

Transdisciplinary dimensions in the composing activities of children: transfer of strategies and transformation of knowledge

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Existing studies show the value of using visual expression as a means of teaching children to understand and create music. This study aspires to point out an additional valuable aspect, namely, the influence composing via visual expression – whereby children transform their own drawings – may have on children’s subsequent compositional processes. This is an area which is, as yet, largely unexplored. The article will examine this within a context in which children compose individually at the keyboard. With the aid of some examples taken from actual teaching practice, the author shows how children – consciously or intuitively and in a more complex and sophisticated manner – transpose their playing strategies from ‘visual composing’ to a primarily musical context or a context incorporating new, non-musical references.

Introduction

A large number of studies have addressed the question of children’s compositional strategies and products and the cognitive value of musical creation for their intellectual and emotional development. To learn more about children’s compositional strategies and products it is important to examine the context and the tasks through which the compositions are generated (Burnard, 1995; Barrett, 1998a). We have already learned a lot about the nature of children’s musical thinking from studies whereby children experiment, complete tasks or compose within the conventions of tonal Western harmony and metric system (Swanwick & Tillman, 1986; Kratus, 1989; Cooper, 2009) or within the possibilities of digital tools such as the computer (Folkestad, 1998; Webster, 2002). More difficult to know is how children’s musical thinking is connected to their *intrinsic* creative thinking. To discover this we need a context without time or task restrictions where children can express themselves musically from a synergy and synaesthesia of their capacities as we find in their spontaneous singing – ‘which is an intrinsic part of a contextual whole, in which song, body movement, rhythm and word are totally interrelated, as one inseparable mode of expression’ (Bjørkvold, 1992; Sundin, 1998).

Barrett (1998b), Sundin *et al.* (1998), Glover (2000) and Burnard and Younker (2004) highlight that, even more than examining children’s verbally communicated meaning whilst composing, we have to examine carefully their actions and the musical discourse that arises from it. We also have to observe the way children apply form and structure. Barrett (1998b)

argues that form and structure are the means by which non-formal and extra-musical meanings are presented. In designing tasks Burnard (1995) refers to tasks that aim to promote artistic activity in which individuality and unpredictable outcomes can be valued. Another condition of task designs is that the effect of constraints versus freedom can be valued (Burnard & Younker, 2002). Winters (2012) emphasises that composing activities are inextricably linked to other areas of musical activity and that the place of composing should be at the heart of music pedagogy.

Regarding the relationship between music and visual expression, some studies have researched in how far visual expression can be of value for experiencing, understanding and composing music. However, one area of relatively unexplored terrain is the influence that composing via visual expression – whereby children transform their own drawings – may have on children's subsequent compositional processes, when they compose without the act of drawing.

From music to image and vice versa

Reybrouck (2007) sees the visualisation of music as a creative process that promotes an inquiring and exploratory listening attitude. How music is experienced or understood can be externalised and articulated by means of visualisation (for example, with a static image). This can occur at different levels, which is why Reybrouck refers to open, half-open and closed articulations. Open articulation principally involves creativity and imagination. The listener can freely represent what he or she hears using an intuitive notation involving a time line and a code for the signs or symbols used. In the case of half open and closed articulations the listener is asked to focus more on the actual musical structure than on his or her emotional experience.

Various forms of articulation can be found in research into children's musical representations, such as the studies carried out by Davidson and Scripp (1988), Barrett (1997) and Reybrouck, Verschaffel and Lauwerier (2009). Barrett points out that children's graphical symbols can be seen as precursors to the culturally determined symbolic systems developed by adult composers. It is therefore no surprise that a great many composers, such as Kurtág (1979), use abstract or pictorial symbols in their artistic-pedagogical work that resemble doodles or children's drawings and, in so doing, lower the threshold for musical experimentation and improvisation. Moreover, in designing his symbols, Kurtág was inspired by the musical behaviour of children at the keyboard.

In the case of piano teaching there are very few methods that make use of children's visual capacity. In the methodologies of Runze (1971) and Mirkov-Stes (2012) children draw in order to learn the relationship between the musical learning content they are required to assimilate and the world around them.¹ Likewise, the method developed by Apagyí (2006) also includes composition. In her method, music and the visual arts are linked through their shared structural similarities. Apagyí and her husband, the painter Ferenc Lantos, have designed a teaching method which focuses on integrated thinking, and the transmission of knowledge from one discipline to another. In their system, music and the visual arts are taught in an interrelated way. Pupils are given assignments based around inter-disciplinary topics ranging from elements such as dots, spots and lines to structural principles such as symmetry, inversion, variation, the golden section, etc. Pupils

are required to elaborate these assignments, both visually and musically, in such a way that they learn to use both forms of expression – working from their specific characteristics – as a language, in order to show the underlying relationships. Apagyi illustrates her work with examples from Lantos, in which he visualises, *inter alia*, sound groups. Examples of her teaching method are discussed in Roels and Van Petegem (2014).

While Apagyi and Lantos establish a relationship between the musical and the visual, we find these unified in the work of the painter and musician, Paul Klee (Boulez, 1989). Klee establishes a link between melodic curves and drawn lines. A melodic curve can be decorated in different ways and Klee succeeds in visualising this by decorating a drawn line in a variety of ways using secondary lines. An integral component in decorating a melodic or drawn line is the way in which secondary lines organise themselves geometrically with respect to the principal line (Boulez). As an example, Klee draws lines with a convergent character and compares this to a man walking his dog, which walks freely at his side. In doing so, Klee captures an external movement in lines, abstracted from a non-musical or non-plastic phenomenon, to explain the concept of decoration.

Children also have a powerful imagination and the capacity to capture an external movement in lines in order to express a musical concept. This is demonstrated in the free drawing 'Run' (Fig. 1) by 10-year-old Michaël in which he visualises the concepts '*crescendo e accelerando*' and '*diminuendo e ritenuto*'. Michaël explains that the horizontal lines represent 'the runner' and here we find various modifications to the running movement, with a clearly undulating principal line. The secondary lines and figures represent 'the energy and sweating of the runner' and here Michaël captured a biological process in lines. Michaël's picture can be seen as a graphical score in which reference is made to time and space (Fig. 1). A musical interpretation might consist of a rhythmic line surrounded by sound groups or sound fields. Michaël's drawing is a good example of how a non-musical movement can be captured in an image and from there converted into a musical movement.

Children can also draw freely – irrespective of a specific assignment – in order to transform their drawings into music and this process can pave the way for composing later on.

Research questions

How do children compose if they have originally learned to compose by transforming their own drawings? Is there a transfer of strategies?

Background

In the academy of music where I teach piano, children learn to play an instrument from about the age of nine years old, after having studied the basic elements of music for one year. When they attend my class, I let them draw whatever they feel like. Their drawings usually contain music notes of different values, which may or may not be on a staff. In my early years as a piano teacher I began to ask the children if there was an interrelationship between these notes but mostly there was not. Hence these notes constituted a starting point from which to build musical phrases that subsequently evolved into small compositions. Pupils then practised these pieces, and sometimes made rough notations of them. I also asked the children's opinion about the illustrations in the piano books we used. If their

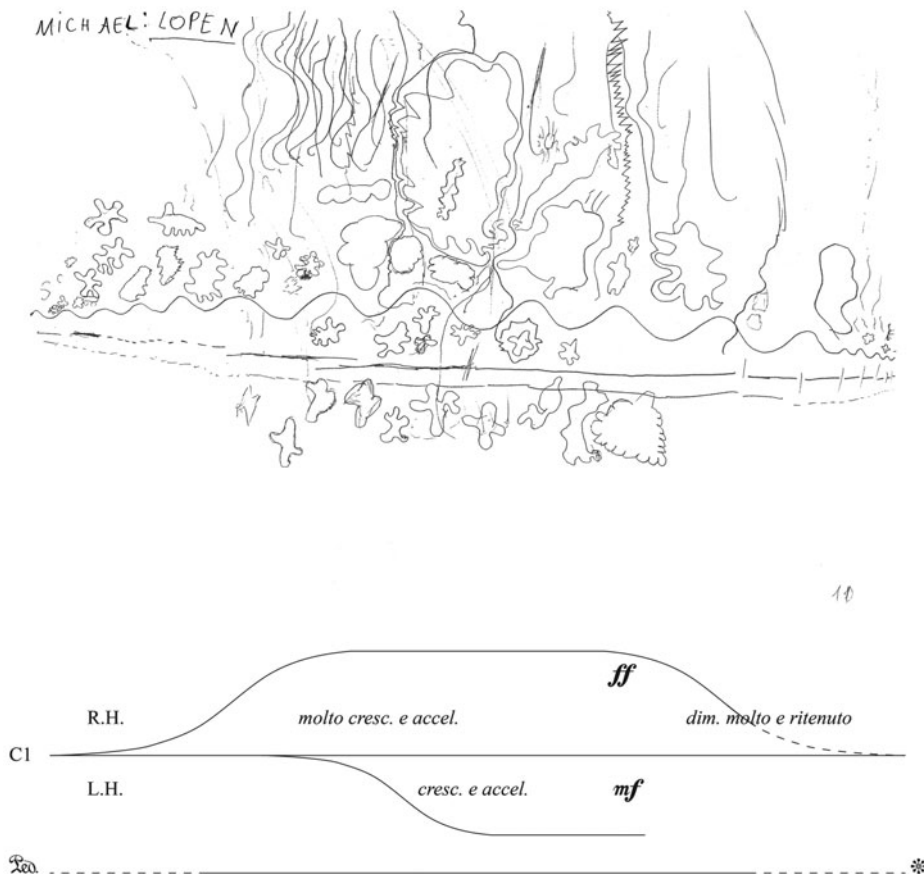


Fig. 1. Run, Michaël (aged 10).

response was that the illustrations and the music did not go together, I challenged them to remedy this by making their own drawings or sounds. As a consequence, *the children then wanted to ‘play’ their own drawings on the piano and they challenged me, in turn, to come up with a method for doing this.* In 1998, the children and I began to experiment and this resulted in the first compositions and drawings based on the relationship between both disciplines (Roels, 2002). As a result, the children learned how to create a musical structure. Since then, 12 children have followed a nine-year learning process whereby, in addition to reproducing music, they also composed a lot of music (Roels, forthcoming).

Methodology and analysis

The children compose as part of their weekly 60-minute piano lessons. The completion of a composition usually takes more than one lesson. By initially working with drawings in a guidance and dialogue process, children learn how to transform their ideas into music.

As a result, some children very soon produce compositions that they have made entirely on their own, although they obviously need some help to make a score. Others need more guidance to create a musical whole, but nonetheless make an effort to include their own original ideas.

The examples that follow will be presented in pairs. The first composition is the result of the transformation of a drawing. The second composition is created autonomously and without the use of visual expression. I will explain the pedagogical process used in each example and then provide an analysis of the strategies children use to arrive at a musical structure. Finally, both compositions will be compared in a music-psychological reflection to see if the strategies used in the first composition are influencing the second composition.

The compositions are not the product of particular assignments, but rather the result of a particular learning context. For that reason, with regard to the analytical framework, I opted for a narrative, descriptive-interpretive approach which refrains from extensive coding procedures. This gives me the possibility to remain close to the data (Van Manen, 1990) and to speak directly to the reader and share insights (Burnard *et al.*, 2010). Inspired by Barrett (1998b), I suggest that in this approach, rather than using predetermined analytical models which may have inherent limitations, 'a greater depth, openness and detail may emerge from the analysis'. I also used my own notes and audio-visual recordings which, in many cases, chart the child's entire process from his or her initial ideas to the final product.

Results

Before presenting the results, I will explain briefly why visual expression can be used to compose and how drawings can be transformed.

Using visual expression to compose

When children make a drawing they are intrinsically involved on a physical, emotional and intellectual level. By expressing their inner world and imagination their natural sense for composition is manifested. Children externalise their inner perception of shapes, proportions and colours and this makes their drawings original and modern of expression. However, *the natural sense for musical composition* which children possess is difficult to examine if we let them compose according to theoretical models – within the conventions of tonality with functional harmony – or on the basis of specific tasks with focus on certain musical parameters. Another problem is that teachers barely can rely on compositional methods for children (De Bra, 2007) and, according to Winters (2012), teachers have a lack of confidence in their own ability to compose.

The use of visual expression as a tool to learn to compose, provides children with the opportunity to learn to understand and perform music from an intrinsic motivation. Sloboda (1995) stresses that intrinsic motivation helps to establish links between structure and emotion, which are the key to spontaneously expressive performance. The use of visual expression also gives children the opportunity to learn about musical syntax from a holistic perspective – *in casu* the overall structure of their drawing or story – and moreover, from a trans- and interdisciplinary and symbolic context. This encourages us to reflect on the problem of 'gestalt-like, whole-part-whole' composing from experienced composers

versus 'note-by-note' composing from unexperienced composers, to which Barrett (1998a) refers.

This approach is of a different order than the often abstract and cognitive approach in which children merely learn to reproduce music and the physical, emotional and intellectual involvement has to be taught.

Transforming drawings

Children's drawings can be viewed musically. Both the colours and lines and the story linked to the drawing contain elements that can be converted into musical parameters such as rhythm, melody, harmony and form. As they convert their drawings into music, the children co-decide as to whether their compositions will be based on the entire drawing and story or on a single aspect of it. Once the choice is made, it is important that they can construct sounds from inside out to characterise their drawn and narrated ideas. This is achieved by using the Socratic method to elicit the children's understanding of the musical parameters. Thereafter the children can experiment with the instrument in order to work out the specifics of their inwardly heard sounds. In doing so, the children find aspects of form, as well as melodic, rhythmic and harmonic fragments that can be used as building blocks for making a composition. How these building blocks are used, will depend on the interaction between teacher and children. Detailed examples of this transformation process can be found in Roels and Van Petegem (2014).

In the examples below (Figures 2–7) the first composition is created by transforming a drawing, whereas the second composition is created autonomously and without the use of visual expression.

Traffic Bustle versus Do, Tara (aged 10)²

Pedagogical process: Traffic Bustle

Tara explains her picture: 'The car is coming up to the traffic light. The traffic light shouts out that the car has to stop and the car stops suddenly'. Tara wants the car to be 'driving along quite slowly' and looks for a suitable motif (a). In answer to my question as to how the traffic light shouts, she says: 'You have to stop! You have to stop!' ('*Jij moet stop-pen, jij moet stop-pen!*'). Imitating her voice she considers the sounds, comes up with motif (b) and gets the traffic light to call out every three bars. When I ask how the car has to stop 'suddenly', she shouts 'stop!' ('*stóp-pen!*') and after my suggestion to try out a few intervals, she comes up with motif (c). Finally, I ask if she can get the car to approach the traffic light. Tara looks for a way of doing this and gets rid of a few bars from the car motif so that the light shouts after three, two and one bars.

Analysis: Traffic Bustle

Tara depicts the figures she has drawn and imitates their actions. She expresses this musically in the sound, tempo, accentuation, dynamics, etc. and in *ostinati* and syllabic

The image shows a musical score for a piece titled 'Traffic Bustle' by Tara, aged 10. The score is written in 3/4 time and consists of two systems of music. The first system starts with the tempo marking 'tamelijk rustig' and a dynamic of 'mf'. It features a bass line with a steady eighth-note pattern and a treble line with rests. A circled letter 'a' is placed above the first measure. The second system begins with a circled letter 'b' and a dynamic of 'f', followed by a crescendo leading to 'mf'. A circled letter 'c' is placed above the final measure, which has a dynamic of 'sffz'. Below the score is a drawing of a traffic sign on a striped post and a car with 'Shuma' written on its side. The drawing is signed 'Tara 10'.

Fig. 2. Traffic Bustle, Tara (aged 10).

motifs. In compressing the phrase by getting rid of bars numerically she has visualised the car's approach and the time period and portrayed it in sound.

Pedagogical process: Do

After composing Traffic bustle, Tara composes the work Do, using her own game rules as a guideline. She writes:

'The 'Do' game: the 'Do' may NEVER be played! The boys are on one side and the girls on the other. The 'ordinary' Do is the line that they are not allowed to touch or cross. The children try to get closer and closer to it until the highest or the lowest (leaders) call them back.'

Do

Aan de éne kant staan de jongens, aan de andere de meisjes.
 De gewone \downarrow is de lijn waar ze niet mogen op- of overkomen.
 Zo proberen de kinderen steeds dichterbij te komen,
 tot dat de allerhoogste of de allertaagste hen terug roepen...

(leiders)

Het do-spel:
 de do mag ~~NOOIT~~ gespeeld
 worden!

Tara Heysers L4 10j

Fig. 3. Do, Tara (aged 10).

On the keyboard, Tara marks off a play area between two octaves, with middle C as the dividing line. Using both hands, she lets the children move and explains how this happens: at first defiantly with little steps, then more sneakily and finally boldly.

Analysis: Do

Using motor symmetry Tara imitates and differentiates the actions of the imagined figures. This results in a musical structure with contrapuntal characteristics (imitation, inversion, retrograde motion and *stretto*), asymmetrical rhythm and phrasing, as well as in an articulated style of playing with *staccato*, *legato* and *martellato* (video 1). By lengthening the motifs and making them denser she has visualised the way of approaching and the time period, and portrayed it in sound.

Psychological reflection: Traffic Bustle versus Do

A story from a drawn picture becomes a similar story from a transvisual picture; events from the first story are transposed into the second (both stories are about movement, language and time). The two stories have been transformed, however, with differences in the transformation process. In Traffic Bustle both figures are represented by thinking

about different musical parameters. In *Do* a reduction has taken place. Here, the children running back and the leaders become a single entity (Tara calls the leaders the 'highest' or the 'lowest', by which she means the high and low notes; the notes of the children playing) and the piano is approached geometrically, as a result of which the *ambitus* is limited and the sound is of secondary importance. Besides the reduction there has also been an expansion and an internalisation. In *Traffic Bustle* the car just drives forwards. The traffic light has been personified and its speech is imitated. The notes chosen represent two separate figures. In *Do* we see a multiple movement by figures that have been identified and there is abstraction from language. The notes are no longer chosen: they *are* the figures. In both compositions, form and character are inherent to the story. In *Traffic Bustle* both the picture and the interaction with the teacher have influenced the composition. In *Do* Tara has abstracted from her internal representation, without any interaction with the teacher. In the compositions we see an evolution from simple-repetitive and visual, to complex-differentiated and abstract.

The Time Clock versus Chorale, Jef (aged 10 and 11)³

Pedagogical process: The Time Clock

Jef draws a time clock and says: 'The time clock takes me to the future, the past and the present. In the future I meet a Martian, in the past I meet a knight and I ask them to travel with me. When we arrive in the present we find chaos: the noise of trucks, police cars sirens, a plane, etc. Then a door closes and the story is finished.'

With this fictional story Jef is making the step towards modern piano techniques (video 2) and a spatial notation with graphical and traditional symbols. As he transforms the story Jef tries to decide in which registers everything has to take place and in his dialogue with the figures he adjusts his own pitch. Jef also experiments with tone duration and text setting. When he represents the chaos, I ask him if there is also order. He says there is and, at my suggestion, he looks for a way that this can be represented and integrates four triads in root position (a). I get him to play these one after the other, explaining that this is a small chorale.

Analysis: The Time Clock

The story contains three aspects: the time clock which takes Jef to different dimensions, the dialogues that are conducted and the closing door. As a result the piece has a rondo form: ABACAD-coda. By integrating triads in the chaos Jef has continued the rondo form on a smaller scale. Space and time are created by the use of different registers, *fermata* and overtones. The spoken words are set to music syllabically and the melodies have a centripetal character (b). At one point Jef uses a dotted rhythm derived from the contraction of the words 'in 't ver- le-den' [= in the past] (c).

Pedagogical process: Chorale

A few weeks later Jef composes *Chorale* and includes the triads from *The Time Clock*.

(a)

Glissando
cresc. e accel.

f

sf *sf* *sf* *sf* *fff*

(b)

Ga je mee naar het he - den?

sf O - ké!

(c)

in't ver-le - den

Fig. 4. The Time Clock (fragments), Jef (aged 10).

Analysis: Chorale

Jef composes using only triads in root position. Chorale has a spontaneously created structure with characteristics of a rondo and ABA-coda form. The piece has a Gregorian feel to it because of the weaving melody with centripetal character, the coincidence of rhythmic and melodic moments of tension and relaxation and the Dorian mode. Phrases are separated by long notes (fermata), different registers are used and striking is the dotted rhythm and syncopation.

Psychological reflection: The Time Clock versus Chorale

I got Jef to play the chords from The Time Clock one after the other and, in so doing he managed to expand them into a phrase. From the context of The Time Clock, where

The image displays a musical score for a chorale, composed by an 11-year-old named Jef. The score is written for piano and consists of five systems of music, each with a treble and bass clef staff. The notation is characterized by dense, block-like chords and textures. The first system begins with a forte (*f*) dynamic in the treble and a piano (*p*) dynamic in the bass, with a *leg.* (legato) marking and a *simile* instruction below. The second system features alternating dynamics of *f* and *p* between the staves, with a *simile* marking below. The third system starts with a piano (*p*) dynamic in the treble and a *leg.* marking in the bass. The fourth system maintains a piano (*p*) dynamic in both staves, with a *leg.* marking in the bass. The fifth system begins with a piano (*p*) dynamic in the treble and a pianissimo (*pp*) dynamic in the bass, with a *leg.* marking in the bass. The score concludes with a double bar line.

Fig. 5. Chorale, Jef (aged 11).



Fig. 6. (Colour online) The Merry Underwater World (fragments), Niels (aged 10).

we find a 'refrain-stanza' structure on two levels, Jef has understood that a phrase can be placed between other phrases. While the structure of *The Time Clock* is simple and has been derived from the story and the interaction with the teacher, the structure of *Chorale* is complex and surprising. In both pieces Jef has interpreted time and space in a similar way and so we find *fermata* and overtones versus the lengthening of each phrase with a long sounding chord. In *The Time Clock* Jef's empathy with the figures plays a role. That's why dialogues take place within registers with shared pitches. In *Chorale* Jef conducts a purely musical dialogue using different registers and shared pitches. The dotted

(d) motif a 1234 motif b 5678

Fig. 7. Anger (fragments), Niels (aged 10).

rhythm derived from words in *The Time Clock* becomes a purely musical figure in *Chorale*. Jef has transcended the need for the support provided by the story and the interaction with the teacher, resulting in an evolution from a ‘visual-musical’ to a purely musical interpretation.

The Merry Underwater World versus Anger, Niels (aged 10)⁴

Pedagogical process: The Merry Underwater World

Niels explains what his picture shows: water, five leaping fish, an angry fish, two fish going hand in hand and making electricity, three fish playing instruments: a banjo, flute and xylophone. Niels wants to begin with the water and says that there are air bubbles in it. He spontaneously uses an abundance of glissandi and unrelated notes (and hereby takes a step towards modern piano techniques). In order for him to be able to continue I suggest that he selects a certain number of notes. He chooses six. Niels wants the fish with the banjo, flute and xylophone to play together; the first two engaging in a dialogue and the third accompanying them, in other words, a trio. I therefore ask him if he can arrange the six notes as question and answer and if he can find a chord for the accompaniment (a). Having done this, Niels puts the first notes of the banjo and the xylophone together, looks at the keys for a moment and says: 'Everything that is white must be black and inverted' (b). At this point I challenge him to rearrange the notes in a different way again (c). We continue the story with five leaping fish and here Niels spontaneously (and for the first time) plays trills. At my suggestion he continues with trilled chords. Niels alternates left with right and does the same for the two fish that make electricity (d). With the angry fish expressed in clusters, Niels has covered all the figures. When I ask him whether this is all he answers: 'The water is still there and I can hear something else in the distance'. We review everything to see if there is something we can use again. So, Niels takes back the beginning and the notes of the trio which he rearranges into chords (e).

Analysis: The Merry Underwater World

Niels creates different spheres and moods and decides in which register these can be expressed. In arranging the trio he chooses the tones in such a way as to arrive at an ascending degree of complementarity and vibration. The question-answer arrangement brought about that Niels continues to rearrange notes, forms chiasmi and uses techniques such as transposition and retrograde motion in a playful way. In the middle section he creates a *stretto* with a successive series of events, a combination of different playing techniques and a climax expressing the angry fish. By reviewing the work, selecting and adding motifs, the final composition acquired an ABA-coda form.

Pedagogical process: Anger

A few weeks later Niels wants to express 'anger' in a composition. He plays a trill and a cluster and establishes the duration of the notes in seconds. I ask him what he should do with these components to continue the piece. He does more trills and clusters, but he also experiments with the order of both and with the duration. Spontaneously, he lets the various trills flow out into motifs (a, b). Then Niels appears to start messing about. I ask him what he is doing and he explains. I don't understand his explanation, so I ask him to repeat it whilst I put it on tape. Listening to the tape, I note it down (c), analyse it and transpose it into numbers for the sake of greater clarity (d).

Analysis: Anger

In *Anger*, Niels creates tension with clusters and trills in the low register. After that he creates a climax with an arithmetical system and consciously applies the following playing factors: responses between a and b on 4–3–2–1/8–7–6–5 and ‘proportional’ anticipation. At the level of the third anticipation each motif divides; a responds on a and b responds on b. The responses are resumed in the same way for each motif on its own, while the anticipation continues. The playing factors also contain a great many components of which Niels himself is not aware: a constant figure; 4 always stays on 5 and 1 on 8. Every five beats, b ↓ responses to a ↑ and vice versa. The responses between b and a ↓↑ give a row of alternately two and three beats which, musically, represents the *aksak* rhythm. Between the anticipation (y) and the original groups (x) there is a polyrhythm (with the smallest common multiple every 30 beats, if developed further). The anticipations cause a horizontal expansion. The divisions cause a vertical expansion with an increase of tones every 15 beats (°).

Psychological reflection: The Merry Underwater World versus Anger

The creation of spheres and moods, with the accent on the angry fish, has evolved into the expression of an emotional tension. In converting the different elements into music Niels arranges the material in a systematic way. In *The Merry Underwater World* he looks for complementarity. In the trio we find it in the construction of sounds and the game he plays with the white and black keys, in the *stretto* in the right-left alternation of the hands and in the coda in the chord arrangement. In *Anger* his approach is numerical and he experiments with the order of the components. In both pieces Niels has created a *stretto* in an organic way, with a densification of sound and movement. While in *The Merry Underwater World* a *stretto* is inherent to the story, in *Anger* Niels creates a *stretto* by means of an algorithm. The musical interpretation has evolved from visual and rudimentary to abstract and sophisticated. In terms of his playing skills, Niels has both extended his boundaries and gone beyond the limits of his capabilities. Immersing himself in his underwater world he uses his natural abilities (video 3). However, in *Anger*, because of the complexity of the algorithm, the performance is only suitable for more advanced pianists (♯ 1).

Conclusion and suggestions

The individual case studies cited in the present article demonstrate that composing by means of visual expression has an influence on children’s subsequent compositional processes. As they abstract from their drawings and stories children construct an inner world of sound drawn from their imagination. In experimenting with a series of musical parameters, children manipulate the material in accordance with a visual representation of their ideas. In this way, they make their own motifs or building blocks that they can use to construct music. The motifs relate to individual figures from drawings and stories and are mainly formed on the basis of empathy, personification and imitation. Using the structure of the story children learn to relate the motifs in a structural way and are challenged to find ways of doing this. The results that emerge from the interaction with the teacher and/or the

child's spontaneous input are surprising: in the compositions we see how 'time' is expressed numerically; how 'chaos' is systematically ordered; how registers and pitches become 'means of communicating'; how motifs are systematically varied by means of chiasmi; how chiasmi are formed from the structure of the keyboard and the child's motor skills; also, how techniques such as transposition and retrograde motion are applied in a playful way.

Mak and Jansma (1995) refer in their work to the comparability of narrative structures with musical form diagrams. Form diagrams create expectations regarding the musical events still to come and offer the composer a context for musical invention and innovation. But also the structures of both drawings and linked stories⁵ create expectations with respect to the interpretation of musical phenomena and provide children with a context for musical invention and innovation. In this way children learn to create their own form diagrams. Likewise, drawing and story-telling enables children to learn to compose in a more holistic manner. This is very evident in the composition *Do* which was composed from the overall structure of the story and in the composition *Choral* whereby the overall structure was derived and understood from the composition *The Time Clock*. Therefore, the examples can contribute to the problem of 'gestalt-like' versus 'note-by-note' composing, to which Barrett (1998a) refers.

From the transformation process the child has understood that musical material can be manipulated and ordered on the basis of non-musical phenomena and skills. As children compose on their own they create a new context, which might contain new, non-musical references or might be primarily musical. The musical material, newly invented or originating from 'visual composing', is already structured because the child has (consciously or intuitively) transferred his or her playing strategies from the transformation process. The playing strategies have now taken on a more complex and more sophisticated form, something that is reflected in the abstract nature of the compositions. This is an indication that now the child's imagination is focused on structure and that the child limits the material so as to be able to work with it. In *Do*, the game rules are not just rules of the game but guidelines to compose and the imaginary playing field is structured by using the structure of the keyboard. In *Anger*, a 'musical algorithm' is created with eight notes. Although the child's explanation was vivid, it was not clear to me that it was an algorithm. I had to discover it later. This accords with Barrett (1998b) who argues that form and structure are the means by which non-formal and extra-musical meanings are presented. It also shows the importance of observing the relationship between children's acting and verbally communicated meanings whilst composing (Barrett, 1998b; Sundin *et al.*, 1998; Glover, 2000; Burnard & Younker, 2004). Furthermore, a link can be made with the algorithmic composing of adults (de Ruiter, 1993). In *Chorale* the triads are structured at the level of purely musical imagination and the child has gone beyond the need for a non-musical reference.

Children's emotional connection to their own work is manifested in a spontaneous, expressive performance, in which they show great concentration, and which takes them to the limits of their abilities. This concurs with Sloboda (1995) that intrinsic motivation helps to establish links between structure and emotion, which are the key to spontaneously expressive performance. An additional finding is that children's ideas can be of a complexity that surpasses their own performance skills.

Further research might demonstrate the value of this study in terms of promoting a (piano) teaching method which opens the door to composition by using the child's own

world of imagination and perception. The examples given above show how children learn to think in a problem-solving way, from a synergy and synaesthesia of their capacities and skills. More than abstracting from their drawings and stories children are able to abstract from a learning process – an evolution to self-regulated learning.

In designing tasks both children's individuality and unpredictable outcomes can be included (Burnard, 1995; Burnard & Younker, 2002). Winters (2012) expresses that composing activities are inextricably linked to other areas of musical activity. Here we see how composing activities are inextricably linked to areas of non-musical activity. Moreover, the compositional strategies children use are further confirmation of the view that musical thinking, conceived as structural thinking, is related to other ways of thinking such as narrative thinking, as well as mathematical and visual thinking as is apparent in the work of Reybrouck (2001, 2002, 2007).

This study shows children's ability to learn to understand music from a trans- and interdisciplinary context and from symbolic thinking and this is consistent with Langer's (1953) vision of 'meaning-making in the human mind through the power of 'seeing' one thing in terms of another'.

Supplementary Material

To view supplementary material for this article, please visit <http://dx.doi.org/10.1017/S026505171500025X>

Notes

- 1 Examples in Roels and Van Petegem (2014).
- 2 Encouraged by her parents, who are not musicians themselves, Tara came to my piano class two weeks before the age of nine. Here she got her first piano lessons and made her first compositions (individually and in small groups). She remained in my class until the end of her studies, which encompassed a time period of about nine years, and evolved beautifully in her playing and composing skills (Roels, forthcoming).
- 3 Jef came to my piano class at the age of nine. Here he got his first piano lessons and made his first compositions (individually and in small groups). He was familiar with folk dancing because his father was playing in a folk dance group. He himself had a preference for bagpipes and learned to play them. Jef remained in my class until the end of his studies, which encompassed a time period of about nine years, and evolved beautifully in his playing and composing skills (Roels, forthcoming).
- 4 Niels came to my piano class at the age of nine. Here he got his first piano lessons and made his first compositions (individually and in small groups). He remained in my class until the age of 15. Noteworthy is that most of his compositions were influenced by mathematical thinking (Roels, forthcoming).
- 5 Narrative structure and musical structure can also occur simultaneously during the interaction as in *The Merry Underwater World*. As a result, the composition leans strongly towards a written improvisation.

References

- APAGYI, M. (2006) *Zongoráalom. Kreatív zongoratanulás I* [Piano Dream. Creative Piano Playing]. Budapest: Hanga Kiadó.

- BARRETT, M. (1997) Invented notations: a view of young children's musical thinking. *Research Studies in Music Education*, **8**, 2–14.
- BARRETT, M. (1998a) Researching children's compositional processes and products: connections to music education practice? In B. Sundin, G. E. McPherson and G. Folkestad (Eds), *Children Composing* (pp. 10–34). Lund: Lund University.
- BARRETT, M. (1998b) Children composing: a view of aesthetic decision-making. In B. Sundin, G. E. McPherson & G. Folkestad (Eds), *Children Composing* (pp. 57–81). Sweden: Lund University.
- BJØRKVOLD, J.-R. (1992) *De Muzische Mens. Het kind en het lied – spelen in alle levensfasen* [The Child and the Song]. Rotterdam: Ad Donker.
- BOULEZ, P. (1989) *Le pays fertile. Paul Klee* [The Fertile Land]. Paris: Gallimard.
- BURNARD, P. (1995) Task design and experience in composition. *Research Studies in Music Education*, **5**, 32–46.
- BURNARD, P. & YOUNKER, B. A. (2002) Mapping pathways: fostering creativity in composition. *Music Education Research*, **4**, 245–261.
- BURNARD, P. & YOUNKER, B. A. (2004) Problem-solving and creativity: insight from students' individual composing pathways. *International Journal of Music Education*, **22**, 59–76.
- BURNARD, P., KELLY, E. & BIDDULPH, J. (2010) Mapping the creative journeying in practitioner research. In M. Khine & I. Saleh (Eds), *Practitioner Research. Teachers' Investigations in Classroom Teaching* (pp. 1–15). New York, NY: Nova Science Publishers.
- COOPER, B. (2009) *Child Composers and their Works: A Historical Survey*. Lanham, MD: Scarecrow Press.
- DAVIDSON, L. & SCRIPP, L. (1988) Young children's musical representations: windows on music cognition. In J. A. Sloboda, (Eds), *Generative Processes in Music: The Psychology of Performance, Improvisation, and Composition* (pp. 195–230). Oxford: Clarendon.
- DE BRA, A. (2007) *Muzirama. 4123 piano-pedagogische boeken* [Piano Teaching Books]. Brecht: De Bra.
- FOLKESTAD, G. (1998) Music learning as cultural practice: as exemplified in computer-based creative music-making. In B. Sundin, G. E. McPherson & G. Folkestad (Eds), *Children Composing* (pp. 97–134). Lund: Lund University.
- GLOVER, J. (2000) *Children Composing 4–14*. London: Routledge.
- KRATUS, J. (1989) A time analysis of the compositional processes used by children ages 7–11. *Journal of Research in Music Education*, **37**, 5–20.
- KURTÁG, G. (1979) *Játékok I zongorára*. [Games]. Budapest: Editio Musica Budapest.
- LANGER, S. K. (1953) *Feeling and Form: A Theory of Art Developed from Philosophy in a New Key*. New York: Scribners.
- MAK, P. & JANSMA, M. (1995) *Compositie en improvisatie* [Composition and Improvisation]. In F. Evers, M. Jansma, P. Mak, & B. de Vries (Eds), *Muziekpsychologie* [Music Psychology] (pp. 81–104). Assen: Van Gorcum.
- MIRKOV-STES, M. (2012) *Klavirska Kefalica* [Piano Thoughts for Kids]. Subotica: Danilo Kis.
- REYBROUCK, M. (2001) Over de relatie tussen muziek, wiskunde en beeld [About the Relationship between Music, Mathematics and Image]. *Wiskunde & Onderwijs* [Mathematics and Education], **27**, 276–295.
- REYBROUCK, M. (2002) Logico-mathematisch denken tussen abstractie en aanschouwelijkheid: het verband tussen wiskundig, plastisch en muzikaal denken. [Logical-mathematical thinking between abstraction and representation. The relationship between mathematical, plastic and musical thinking]. *Wiskunde & Onderwijs* [Mathematics and Education], **28**, 126–146.
- REYBROUCK, M. (2007) Met open oren. Onderzoekend luisteren naar muziek [With open ears. Exploring listening to music]. *Cahiers van didactiek*, **21**. Mechelen: Plantyn.
- REYBROUCK, M., VERSCHAFFEL, L. & LAUWERIER, S. (2009) Children's graphical notations as representational tools for musical sense-making in a music-listening task. *British Journal of Music Education*, **26**, 189–211.

- ROELS, J. M. (2002) *Kinderen op vleugels* [Children on Wings]. Antwerp: Metropolis Music Publishers.
- ROELS, J. M. (forthcoming) *Kinderen op vleugels 2. Analytisch Praktisch Werkboek* [Children on Wings 2. Analytical Practical Workbook]. Antwerp: Metropolis Music Publishers.
- ROELS, J. M. & VAN PETEGEM, P. (2014) The integration of visual expression in music education for children. *British Journal of Music Education*, **31**, 297–317.
- RUITER, W. DE. (1993) *Compositietechnieken in de twintigste eeuw* [Compositional Techniques in the Twentieth Century]. Haarlem: De Toorts.
- RUNZE, K. (1971) *Zwei Hände – Zwölf Tasten Band 1. Ein Buch mit Bildern für kleine Klavierspieler* [Two Hands-Twelve Keys]. Mainz: Schott Verlag.
- SLOBODA, J. A. (1995) Talent, motivatie, oefening en succes [Talent, motivation, exercise and success]. In F. Evers, M. Jansma, P. Mak & B. de Vries (Eds), *Muziekpsychologie* [Music Psychology] (pp. 27–40). Assen: Van Gorcum.
- SUNDIN, B. (1998) Musical creativity in the first six years: a research project in retrospect. In B. Sundin, G. E. McPherson & G. Folkestad (Eds), *Children Composing* (pp. 35–56). Lund: Lund University.
- SUNDIN, B., MCPHERSON, G. E. & FOLKESTAD, G. (1998) *Children Composing*. Lund: Lund University.
- SWANWICK, K. & TILLMAN, J. (1986) The sequence of musical development: a study of children's composition. *British Journal of Music Education*, **3**, 305–339.
- VAN MANEN, M. (1990) *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*. London, Ontario: Althouse.
- WEBSTER, P. R. (2002) Computer-based technology and music teaching and learning. In R. Colwell & C. Richardson (Eds), *The New Handbook of Research on Music Teaching and Learning* (pp. 416–439). Oxford: Oxford University Press.
- WINTERS, M. (2012) The challenges of teaching composing. *British Journal of Music Education*, **29**, 19–24.

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