

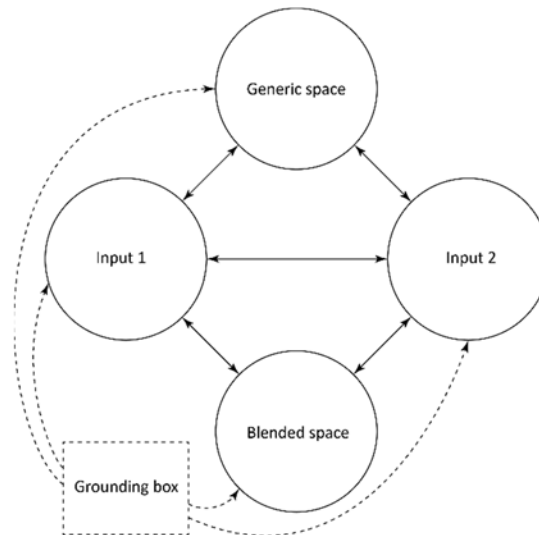


Diagram 1. Diagrammatic representation of a CIN

In line with Maria M. Hedblom, Oliver Kutz, and Fabian Neuhaus (2015), Mihailo Antović (2018) proposes that the organizational framework of the generic space contains image-schema families, that is, ordered sets of conceptual primitives, themselves organized in the form of dynamic embodied patterns of understanding and reasoning, which derive from previous kinesthetic, linguistic, and/or historical experiences (Johnson, 1987). Taking his cue from Seana Coulson and Todd Oakley (2005), Mihailo Antović also suggests that the conceptual universals of the generic space are not the only factors binding the establishment and operation of a blend, and that conceptualization is also influenced by such contextual factors as the individual life experiences, values, and competencies of the person running the blend, as well its particular setting, goals, and cultural context (Antović, 2016; 2018). This information constitutes what Line Brandt and Per Aage Brandt (2005) have termed the “semiotic space” and what Seana Coulson and Todd Oakley (2005) have defined as the blend’s grounding box, itself not a mental space, but a set of “contextual prompts” in background cognition (Antović, 2016, p. 119).

The growing number of studies attempting to apply CBT in film music (e.g. Chattah, 2009; Fatihi, 2012; Vouvaris & Tasoudis, 2018) does not come as a surprise given that the intrinsic multimodality of the cinematic medium allows for its investigation in terms of what Gilles Fauconnier and Mark Turner (2002) describe as “double-scope creativity”. In a double-scope CIN, the frames that organize the elements of the input spaces are different, if not clashing. A potential clash of the inputs’ frames provokes the imagination and often leads to a highly innovative emergent structure in the blended space (Fauconnier & Turner, 2002, p. 131). In the case of the cinematic experience, its multimodal character increases such a possibility, thus encouraging the construction of innovative and imaginative blends.

CBT has been extensively applied to music (for a recent overview, see Cambouropoulos et al., 2018). In his latest work, Lawrence Zbikowski (2016; 2017) has more or less explicitly

accounted for the legitimation of music to act as an input space to a blend on the grounds of musical utterances being able to provide sonic analogs to dynamic processes that underlie many facets of human interaction, chief amongst which, the “sequences of physiological and psychological events associated with the emotions, the spontaneous gestures that accompany speech, and the movements of bodies –including our own– through space” (Zbikowski, 2016, p. 47). Given the embodied dimension that these sequences have in common with image-schematic structures, music’s link to a generic space, potentially shared with one or more other mental spaces of alternate modality, warrants its ability to enter a blend as a distinct mental space with its own elements and organizational frames.

Methodology

Sixteen students (five female and eleven male) of the Thessaloniki Music High School participated in the study. They were all attendees of the courses “Music ensemble (for instrumental use or of other kind)” (1st to 6th grade) and “Music ensemble (for music expression and creativity)” (4th to 6th grade). In practice, the two courses are customarily taught in conjunction because of the common goals they share, one of which is to promote creativity and experimentation (Official Government Gazette 2858/28-12-2015, pp. 34130–34212). A consequence of the conjoined teaching of the two classes is the formation of music ensembles that include students of a wide array of age and/or level of musical competence (from 1st to 6th grade). That was the particular case of the ensemble that was chosen for the research, a mixed ensemble whose supervising teacher included projects of composing and/or improvising musical accompaniments to short films in the teaching activities.

The students were asked to watch the same short animation film, with all original music and sound design muted. The film was *The leaf of the poplar* by Eirini Vianelli (2015, duration 3:48; retrieved on April 14, 2020, from <https://www.youtube.com/watch?v=0ScwQc4MLeA>), an awarded film that had already been proposed by the Megaron-Athens Concert Hall for its International Animated Film Music Competition in 2017 (retrieved on April 14, 2020, from <http://www.megaron.gr/default.asp?la=2&pid=296>). Inspired by George Seferis’s homonymous poem, the film depicts a fisherman rowing at calm sea; as the leaves of a poplar tree are carried away by the wind that picks up and the sea gets progressively rougher, the fisherman gets tired, loses his oar, and, as the night falls, eventually gives up; in the following morning, we see the empty boat drifting on the calm sea and a poplar leaf washed out on the shore.

The students were divided by their teacher into two groups, A and B, in such a way as to achieve relative homogeneity within each group with respect to the level of their performance skills and thus more balanced intragroup dynamics. The students of each group were asked to choose instruments and group improvise a musical accompaniment to the film, as it was projected on screen, in three consecutive takes. For each one of the two takes that followed the first one, the students were given the choice to change instruments (see Tables 1 and 2). Group B was given ten minutes to pre-plan the performance, whereas group A was not.

Table 1. Students’ instrument choices in each take of improvised performance (group A)

Name	Grade	Take 1	Take 2	Take 3
K.K.	3 rd	Gong	Drum set	Gong
P.C.	5 th	Drum set	Piano	Piano
Y.S	5 th	Electric guitar	Floor tom, cymbal	Drum set
A.F.	5 th	Electric bass	Electric bass	Piano
A.S.	5 th	-	-	Snare drum
S.T.	6 th	Marimba	Marimba	Marimba
M.S.	6 th	Marimba	Marimba	Marimba
K.P.	6 th	Theremin	Theremin	Bassoon
M.T.	6 th	Piano	Glockenspiel	Glockenspiel



Table 2. Students' instrument choices in each take of improvised performance (group B)

Name	Grade	Take 1	Take 2	Take 3
M.S.	1 st	Gong	Gong	Gong
A.T.	2 nd	Tom, floor tom, cymbal	Floor tom, cymbal	Floor tom, cymbal
T.G.	2 nd	Drum set	Drum set	Marimba
M.K.	5 th	Xylophone	Xylophone	Xylophone
P.K.	5 th	Snare drum	Snare drum	-
E.S.	6 th	Marimba	Glockenspiel	Marimba
N.C.	6 th	Marimba	Marimba	Drumset

Each take of the two groups' improvised performances was video recorded. The third take of each group's performance was followed by an open group discussion, centered around two questions: which aspect of the film attracted your attention the most? How and why did you choose to respond musically to it? The data collected from the transcriptions of the two recorded discussions was processed so as to deduce commonalities in the students' expressed intentions and facilitate the categorization of their creative responses. This data was cross-checked with the data collected from the recorded performances themselves so as to verify and/or further qualify the students' verbal responses. The results were then analyzed and interpreted from the methodological perspective of CBT.

The present study has fully complied with all generally accepted ethical rules of research in terms of its content and method of conduct, respecting the value, the autonomy, and the privacy and personal data of all individuals involved. To do so, it received authorization from the Committee for Research Ethics of the University of Macedonia (protocol number: 16/15-10-2019), as well as from the Greek Ministry of Education and Religious Affairs (protocol number: 177267/Δ2/13-11-2019).

Results

When asked to comment on the aspect of the film that attracted their attention the most and prompted their musical responses, all students made a more or less explicit reference to the perceived overall affect of the film (for more information on the affect heuristic, see Slovic et al., 2007). Their verbal expressions attested to the way they conceptualized this affect in terms of the conceptual dipole agitated/anxious vs. calm/tranquil:

K.P.: *"The alternation of both the scenes and the moods and tenor of the film, in general, is very fast, that is, while, at one moment, everything is quite tranquil and fine, all of a sudden it is rather agitated and anxious, so to speak."*

M.T.: *"In the entire film, from beginning to end, you sense this continuous feeling of anxiety, you feel that something is wrong, already from the beginning, and as the film nears the end where [this feeling] culminates, and the last scene completely opposes the preceding one, you don't feel complete, you don't feel euphoric."*

The aforementioned quotations exemplify the conviction of all students to grasping the overall affect of the film not as something static, but as something that fluctuates and varies both in degree and/or quality. In fact, one of them went as far as explicitly describing the affective trajectory of the film in terms of a cyclic scheme:

E.S.: *"Actually, the film strikes me as a cycle, that is, as something that escalates and, boom! back again. In the beginning, I wanted to start with something simple, since everything was simple at the time, and then to have [the music] escalate just like in the film; that is, it parallelizes the film and, in the end, although something has changed, because the man in the boat is gone, the rest of the shot shows that nothing has changed. Whatever happens, some things remain the same."*



Although the cyclic trajectory of the film's affective fluctuations is explicit in only one student's testimony, it can be readily inferred from all of them. Despite the variety of word choices to describe the course of the film's affective fluctuations, there seems to be a consensus about the gradual intensification and de-intensification of a perceived affect of negative valence, aligned with the film's narrative.

Although all students seemed to agree on the overall affective trajectory of the film, their creative responses to it were notably varied. In fact, each student reported that she/he focused on different musical attributes to manipulate during her/his improvisation. All in all, the students' testimonies were corroborated by their recorded performances, with minor deviations noted only with respect to the extent to which they actually manipulated the reported musical attributes. Nonetheless, there were many aspects of the students' recorded performances that were not explicitly mentioned by them in the follow-up discussions. This is the reason why data was drawn from the recorded performances as well, that is, not only to verify their sayings, but also to further qualify them.

The musical attributes that the students chose to focus on may be classified as pertaining to seven categories: harmony, texture, melody, timbre, tempo and rhythm, and dynamics. What follows is a detailed examination of the students' creative responses, reported in the follow-up discussions and verified by the recorded performances, with respect to each one of these categories.

Harmony

Eleven out of the sixteen students chose to manipulate musical attributes that customarily fall under the rubric of harmony. Four of them made explicit reference to playing dissonant vs. consonant harmonic intervals to respond to the intensification of the film's negative affect:

M.T.: *"I tried to maintain this stance [i.e. a continuous feeling of anxiety] throughout the piece. Whenever there was a scene change, I would change, so to speak, the intervals; they would be more dissonant when the film got darker."*

Some students orientated the focus on dissonant vs. consonant harmonic intervals towards the domain of chords, calibrating their performance along the diminished vs. augmented and/or the minor vs. major axis:

P.C.: *"Actually, when the screen was dark and all anxious, I played dissonant intervals and minor chords, and as soon as it was empty at the end and serene, I switched to major ones."*

A.F.: *"In general, at the beginning, when it was all panicky, I used diminished chords because I liked them, they made sense. Then, when it got all black, the augmented chord suited me very well because, I don't know, it reminded me somewhat..., it brought to my mind stars and simultaneous intervals, so I stroke an augmented chord."*

It should be noted that the recorded performance of A.F. showed a more intricate rendition than the one described above: the student started off with a melodic fragment, built around a C-minor chord, that soon gave way to a repetitive C-diminished chord; then, at the point referred to in the quotation above, the student started playing a series of augmented chords oscillating semitonally up and down, before rounding off with a major chord. When asked about the choice of a major chord at that specific point, A.F. responded that the intention was to interject something "surreal" as some sort of ironic musical commentary.

From the students' reports, it is easily inferred that some of them chose to manipulate the harmonic dimension of their music not in terms of harmonic intervals or chords, but in broader terms of pitch-class referential sets, starting off in major, moving on to minor, and finally returning to major mode (or not):

M.K.: “[The music] started in major [mode], since everything was tranquil in the beginning, then, when the sea became kind of [agitated], I moved on to minor [mode], and then we returned to major [mode].”

N.C.: “In the beginning, because everything was tranquil, we decided to be in major [mode]; then, as the wind starts blowing, [we decided] to move on to minor mode; and as the storm starts, the waves get higher, and the man dies or drowns, whatever, we decided to use dissonant intervals because it is sadder, more..., it shows anxiety.”

Along similar lines, some students implicitly decided to explore the harmonic possibilities of moving from diatonic to chromatic referential sets:

T.T.: “I didn’t use a specific key [...] simply, in the beginning, I started with no sharps, with something clean, so to speak, and then I added more but not something specific.”

K.P.: “For the beginning, I thought I play something slower, then, because the scenery reminded me of an island, I played a [melodic] figure like an old Demis Roussos song. Afterwards, however, I tried [...] to do a general transformation of things; at the point when the wind was blowing through the poplar tree, I tried to bring out something a bit more modernistic.”

Texture

Customarily defined as a measure of the density of the pitch material on the musical surface (Vouvaris, 2015, p. 16), texture was implicitly reported by five students as a preferred musical attribute given to creative manipulation:

M.S.: “In the last scene, with the leaf at the edge of the sea [...] I used fewer notes.”

It should be noted that, although the manipulation of texture was not explicitly reported by the rest of the students, the recorded performances showed that they all engaged, in one way or another, with the gradual thickening and thinning of the musical texture in the course of the film.

Melody

Students playing melodic instruments seemed rather uninterested in exploring the expressive possibilities of melodic structure in both their reports and their actual performances. Apart from K.P., who played the bassoon in the second take (see the related quotation in the last paragraph of the previous section on harmony), only one more student (who played the piano in the second take) made an explicit reference to the manipulation of some sort of melodic construction:

P.C.: “In the beginning I played a melody, which, as it got dark, it started breaking down, so to speak, and I played loud bass and a diminished chord, whereas in the beginning things were melodious.”

Timbre

When asked about their choice of instrument, most students either did not give a specific reason or they said that they just happened to have it with them (as in the case of K.P.’s Theremin). However, in some occasions, students gave specific reasons for their choice of instruments in response to the film:

M.T.: “[I preferred] the glockenspiel [in the second and third take, over the piano in the first one] because it is clearer, more transparent. [...] I also chose the glockenspiel because it suited the wind.”

N.C.: “In the first two takes, I chose the marimba, playing tremolo [...] and then, in the third take, I decided to choose the brushes because I wanted to make the sound of the sea.”

Although each student performed on one specific instrument in each take, they all seemed to explore the expressive possibilities of timbre by differentiating it through various performance techniques in accordance with the progression of the film's narrative and affective trajectory (e.g. extensive use of tremolo, often employed to allude to the trembling leaf or the trembling face of the fisherman). Some of them were explicit about it in the follow-up discussion as a purposeful response to specific scenes of the film:

A.S.: *"At the beginning, there was a sense of color change within the film and I didn't have much of a choice with the specific instrument [snare drum], so I used other things as well, such as the chair."*

A.T.: *"Mainly, so to speak, the deep sound of the toms brings to mind the sound of the thunder and, let's say, [that of] the cymbals [bring to mind] the sound of the sea, if you do some sort of tremolo or something, so that's what I did."*

K.P.: *"Then I tried –I think I failed miserably there– at the scene with the goat, to mimic the baa of the goat [on the bassoon]."*

Tempo and rhythm

During the performances, all students manipulated the parameter of tempo, accelerating their playing as the film progressed towards its culmination and decelerating as it reached the end. Nonetheless, only one made explicit reference to tempo in the follow-up discussion:

K.P.: *"It [i.e. the music] was more long-drawn when it [i.e. the film] was tranquil, at least this time [i.e. in the third take, in which K.P. chose to play the bassoon], and then I think I started to change the tempo a lot and the mood, when it became, I don't know, fast."*

On the other hand, the manipulation of the rhythmic parameter was limited to playing either series of undifferentiated rhythmic values (usually in the form of long tones, retained through tremolo), accelerating and decelerating as the film progressed, or repetitive rhythmically differentiated patterns which dissolved as the film progressed towards its culmination (and sometimes it re-emerged as the film reached its ending):

A.S.: *"If I remember correctly, I played a pattern, a specific pattern, a repetitive rhythm, which started to dissolve little by little."*

Other than that, more rhythmically differentiated music was performed only by those students that chose to invest in melodic construction (see the previous section on melody).

Dynamics

As expected, all students responded to the narrative and affective trajectory of the film by manipulating dynamics, gradually crescendoing towards the culmination of the film and decrescendoing towards its ending:

Y.S.: *"I simply put emphasis on dynamics while I was playing percussion; when the film's rhythm was fast, so to speak, with the sea, with the leaves, I would try to play louder myself, that is, in accordance with the rhythm of the film."*

A.T.: *"When it was not windy and everything was very tranquil, I started playing very loosely, that is, some kind of a tremolo, something like that anyway, which could barely be heard; and then, when the waves and the storm started, I played louder and I started pulling back again when the film reached its ending and the man drowned."*

Combined manipulation of musical attributes

The preceding categorization helps systematize the musical attributes that attracted the students' interest and focus on the specific ways they chose to manipulate them. Nonetheless, it should not be misread as a claim to grasp the totality of the actual improvisatory reflexes of

the students. For one thing, the projected musical attributes are not completely independent from each other (e.g. texture is, to a certain extent, indebted to rhythm and tempo), which means that, whenever a student would focus on one musical attribute, she/he would inevitably manipulate other ones as well, albeit sometimes inadvertently. On the other hand, even in the case of mutually independent musical attributes, students engaged with them by combining them simultaneously and/or in succession in various ways, and often with different points of onset and/or cessation. To offer an example, the case of E.S.'s performance is characteristic of such a combinatorial approach: playing the marimba in all three takes, E.S. started off both of the first two takes with a repetitive octave melodic motive; as the film progressed towards its culmination, this motive started getting accelerated, melodically more elaborate, and rhythmically more mercurial; subsequently, E.S. contracted the intervallic content of the motive and accelerated it into trills; after its occasional reappearance, this time expressively emphatic in its dynamics and articulation, the motive eventually gave way to extended tremolo figures and a series of erratic one-octave bidirectional glissandi, before it remerged in its original context as the film approached its ending.

Analysis

The results show that, despite the occasional attention to specific details of the film's narrative and/or visuals, all students chose to creatively address the overall affect of the film, implied by its narrative line, not as a static state, but as a dynamic process. A plausible way to integrate the students' varying conceptualizations of this process into a unitary description, explicitly or implicitly verbalized during the follow-up discussion, could be along these lines: an initial state of tranquility and placidity (for some, negatively charged with the ominous prospect of a bleak turn of events) gradually gives way to an escalating sense of anxiety and agitation that culminates to a point of high tension before gradually subsiding to the initial state of calm and serenity (for some, differently qualified than that in the beginning). Students coordinated their improvised performances with this process by subjecting the musical attributes of their choice to a process of manipulation along the lines of a similarly dynamic scenario:

- In terms of harmony, students tended to move from consonant to dissonant and back to consonant harmonic intervals, from major to minor and back to major chords, from diminished to augmented and then to major chords, from major to minor and back to major modes, and/or from diatonic to chromatic and back to diatonic referential sets.
- In terms of texture, students tended to begin with a relatively thin texture, subsequently dense it up and finally thin it out again.
- In terms of melody, students playing melodic instruments tended to start off with more or less distinct melodic figures, which they subsequently subjected to a process of gradual disintegration, before choosing to reinvigorate them or not.
- In terms of timbre, students tended to become more adventurous and experimental with the timbral possibilities of their instruments of choice as the film progressed, and return to more conventional performance techniques as the film neared its end.
- In terms of tempo and rhythm, students tended to gradually accelerate and then decelerate rhythmically undifferentiated values or repetitive rhythmically differentiated patterns, gradually subjected to dissolution.
- In terms of dynamics, students tended to move from softer to louder and back to softer dynamics.

These findings can be effectively interpreted from the perspective of CBT (Diagram 2). Acting as grounding box, the film's narrative and the way it resonated with each participant, combined with the setting and the particular circumstances of the performances, provided the motivation for choosing, populating, and connecting the mental spaces appropriate for the emergence of a novel structure in the blended space as an intended finished product.

Input 1 seems to have been unanimously populated by the film’s affective trajectory as described above, while input 2 seems to have been populated by a varying selection of musical attributes, manipulated (singularly or in various combinations) along the lines of an analogous trajectory. The analogical cross-space mapping between input 1 and input 2 was facilitated by the common structure of both trajectories as dynamic processes, the former specifying it in the context of the fluctuating affect deduced from the film’s narrative and the latter providing various singular or combinatorial sonic analogues to it. The structural commonality of these dynamic processes can be grasped in terms of an image-schema family that pertains to the network’s generic space. This image-schema family may be thought to combine two image schemas: on one hand, the CYCLIC CLIMAX schema, which underlies many of our life experiences that “exhibit a character of build-up and release” (Johnson, 1987, p. 119); on the other hand, the SCALE schema, relevant to the quantitative and qualitative aspects of our experience of the world, as pertaining to objects and events that increase or decrease in amount and/or degrees of intensity (Johnson, 1987, p. 122).

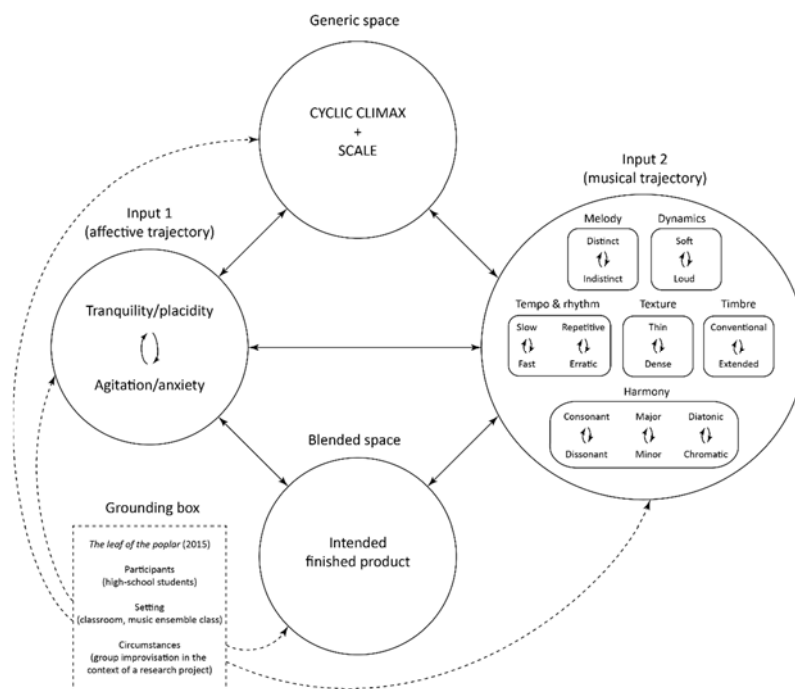


Diagram 2. Diagrammatic representation of the class of CINs, relating to the students’ improvised musical accompaniment to *The Leaf of the Poplar*

Diagram 2 depicts the topology of input 2 as being regulated by the different categories of musical attributes that attracted the students’ attention (harmony, texture etc.). Each one of these categories acts as a different conceptual frame that organizes the elements that populate it along the lines of a continuum of underspecified possibilities, heuristically delimited by two poles (e.g. consonant-dissonant, slow-fast etc.). This means that, in fact, each conceptual frame and its pertinent elements constitute a distinct mental space, acting as a separate input space to the blend. In this respect, the diagrammatic depiction of input 2 is but a cumulative representation of the varying possibilities of different mental spaces of the musical domain, inputting singularly or in combination to the CIN according to each student’s creative choices. The same goes for the blended space, the intended finished product being a different conceptual construct for each student, depending on her/his own vision about the intended outcome. From this perspective, Diagram 2 does not actually demonstrate a single CIN, but an entire class of as many as sixteen “multiple blends” (Fauconnier & Turner, 2002, pp. 279–299) of varying cardinality of mental spaces. What is more, given that the emergent

structure in the blended space of each one of these multiple blends pertains to the highly personalized creative response of each student to the filmic stimuli, the organizing frames of the input spaces, in some of the proposed multiple blends, are different, if not clashing, resulting in highly innovative blends (e.g. A.F.'s harmonic frame in the context of a move from minor to diminished to augmented to major harmony does not correspond exactly to the trajectorial conception of the organizing frame of input 1). In this respect, some of the blends implied by the network in Diagram 2 are not only multiple, but also double-scope.

Another aspect of the proposed CIN that needs to be taken into consideration is its conception as a dynamic process itself, given that it operates on the basis of its bidirectional cross-space links remaining continuously and simultaneously activated (Fauconnier & Turner, 2002). This means that, as soon as the blend is established, there is a continuous projection back and forth from one mental space to another, resulting in the constant renegotiation of the elements that populate them and/or the frames that organize them, while retaining the binding links of the blend. This process is often referred to as "running the blend" (Fauconnier & Turner, 2002, pp. 48–49) and, in the case of the students' creative responses to the film, was evinced by the constant shift of attention to different musical attributes and/or different combinations of musical attributes and/or different ways to manipulate these attributes (e.g. see the case of E.S. at the final paragraph of the results unit of this article). In other words, when each student ran the blend, she/he was immersed in a dynamic cognitive process that entailed the constant fluctuation of the cardinality of the mental spaces that comprised the multiple blend, the quantitative and qualitative modification of their components, as well as the different ways of selectively projecting, composing, completing, and elaborating these components. According to the theory, the motivation behind the idiosyncratic way in which the blend "pulsated" (Antović, 2016, p. 107) for each student during the act of contributing to the improvised performance was simultaneously warranted and constrained by the student's unique characteristics that informed the blend's grounding box, that is, her/his competencies, preferences, interests, and emotive dispositions.

The personal traits of each participant were not the only elements of the grounding box that must have affected the blend and its elaboration. The particular setting and circumstantial conditions of the improvised performances played an inevitable role in the students' decision-making process. Of these conditions, the most decisive one must have been the group setting and the particular dynamic of each group in terms of the possibility of intended or unintended interaction. In fact, during the follow-up discussion with the members of group A (no pre-planning), three students reported that they had been responsive to the performance of others, one said that he had purposefully ignored them, and five made no relevant comment (although three of them expressed their wish for pre-planning and more cooperation). On the other hand, all members of group B (pre-planning) reported that they had taken into consideration the discussion that preceded their performances, three of whom made a specific comment about the way they had cooperated with others. This means that, on one hand, the way the members of group B populated the mental spaces of their blends, as they were being established, must have been, to a variable degree, informed by the insight of their peers as expressed at the pre-planning stage (not the case for the members of group A). On the other hand, the way some students of either group ran their blend during the ongoing improvisation was grounded by the possibility of being more or less inclined towards intentionally or unintentionally responding to the performance of their peers.

Conclusions

Through the lenses of CBT, the present study has tried to interpret the heuristics employed in common by high-school students when asked to respond creatively to a silent short film by contributing to the group improvisation of a musical accompaniment to it. The analysis has shown that students tended to focus on the overall affect of the film as a dynamic process and manipulate the musical attributes of their choice in a way that allowed their musical

contributions to provide sonic analogs to this dynamic process. The outcome varied from commonplace to highly innovative contributions, depending on how each student decided to establish and run the blend.

The study's addition to the ongoing research on the application of CBT on musical creativity and film music rests upon the way it addresses the need for a much-wanted empirical footing of the theory. Its qualitative methodological perspective may not allow it to provide conclusive results with respect to either the students' creative strategies and/or the validity of the theory to explain them, but it can help formulate a viable hypothesis, open to further and more systematic investigation. Any such future attempt would have to attend to the limitations of the present study as pertaining to the quantitative and qualitative characteristics of the chosen group of participants, the methods employed to collect the data, the choice of the filmic stimulus, and the group setting of the improvisatory activity and follow-up discussion. Furthermore, the analysis of the data that pertain to such issues as the investigation of the consistency of each student's creative choices in each take, the qualitative differences between the students' creative responses with respect to their level of musical competence, age, and/or sex, and the precise role of the elements that inform the grounding box in the students' choices of creative strategies exceed the scope of this paper and will be addressed in a future publication.

Beyond its aspiration to encourage further research in the field, the present study hopes to add to the call for more education in musical creativity in general (e.g. see Odena, 2012) and in relation to film music in particular (e.g. see Orzolek, 2010). The students' high level of commitment to the project, as well as their ability to provide compelling creative responses and to expound on their creative intentions and motivations, attest to the prospect that there is much to be gained from including more outlets for cross-modal creativity in our educational practice. As the present study has tried to argue, when students are involved in trying to provide a musical accompaniment to a silent film, they put themselves against the challenge of handling effectively and meaningfully the demands of complex cognitive processes, structurally comparable to those required by their involvement in other fields of knowledge (e.g. see Root-Bernstein, 2001). Even beyond the specifics of creatively responding to a silent film, the ability of music itself to provide sonic analogs to abstract dynamic processes, common to other facets of the human experience, and, in so doing, to deepen our grasp of the human condition, opens educators up to the opportunity to acknowledge and capitalize on the merits of the humanist dimension of education in arts. Education in musical creativity can serve as the paradigm of a truly creative education.

Acknowledgements/Funding

I would like to thank Dimitris Tasoudis for his valuable help and support. This research is funded by the University of Macedonia Research Committee as part of the "Principal Research 2019" funding program.

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