Enriching the Blend: Creative Extensions to Conceptual Blending in Music

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ABSTRACT

In this paper we critically investigate the application of Fauconnier & Turner's Conceptual Blending Theory (CBT) in music, to expose a series of questions and aporias highlighted by current and recent theoretical work in the field. Investigating divisions between different levels of musical conceptualization and blending, we question the common distinction between intra- and extra-musical blending as well as the usually retrospective and explicative application of CBT. In response to these limitations, we argue that more emphasis could be given to bottom-up, contextual, creative and collaborative perspectives of conceptual blending in music. This discussion is illustrated by recent and in-progress practical research developed as part of the COINVENT project, and investigating structural and cross-domain blending in computational and social creativity contexts.

I. BACKGROUND & CRITICAL QUESTIONS

A. Conceptual Blending in Music

Conceptual Blending or Conceptual Integration (Fauconnier & Turner 2001) is a cognitive theory whereby elements from diverse but structurally compatible mental spaces are 'blended' giving rise to new or enriched concepts. The blending paradigm extends Lakoff & Johnson's (1980) influential theory of Conceptual Metaphor (CMT), to suggest multiple integrations operating across different conceptual spaces, rather than unidirectional cross-domain mapping between a source and a target domain. Blending has been discussed extensively with regard to several fields, but has primarily been applied to language and mathematics. The theory has also been criticized as a 'theory of everything' (Gibbs 2000), given that its potential scope is so broad. Consequently, research in blending often focuses more on designing case-specific experiments for particular applications of the theory, and on building constraints and optimality principles for narrowing its scope (e.g. Bache 2005).

With regards to music, conceptual blending has been predominantly theorized as the cross-domain integration of musical & extra-musical domains such as text or image (e.g. Zbikowski 2002 & 2008; Cook 2001; Moore 2012), and primarily discussed from a musico-analytical perspective focusing on structural and semantic integration, between e.g. musical and textual rhythms, verbal and musical meaning etc.

Blending as a phenomenon involving "intra-musical" elements (Spitzer 2003, Antovic 2011) is less straightforward. In principle, one of the main differences of blending theory from CMT is that it may involve mappings between incongruous spaces *within* a domain (e.g. conflicting tonalities in a musical composition). In this case, 'intra-musical' conceptual blending in music is often conflated with the notion of structural blending (e.g. Kaliakatsos-Papakostas *et al*. 2014, Ox 2012) and Fauconnier and Turner's theory is primarily applied to the integration of different or conflicting structural elements, such as chords, harmonic spaces, or even melodic-harmonic material from different idioms. Nevertheless the recourse to intra-musicality, and its implicit identification with structure, is not a neutral gesture; in fact it brings a number of questions to the fore, including:

- What is a musical concept?
- What constitutes structural blending in music and how does it relate to / differ from cross-domain blending and mapping?
- What can blending theory tell us about music not only as top-down formalized structure but as an emergent, data-driven, creative activity?

In their work on algebraic semiotics, Goguen & Harrell (2010) have distinguished conceptual blending from structural blending; they have used the latter to enrich the linguistic notion of blending with "structure building operations" (291), which include the composition of syntax, narrative etc. In this respect, their approach is one of the few cases that have dealt with blending from a bottom-up, creative perspective of *generating* novel blends rather than analysing existent ones (see next section).

In defining musical concepts and the process of their formation, it is common practice to rely on divisions between what is 'music in the proper sense' and what falls outside of its scope. Such divisions, as we shall argue in the next section, are perhaps one of the reasons for the relatively limited application of blending theory in music thus far.

B. Revisiting the Intra- / Extra-musical Divide in Musical Conceptualization

"The intramusical (simply referred to, in music parlance, as 'music') is captured either in the inscription of notation, or in specifically quantifiable, audible phenomena. Only what avails itself of the assignment of specific musical values (i.e., pitch [and pitch relations], meter, tempo, dynamics, instrumental voicing) is proclaimed internal to the proper concerns of music. All else is extramusical." (Kim-Cohen 2009, p.40)

The passage above illustrates the problems of an age-old division between "absolute" and "programme" music (Hanslick 1891), also manifested in "absolutist" versus "referentialist" accounts of musical meaning (Deutsch 2013, p.589). Several recent theories attempt to break this binary down, or develop it into somewhat more encompassing, tripartite models of musical meaning and conceptualization. Koelsch (2013), for instance, adds a further category, "musicogenic" meaning, which refers to physical, emotional and "personality-related" responses to music. At the same time, he essentially retains the traditional definition of intra-musical meaning as the product of "structural relations between musical elements" (p.xi) and considers extra-musical meaning as "iconic, indexical or symbolic" (p.xi, p.157).

Koelsch's tripartite model is not without its parallels. Brandt's (2009) typology of formal, emotional and referential levels of musical conceptualization can be neatly mapped onto the former categories of intra-, musicogenic, and extra-musical meaning respectively. A similar division is found in Kühl (2007), but, unlike Brandt, the tripartite typology of emotion, cognition and kinaesthetics is not depicted as a linear progression, but rather as a cycle (for a detailed evaluation of tripartite models such as these, as well as an overview of terminological issues relating to levels of conceptualization and the number of conceptual spaces at play in this process, see Antovic 2011).

Fauconnier and Turner's theory, however, rests more on the assumption of conceptualization as an ordered, if not entirely linear, progression, and essentially posits three stages (or "levels") of blending: Composition, Completion and Elaboration. As Bache (2005) notes, progression between these stages is depicted as a directional process, which emphasises the subconscious, automatic aspects of integration over the conscious process of dis-integrating elements in order to reach an optimal selection of features for blending. In response, Bache proposes an alternative three-level model, starting from a low-level process of "Binding" conceptual spaces (Level 1), then moving on to more abstract "Construction Building" (Level 2), and finally, reaching a "Partial Selection" Blend (Level 3), achieved through a number of consciously imposed constraints on the lower-level blends.

A fundamental limitation in all of the above divisions is that they are retrospective analyses of progressions between different levels of conceptualization; in other words post-hoc accounts of concepts that have already been formed and are in common use. Hence, even though Fauconnier and Turner (1994; 2002) have theorised blending in relation to concept formation, emergence and invention is largely studied by looking at concepts as the already formed *products* of blending processes, rather than setting up processes that may lead to a new formation. As Schorlemmer *et al*. (2014) note, CBT is "silent on issues that are relevant if conceptual blending is to be used as a mechanism for designing creative systems… [It] does not specify *how* novel blends are constructed" (2014, p.2). Studies like Goguen and Harrell (2010, see previous section) are a promising step in this direction, which in recent years has been followed more systematically in some domains, particularly the intersection of computational creativity and poetry (see e.g. Corneli *et al*, forthcoming). To our knowledge, however, there is very little evidence of similar research dealing with generative, creative theorisations and applications of blending in music. The fact that "composition", a term assigned to one of the most complex high-level functions in music is used in CBT to refer to the most basic-level process of subconscious binding between domains also indicates that the ordering of levels in CBT might require some adjustment and relativisation if it is to be applied to musical creativity.

A further problem with retrospective applications of the blending model (i.e. identifying a pre-existent blend, then examining how it was constructed) is that they are less relevant to High-Context situations (Hall 1992), where structural and semantic relations are formed ad-hoc and are extremely case-specific. However, for socio-centric, contextualist theories of musical meaning, pretty much all music could be considered high-context, so long as it is inextricably tied with the subjective, variable nature of real-time performance and interpretation. Schutz (1951) goes so far as describing music as "a meaningful context which is not bound to a conceptual scheme". In practice, this could mean that musical conceptualization is much more dependent on dynamic, context-specific processes than it is tied to fixed, determinate products.

The issue at hand, then, is to develop ways of overcoming an analytical bias on fixed content theorisation and top-down / post-hoc formalisation, and to also look for bottom-up, creative applications of blending in the context of compositional and performative musical processes.

II. BLENDING AS MUSICAL CONCEPT INVENTION: TWO EXAMPLES

A. Melodic Harmonisation & Structural Blending

Structural blending processes appear in music across several formal musical levels, from the level of individual pieces harmoniously combining music features of different pieces or styles, to the level of entire musical styles having emerged as a result of blending between diverse music idioms (for instance, jazz can be seen as 'blend' of african music, european harmony and american pop, or, bossa nova as combining samba and jazz; more generally, fusion music 'fuses' musical characteristics of different idioms/styles). Can such blending be considered as conceptual blending or is it a different type of blending? What is a music concept in the context of structural blending?

Goguen (2003) suggests that structural blending is different from conceptual blending: "Whereas conceptual spaces are good for studying meaning in natural language, they are not adequate for user interface design and other applications where structure is important, such as web design and music. For example, conceptual spaces and conceptual blending can help us understand concepts about music, but semiotic spaces and structural blending are needed for an adequate treatment of the structure of music, e.g., how a melody can be combined with a sequence of chords." (p.9). Conceptual blending is good for blending concepts about things (i.e. conceptual spaces that describe high-level language-related descriptions of things) but less adequate for blending the structure of things.

In the context of the COINVENT project (Schorlemmer et al., 2014) a model is being developed that is based on Goguen's proposal of a Unified Concept Theory (Goguen, 2006), inspired by the category-theoretical formalisation of blending (Goguen, 1999). As an illustration of the model's potentialities, a proof-of-concept autonomous computational creative system that performs melodic harmonisation is developed. In this section, we present and discuss a couple of creative examples that have arisen in the context of the COINVENT melodic harmoniser.

In the current project, music concepts are taken to be generalisations of harmonic entities and relations, derived from a corpus of harmonic annotated data via statistical learning. This data-driven approach ensures that learned concepts adequatelly reflect characteristics of different harmonic idioms. From each independent harmonic space (e.g. modal, common-practice tonal, jazz, atonal, organum, etc.), represented by a set of characteristic annotated music pieces, important harmonic concepts (e.g., chord types and categories, chord transitions, chords at phrase endings, note connections of successive chords, etc) are automatically extracted and encoded. This structural information sometimes corresponds to standard musicological linguistic terms (e.g. 'cadence', 'perfect cadence', 'dominant', 'leading-note' etc.), bringing the learned musical concepts closer to the standard notion of 'concept' in the domain of cognitive linguistics. In any case, the important aspect of this approach is that manual hand-coding of structural concepts is avoided, and emphasis is given to bottom-up data-driven knowledge acquisition.

Another important aspect of the adopted methodology, is context-sensitivity. The acquired structural descriptions are relative and meaningful within the context of a particular corpus of musical works. Music is defined in a circular manner as something that specific human cultures identify as being music (no general definition of music exists); specific music contexts define relative musical concepts. The adopted corpus-based learning methodology is one way to respect contextuality, flexibility and adaptability of harmonic descriptions; such automatically derived 'ontologies' may be employed in conceptual blending.

Most of the research in conceptual blending in the domain of music involves *explication* – particular music passages or pieces involving, for instance, music-image or music-text blends, or even structural blending between chords (as in an excerpt by Stravinsky, analysed by Ox, 2014). All such studies provide a rich interpretation of the selected music examples via Conceptual Integration Networks (CINs). It is, however, anything but trivial to reverse such processes so as to employ the constructed CINs with a view to generating new music examples. Constructing a blending framework that can be used for the invention of new concepts and new musical structures is a much more complex procedure; an abstract language-based CIN outline is not sufficient. What is required, is rich ontologies for the input spaces (including redundancy), a strategy for constructing the generic space (i.e. what the two input spaces share), and then to find efficient strategies to combine 'weakened' descriptions of the input spaces that avoid inconsistencies/contradictions and at the same time preserve important properties of the input spaces (using possibly priorities/saliences and other heuristics). Some preliminary examples in this vein are given below.

Take, for instance, blending chords and more specifically blending (prefinal) chords in the context of cadences (Cambouropoulos et al. 2015; Zacharakis et al. 2015). It is possible to interpret a certain chord as a blend between other established types of chords. For example, let's examine briefly the augmented sixth chords, and more specifically the German sixth chord (Figure 1). It is established that augmented sixth chords have a strong predominant function (Kostka-Payne, 2000, p. 385) and can be seen both as having a secondary dominant character (Piston, 1978) and a phrygian cadence character (Aldwell & Schachter, 2010). A Conceptual Integration Network (CIN) can easily be constructed to illustrated the German Sixth as a blend, with the Secondary Dominant (V7/V) and the Phrygian cadences as input spaces, and a general cadence description as generic space (brief verbal descriptions can be introduced in the CIN such as 'leading note' for the secondary dominant or 'descending semitone to tonic' for the phrygian input space). This may look good and may highlight the character of a given chord, but it cannot be used to generate new blended cadences or chord progressions.

The current research project is geared towards generation and creative production, not simply explanation. Conceptual blending is employed as a means to construct novel melodic harmonisations and, even more so, new harmonic spaces that can harmonise new unseen melodies. In this sense, constructing rich ontologies for chords and chord progressions in the above example, i.e. chord blending in the context of cadences, and specifying precise mechanisms for blending is anything but trivial. Multiple representations of constituent chord types, roots, bass notes, chord note doublings or ommissions, chord transitions and voice leading, relations between constituent chords in conjunction with weights/priorities for all these properties (i.e., which are more important/salient) are necessary, for a plausible chord blending mechanism to be devised and implemented as a computer program. Appropriate search strategies are paramount in any attempt to create 'meaningful' cadence blends, i.e. blends that preserve salient properties of the two input spaces. A more detailed account of how the COINVENT blending core model can create useful chord blends is given in (Eppe et al, 2015) and an empirical evaluation of the algorithm's output is presented in (Zacharakis et al. 2015).

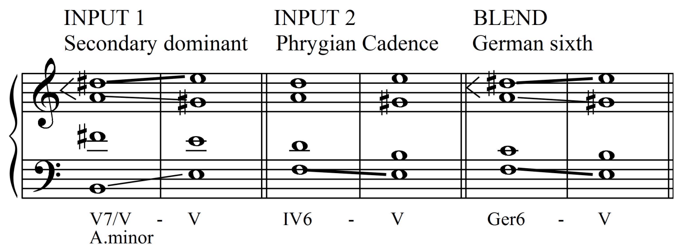
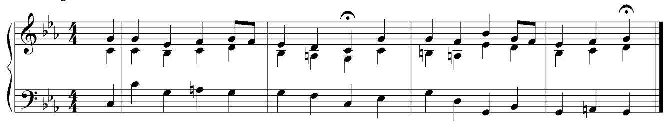


Figure 1. Blending between the secondary dominant and phrygian cadences (both ending on the dominant) gives rise to the augmented sixth chords, such as the German sixth.

If blending of chords is a relatively complex procedure, employing blending in melodic harmonisation is much more so. A melody embodies a rich set of musical concepts that relate to scales, tonal centres, motives, cadential patterns, phrase structure, rhythmic characteristics, implied harmony, and so on. Harmonising a given melody within its implied 'natural' harmonic space involves primarily exploratory creative processes (finding a novel solution within a given harmonic space), whereas a foreign harmonic language triggers the need to combine different musical spaces leading to novel harmonic concepts (combinational creativity). A number of different harmonisations of a single melody are given in Figure 2; the harmonisations are created automatically by the COINVENT melodic harmoniser (at this stage, chord types are computer-generated - voice leading is added manually). The creative system is expected to be able to adapt/adjust existing harmonic systems to foreign (possibly incompatible) melodic structures by means of transformation and/or invention of new harmonic concepts (more details in Cambouropoulos et al. 2015).

a. Bach Chorale melody harmonised in medieval Fauxbourdon style



b. Bach Chorale melody harmonised in Renaissance modal style

Figure 2. Two different harmonisations of a Bach Chorale melody (chord types generated by melodic harmoniser) – reprint from (Cambouropoulos et al. 2015).

It is maintained that a melodic harmonisation assistant that facilitates conceptual blending should allow a modular highly structured representation of harmonic concepts in an explicit manner at various hierarchic levels and parametric viewpoints. In this study, these harmonic concepts are not manually conctructed, but, instead, are induced via machine learning from harmonically annotated datasets. Five constituent structural components of harmony are explicitly represented:

- Harmonic pitch space: scales, pitch hierarchies in scales, consonance/dissonance, chord types.
- Chord transitions: Learning of chord transitions from corpus data in one or more idioms/styles.
- Cadences: Learning of chord transitions that end phrases at various hierarchic levels.
- Modulations: Changes of harmonic pitch spaces that characterise a certain style.
- Voice leading: general characteristics of the way chords are realised and connected in a given idiom.

Once structural characteristics of diverse harmonic idioms are induced in an explicit modular fashion, then blends can be created that combine different harmonic aspects from different harmonic spaces. For instance, modal chord transitions may be combined with tonal cadences (see example in Figure 3), or, more daring blends may be generated that combine, say, messiaen-like octatonic chord transitions with tonal voice leading and modal Renaissance cadences. Such harmonic blending experiments may produce novel harmonic spaces that can generate new interesting melodic harmonisations.

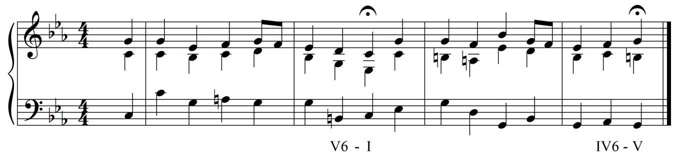


Figure 3. Bach Chorale melody harmonised in medieval Fauxbourdon style with inserted tonal cadences (cf. Figure 2a) – reprint from (Cambouropoulos et al. 2015).

B. Blending in the Context of Social / Distributed Creativity: FolioHarmonies

The importance of collaboration and social interaction in problem-solving as well as more open-ended creative tasks involving structural blending has formed the basis of a series of recent studies, particularly in the fields of mathematics and computational creativity. Inspired by Tim Gowers' (2009a; 2009b) work on collaborative mathematics, Pease (2012; 2014) and Corneli (2014) employ qualitative methodologies to look at the process by which novel solutions, often the result of blended thinking, emerge in social situations (such as an online community of bloggers or peer-to-peer environment contributors, sharing solutions to a mathematical problem).

In music, Georgina Born's notion of "distributed creativity" (2005, p.34) and its subsequent elaboration by Clarke *et al*. (2012; 2013) extends the understanding of musical creativity towards a more pragmatic, process-based understanding of music as an activity distributed across several different agents and attached to everyday activities. This is not without its contingences, particularly when considering music's double role as a social practice and as an autonomous art object in some cultures. In the majority of Western Art Music contexts, for instance, musical performance itself is of secondary importance, and emphasis is placed on fixed-content musical works; consequently, the social distribution of creativity is seen as an extraneous side-effect of the musical process (hence the performance ideal of Western Art Music largely assumes a Low-Context distribution of musical meaning). By contrast, in situations where music is understood as a more flexible, context-sensitive continuum of actions, as in various kinds of improvised or indeterminate composition (e.g. using graphic scores) the unique creative content of every performance can be examined according to more case-specific rules.

In such situations, multiple agents are engaged in a real-time as well as post-hoc interplay of subjective questions and answers: "what is this? is it good/right? is it bad/wrong? is it even music?". As a result, the very question of ontology for every improvised soundwork is both formative and dependent on the process of performance. As Russell (2009) summarizes, "this approach is not ontology understood as the deduction of reality from logical categories: it is the deduction of those categories from reality." (Russell 2009, 78).

How do musical structures emerge and combine in such contexts, and what is the role of conceptual blending in an open-ended, indeterminate music-making situation? In May-June 2014, a loosely structured qualitative study was set up and carried out at the School of Music Studies, Aristotle University of Thessaloniki, to explore social creativity & cross-domain musical blends, supported by the COINVENT project. A private blog was set up at http://folioharmonies.wordpress.com and student participants were invited to contribute as Authors, documenting their responses to an open task.

Participants were given two kinds of sources: (A) an example of a post-1945 graphic score (Folio: December 1952 by Earle Brown, which bears no verbal instructions and uses abstract visual symbols instead of conventional musical notation (B) a set of harmonic space paradigms, drawn from examples used in the COINVENT harmonisation trials. These included sample chord progressions and harmonic reductions of composition segments by five prominent early 20th-century composers, and suggestions for extending the harmonic framework beyond these paradigms (e.g. free harmony).

The task was to collaboratively compose and/or improvise a novel piece, putting these two kinds of sources to use in any combination, following discussion and rehearsal. This latter aspect was emphasized as equally if not more important than the collaborative end-product itself. Setting up and documenting an open-ended process with unknown outcomes was one of the study's key features, aiming at gathering a rich set of process-based, context-specific documentation data.

Participants formed four ad-hoc groups of two to three students each, and collaboratively composed and performed four new pieces. A summary of end products as described by participants themselves upon completion of the study is presented in Table 1 below.

Table 1. End Products in FolioHarmonies

Piece	Ontology description (by participants)	Content description (by participants)	Study materials used
Routes and Destinations	Original composition, resulting from a reworking of the Earle Brown graphic score	A combination of 'noise' and harmonic spaces	Graphic score as structural device & free selection of harmonic paradigms (diatonic / chromatic / clusters)
Me, You, Them	Original "sonic narrative"	A non-verbal narrative around the idea of people forming groups and/or struggling on their own. Each person's 'colour' depicted through a distinct harmonic space, running concurrently and occasionally blending.	Graphic score as structural device & literal individual quoting of particular harmonic successions by each player
December 1952 / Great Smog	Collage or controlled improvisation in two sections	2 pieces in 1, starting with a realization of the graphic score and culminating in a controlled improvisation, with set harmonic material structured around elements of the graphic score	Graphic score as structural and semantic device (on one section) & personal selection of particular harmonic paradigms for each player (drawn from Satie, Messiaen, Bartok)
3/2D in 5-10	Controlled improvisation (inspired by the Earle Brown graphic score).	A 2-dimension space being permeated by 3-dimension volumes, depicted musically as vocal and piano pitches and «noises» against an atonal ostinato background	Graphic score only as a starting reference. Harmonic spaces explored at random and in real time by each player.

What kinds of data can an open-ended experiment like this yield, and what can it tell us about musical concepts and conceptual blending in music? Working with participants who had no prior conceptions or experience in free improvisation, composition or open score performance, and focusing on how they approached the open-ended tasks of combining two dissimilar sources into the composition and performance of original piece of music, enabled us to examine the emergence of novel blends in a social setting. Questions regarding ontology, structure, style and evaluation ("what are we making?", "what context are we making it for?", "why are we making it like this?" and "how do we assess it?") were formulated and answered on an ad-hoc, context-specific, dialogical basis.

Upon a first-level analysis of participants' communication patterns, shared problem-solving patterns also emerged across all four groups. Although not always in the same linear order, all groups followed strategies that could be summarised as follows (Stefanou 2015):

1. *Narrowing the problem space* (e.g. from an open "what if..." or a more case-specific "what to do with these two sources" to a directional "how can we use source A [the harmonic spaces] to interpret source B [the graphic score]" and "how do we make this work?")

2. *Assigning functions and/or meaning to the set material* (e.g. using particular elements in the graphic score as durational markers, or assigning narrative significance to particular harmonies)

3. *Mapping sonic elements onto visual ones*, and vice versa (e.g. creating subscores and testing them via different realisations)

4. *Defining end-product ontologies* (agreeing on what the resultant piece should be described as, and what its constituent elements are).

Three out of four groups (Groups 1, 2 and 4) also produced visual work in the form of 'study scores', aside from their sonic end-products and performances. In the example below (Figure 4), the graph depicts physical motion of the performers in space (red line), with sonic events marked as numbered rectangles on the Earle Brown score. Horizontal rectangles in this version were interpreted as phrases and vertical ones as cadences, drawn from the given harmonic spaces. The marked course was to be followed by a 'lead' singing performer, while two other performers on pianos played melodic and harmonic segments in two clashing tonalities.

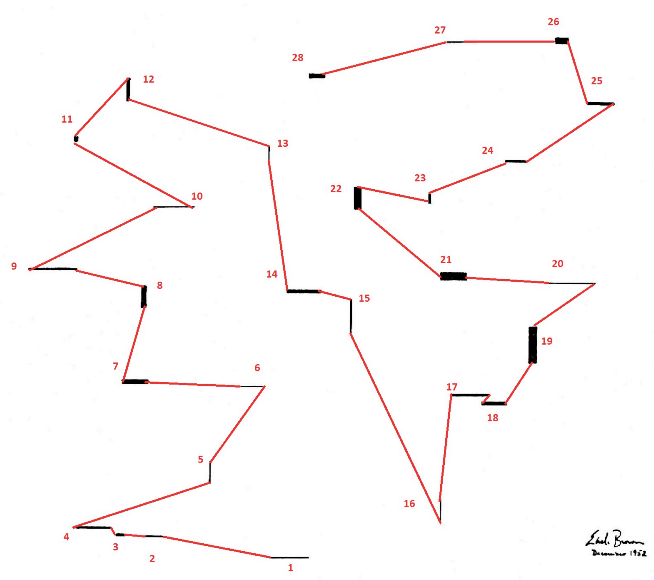


Figure 4. Sub-score developed by Group 2 for *Me, You, Them*.

By creatively integrating two types of inputs – an indeterminate graphic score and a set of determinate harmonic spaces – each group produced something more than a hybrid, exceeding and transcending the two sources. This was largely assisted by the introduction of new elements as 'constraints', to optimize the process. The two types of input might appear to be drawn from the same broad domain (music), and both were presented as source material from which a composition could be made. Nevertheless, they were in fact associated with two distinctly different idioms or even genres (indeterminate / open score music in the case of source A, and harmonic composition in the case of source B). As a stylistic and/or structural constraint, most participants resorted to a third kind of source, which was not given from the onset. Such parameters could be thought of as 'extra-musical', but were described and handled by participants as anything but that; they included noise, pre-recorded sounds and mixed-media (Group 1) narrative and spatial / theatrical motion (Group 2, see Figure 4 above), videos (Group 3).

The cross-domain mapping between visual and sonic spaces was extensive, and permeated all levels of the process. One of the most significant, and somewhat unexpected conceptualisations to have emerged during the study was the dual metaphor "HARMONIES ARE TEXT" / "GRAPHIC SCORE IS SOUND". Across all four groups, participants used references to reading, vision, and texts when referring to source B (the harmonic paradigms), while consistently evoking hearing, listening and sound in relation to source A (the graphic score example). Harmonic paradigms were conceived as something to be "read", "said" (see example 1) and made quasi-verbal sense of. Moreover, they were metonymically associated with the composers of the examples they were drawn from (mentions of "octatonic harmony", for instance, were quickly substituted by references to "the Stravinsky").

A further instance of conceptual metaphor in operation could be articulated as "GRAPHIC SCORE IS SPACE". Despite assigning different status to the two source materials (as e.g. prompts, scripts, maps, targets, or sources) all groups tackled the graphic scores in terms of a space that had to be "navigated" (Groups 1 and 4), a surface that had to be "mapped" (Group 2), or a framework that the harmonies had to "fit into" (Group 3), consistently employing spatial metaphors and in some cases (as in Figure 4 above) translating these into literal motion in the performance space.

In terms of the transformation and structural integration of the given harmonic paradigms, it is interesting also to compare how the exact same material received different handling and was therefore imbued with entirely different meaning across groups. A modal mixture exemplified in bars 3-16 of Bartok's Romanian Dance no.4, for instance, was employed as a structural and narrative device by Group 2, and was used as a kind of main theme, introduced by the leading performer at the start of the piece, and strategically reiterated at the end, to bring the harmonic spaces of all three performers to a convergence. By contrast, Group 1 (see example 1 below) re-framed the mixture entirely, conceptualising it as "oriental".

Example 1: conversation segment, Group 1

Player 2: I won't tune the C differently. Because it sounds nice as it is written. Actually you know what? With a guitar we can say [*sic*] Bartok. And the other could be e.g. pentatonic, like you also said. Also thirds would be nice.

Player 1: With thirds yes, this could work. Shall we try it? Actually shall we try doing it first, to see how it sounds if we both have Bartok going on? On both guitars. Or we may even include another two guitars. And we have the electric one too. […]

[playing]

Player 1: […] Now it has this kind of, I don't know, a Chinese quality to it.

Player 2: So yes, let's add an extra layer… like something oriental, you know, Chinese.

While the material gathered during this study allows for much deeper analysis across several levels, overall the prioritisation of process and social context enabled the formulation of radically relativised ontologies and shared concepts to describe such ontologies. It also fostered a dynamic, multi-level approach to blending, from the level of harmonisation and melodic-harmonic relations, to that of overall forms and end-product pieces.

III. CONCLUSIONS & NEXT STEPS

What becomes evident during a preliminary evaluation of the above examples is that, in applying conceptual blending models to compositional / creative musical processes, a lot needs to be specified, particularly if we are to move beyond a post-hoc explication of existent musical structures and onto the invention & creation of new blends.

In this research we have been going in two directions simultaneously:

a) exploring structural blending in music, in the context of computational creativity

b) investigating how cross-domain blending and conceptual metaphor are implicated in collaborative musical creativity situations in humans

We have also been looking at issues of terminology in the applications of CBT to music so far, particularly with an eye to better situating such research in contexts that are both inclusive (i.e. not using unnecessary or aesthetically biased divisions between conceptual categories) and specific (i.e. formulating a given scope as precisely as possible, so that the appropriate kinds of constraints and optimality principles can be identified and applied in the construction of new blends).

The idea that emergent structural blends do not have to be classified as intra- or extra-musical, but at the same time, need to be described more precisely in terms of the level at which they operate and the context / framework in which they can be considered as blends, is key to this effort. The rather vague, and historically loaded metaphor of music as an exclusive core around which other domains orbit independently (Spitzer 2003) appears less and less relevant to an investigation of structural blending and concept invention in music. By contrast, further research on the types of blending observed in bottom-up creative processes might have significant impact on our understanding of how novel structures and concepts emerge in music, how they are dynamically re-framed and re-situated in high-context situations, and how we conceptualize these transformations across different styles, idioms and genres.

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