Invented Notations: A View of Young Children's Musical Thinking

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Abstract

The research reported in this article describes some of the ways in which young children use idiosyncratic symbols (invented notations) to encode their compositional experiences in music. These symbols may be viewed as vehicles for conveying meaning and are precursors to the development of the culturally agreed symbol systems of the adult literate world. The investigation was naturalistic in design and focused on children's individual responses to simple compositional tasks completed in an early childhood setting. A number of categories of symbolisation emerged from the data collected, suggesting that as children become more experienced in encoding their responses, their recordings become less context-bound and more concerned with ideas and concepts.

Introduction

The research reported in this article describes some of the ways in which young children use idiosyncratic symbols (invented notations) to encode their compositional experiences in music. These symbols may be viewed as vehicles for conveying meaning and as precursors to the development of the culturally agreed symbol systems of the adult literate world. Importantly, such symbols may be viewed as an indication of the dimensions of children's musical thinking, and a representation of musical knowledge. In support of such a view, Davidson and Scripp assert that "...in music, as in language, the ability to represent relationships among elements in various ways is a more powerful measure of understanding than relying on performance or speech alone" (1988, p. 195).

In developing our understanding of children's musical thinking a number of researchers have focussed their investigations on the study of children's compositional processes (see, for example, Bunting, 1987, 1988; Burnard, 1995; Delorenzo, 1989; Hogg, 1994; Kratus, 1989, 1991, 1994, 1994a; Marsh, 1995; McMillan, 1990; van Ernst, 1993; Wiggins, 1994) and products (see, for example, Davies 1986, 1992, 1994; Green, 1990; Loane, 1984; Salaman, 1988; Simmonds, 1988; Swanwick & Tillman, 1986; Swanwick, 1988, 1991, 1994; Tillman, 1989). In other approaches to the study of children's musical thinking, a growing body of researchers have focused their investigations on the study of children's notational processes and products as they seek to record their own, or others' musical structures.

The Study of Children's Invented Notations

Many studies of children's methods of symbolically representing or notating musical experience have focussed on children's attempts to notate adult generated musical structures (Bamberger, 1982, 1991, 1994; Cohen, 1985; Davidson & Colley, 1987; Davidson & Scripp, 1988, 1989, 1992; Davidson, Scripp & Welsh, 1988; Gromko, 1994; Smith, Cuddy & Upitis, 1994; Upitis, 1987, 1990). Within these studies, the musical material provided for the children has included: rhythms clapped by the researcher (and in some instances 'confirmed' by the children echoing the rhythm) (Bamberger, 1982, 1991, 1994; Davidson & Colley, 1987; Upitis, 1987); rhythms presented to the children via drum machine (Smith, Cuddy & Upitis, 1994); 'researcher-devised' tunes performed by the researcher on four separate instruments (Cohen, 1985); an unfamiliar folk-song taught to and reproduced by the subjects through singing and playing (Gromko, 1994); sung performances (pre-recorded, and sung by the subject) of familiar tunes such as Row, Row, Row Your Boat and Happy Birthday (Davidson & Scripp, 1988, 1989, 1992; Davidson,
Scripp & Welsh, 1988); and an instrumental performance (piano) of a familiar and unfamiliar melody (Upitis, 1990).

To summarise, these studies have required children to notate melody, or rhythm isolated from melody, as presented in researcher-generated musical structures. The notational data that has been generated from such tasks have been collected in a range of settings including naturalistic classroom settings (Bamberger's work), standardised clinical interview (Upitis' 1987 study) and individual sessions conducted within the context of the school setting (Gromko, 1994). The children involved in the studies described above have ranged from kindergarteners (Gromko, 1994) to adolescents and adults (Smith, Cuddy & Upitis, 1994), and subjects have been selected for both musical experience and musical naivety.

Significantly, fewer studies have focussed directly on children's methods of symbolically representing or notating their original compositions (Borstad, 1989; Christensen, 1992; Upitis, 1987a, 1987b, 1990a, 1992), tasks in which children have more latitude in choosing and organising the musical dimensions they wish to record (pitch, rhythm, dynamics, instrumentation). These studies have included both small group (Christensen, 1992) and individual composition tasks (Upitis 1987b) and tasks completed within naturalistic school settings and non-school settings. Upitis' case study of a 5 year old boy's notational development through composition recorded Joel's musical output as collected in the subject's home and/or the researcher's office. The music experience of subjects within these studies has included 'immersion' in a rich music-making home environment (Upitis, 1987b) and involvement in general music classes within a school setting (Christensen, 1992). Music materials made available to subjects in these studies have included traditional (Christensen, 1992) and nontraditional (Borstad, 1989) melodic and percussion instruments, piano (Upitis, 1987b) and MIDI keyboard (Upitis, 1992).

Categories/Typologies of Children's Invented Notations

From the studies of children's invented notations of both researcher-generated and original compositions, a number of categories or typologies of children's invented notations have arisen. For example, Bamberger's 1982 study of children's drawings of simple rhythms has led her to propose two general 'types' of drawings, 'figural' (drawings that indicate the shape of the musical phrase) and 'metric' (drawings that record the precise duration of musical events). Bamberger found that figural drawings are the dominant method of representation used by young children (aged between six and seven years) and musically naive adults, whilst children and adults with musical training tended to represent the 'metric' features of a rhythm. (It is interesting to note that in a partial replication of Bamberger's study, Upitis worked with children aged between seven and twelve years and found that children tended to move between figural and metric rhythmic responses depending on the nature of the task (symbolic, motor, aural) presented to them (1987, pp. 75 - 76)). Bamberger suggests that the type of drawing used in representing a rhythm reveals the ways in which subjects 'hear' that rhythm (1994, p. 136) and is indicative of a musical thinking style rather than a developmental progression in which figural representations are viewed as inferior to metric representations. This notion is supported by recent research conducted by Smith, Cuddy, and Upitis (1994, p. 131).

However, Bamberger does suggest some developmental progression in notational strategies and identifies symbolic representations that precede the appearance of figural and metric representations. These are described as 'primitives' or 'rhythmic scribbles' (Bamberger, 1982, pp. 195 - 196). Included in this type are variations such as a sketch of the 'instrument' (e.g., two hands), a classification that Hildebrandt describes as 'iconic' (1987, p. 88). Bamberger also identifies early versions of the figural-metric distinction as 'played drawing' or 'pre-figural' drawings, (1982, p. 198) in which the correct number of sound events are apparent in the symbol. These earlier classifications of 'rhythmic
scribbles' and 'pre-figural drawings' may be related to Goodnow's (1977) 'action equivalents' of rhythmic sequences.

Davidson and Scripp propose a typology of children's invented notations that draws on Bruner's representational types (1973) of 'motor actions', 'images' and 'language systems'. Davidson and Scripp (1988, 1989) suggest that children move progressively from the notational strategy of enactive scribbles that 'capture the action of the piece' to pictorial images, rebus or strings of icons that represent the song including lyrics, storyline, and rhythmic pulse (evident in the work of five to six year olds), to invented or adopted symbol systems (including abstract symbols and words) that code rhythmic or pitch dimensions (evident in the work of seven year olds). Davidson and Scripp (1988) suggest that children use five distinct types of notation: pictorial; abstract patterning; rebus; text; and combination (it should be noted that the use of text largely draws on the textual features of the song lyrics, rather than additional 'instructional' material). The identification of these types has emerged from Davidson and Scripp's descriptions of young children's progressive attempts to notate familiar songs. They maintain that what the child "...considers focal in her understanding is revealed by what she includes and excludes in her notation" (1992, p. 399).

Despite the differences in methodology and the musical dimensions recorded by the children in the above studies (rhythm alone in Bamberger's work, rhythm, pitch and dynamics in Davidson & Scripp's work), parallels may be drawn between the typologies developed by Bamberger and Davidson and Scripp. Both typologies identify 'action equivalents' or 'enactive' categories in which the focus of the representation is the 'playing out on paper' of the rhythmic dimension of the musical structure. Whilst Bamberger does not focus specifically on 'iconic' or pictorial representation, one of the variations of her type 'rhythmic scribbles' (pictorial representation of the instrument) shares some characteristics with Davidson and Scripp's pictorial category (pictorial representation of textual features of the song). Davidson and Scripp's category of invented or adopted symbol systems in which abstract symbols are used to denote rhythmic and pitch dimensions may also be related to Bamberger's main types of figural and metric representations.

Upitis' study of children's notations of their original compositions has confirmed that children draw on 'a vast variety of symbol' in recording their original compositions, including "...conventional letters, numbers, and explicit written instructions, as well as their own icons, pictures, directional symbols, and ways of balancing symbols with blank space" (1990b, p. 154). In addition, children's notations may include conventional music symbols used in traditional and non-traditional ways, and colour coding of sounds (Upitis, 1990).

Upitis (1992) draws on the philosophy/methodology of whole language practitioners such as Graves (1983) and Wells (1986) to argue that children may develop facility with music symbols in much the same way that they move from the 'invented spelling' of early writing to the conventions of written language. Upitis observes that children initially demonstrate some knowledge of musical symbols although correct sound-symbol correspondence is not apparent, suggesting that children are using the conventional symbols as 'pictures' (a form of musical 'invented spelling'). As they become more experienced, the children in Upitis' study progressively incorporated symbols to represent sound units, then symbols to represent melodic or rhythmic features of sounds, eventually arriving at notations that approximated features of conventional western music notation. It should be noted however, that such an approach pre-supposes exposure to conventional music notation and immersion in an environment in which such notations are used for a range of purposes in a context that holds significant meaning for the children involved (Barrett, 1991). It is interesting to note that Upitis' work has taken place in rich music learning settings where such issues are addressed.

Upitis suggests that factors that influence children's notations include the nature of the piece and the instrumentation (1990b, p. 154), with those aspects that the child...
considers most important in the composition (for example pitch) assuming the most
prominent place in the notation. In addition, Upitis suggests that knowledge of the
intended 'reader's' knowledge of notation influences symbol choice (1990, p. 103), as does
prior musical training (1992, p. 42). Other factors that may influence children's
compositional processes and products, and therefore the notations that arise from such
processes and products include: the nature of the compositional task (free or structured);
the time allocation set for the task (strict or flexible time limit); familiarity with the task
(prior compositional/notational experience); and the perceived sense of purpose or
relevance of the task (relationship of the task to the subject's school / music experience)
(Barrett, 1995). Upitis (1992) suggests that this latter factor, sense of purpose or
relevance, is highly influential as children are more likely to explore and use music
notations when they consider the musical outcome to be of personal value.

Whilst Upitis' work provides a comprehensive view of the notational
development of children in a rich musical setting as they move progressively from
invented notations to the conventions of western music notation, there is little reference
to the notational patterns of children who are not exposed to such a rich musical setting.
Upitis' views concerning the parallels between children's acquisition of written language
and conventional western music notation are based on the work of children who "...have
been exposed to music symbols" (1992, p. 58). In addition, much of Upitis' work in
school settings has focussed on the notational output of children aged from seven years
and above, and there is little reference to the notational output of younger children.

When we view children's invented notations as an indication of the dimensions of
their musical thinking and a representation of musical knowledge, rather than as an
interim stage in the progression toward conventional western music notation, a different
view of young children's notational strategies may emerge. With this in mind a study
was undertaken in which the invented notations of musically naive kindergarten
children's original compositions were collected and analysed.

**Research Design**

The research was naturalistic in design and focussed on the collection of data
(notational and observational) within a normal kindergarten classroom setting (Casey,
1992, p. 120).

**Setting**

The study was conducted in a kindergarten with all children enrolled in a
program of four half day sessions (morning) per week. The kindergarten is part of a
district school (K-10 campus, population approximately 750 students) situated in a small
rural town twenty-two kilometres from the nearest city centre. The school community is
comprised of a heterogeneous socio-economic mix.

The kindergarten is staffed by a full-time teacher and one teacher's aide. Children
are encouraged to take responsibility for decisions concerning their participation in
classroom activities, although at times the teacher directs individual children to participate
in activities offered within the kindergarten. This was not a strategy employed by the
researcher during the study and children's participation in the composition/notation
experiences offered by the researcher was always voluntary.

**Participants**

At the time of the study twenty children were enrolled in the kindergarten (nine
boys and eleven girls) encompassing an age range of four years ten months to five years
nine months. All of the children involved in the study may be classified as musically
naive in that none of the children had participated in private music tuition. The school
music experiences of the children were limited to group singing and some associated
movement games. Children in the kindergarten had access to a listening centre and a
tape collection consisting of popular nursery songs and commercial collections of popular
and rock music. None of the children in the group had received prior experience working
with classroom percussion instruments, nor had they any prior experience of composition or music notation. However, all children were familiar with the notion of recording ideas in the contexts of language and maths.

The Researcher's Role

It is a characteristic of naturalistic inquiry that the researcher becomes the primary instrument of data-gathering. In Lincoln and Guba's view, the 'human' instrument is able to combine responsiveness and adaptability, with the ability to recognise values, both within the 'instrument' and the research setting (1985, p. 40). The researcher's role during the study was that of a 'participant observer' in Adler and Adler's sense of an 'active membership role' in which the researcher becomes "...involved in the setting's central activities..." (1994, p. 380). Consequently, the researcher interacted with the children as they worked at the composition/notation tasks, made observations of the nature of children's participation in the task, and annotated the notations completed by the children.

The Method

The researcher visited the site once a week over a period of eight weeks during the final term of the school year. Visits commenced at the beginning of the kindergarten session on Monday mornings, and were of two hours duration (until the children's recess at 11am). The instruments and recording materials (cartridge paper and oil pastels) used during the study were set up in a comfortable corner of the room at the beginning of the kindergarten session. Instrumental resources included: agogo bells, triangles, claves, cabasa, tambour, sleigh bells, tone-block, castanets, and maracas.

Children initiated the music experiences by moving to the music area and choosing an instrument. Although there were sufficient instruments and room for four or five children to work simultaneously, generally the maximum number of children working at any one time was three. Participation in the composition/notation tasks was voluntary and the children regulated the amount of time spent on the tasks. Due to absences from school/class not all of the children enrolled in the kindergarten completed the task. Over the period of the study a total of fifty-two notations were collected from sixteen children. Of these sixteen children, one child completed seven notations, three children completed five notations with the remaining children completing between one to three notations each.

Instructions

At the commencement of each music interaction children were invited to explore the instruments. As none of the children in the class had previous experience with musical instruments some exploration/familiarisation experiences were considered essential. Initially children were encouraged to engage in 'question and answer' exchanges using the instruments. Through these exchanges the researcher modelled ways of producing sound on the instruments, and addressed the musical elements of dynamics, duration, pitch, and timbre. These exchanges were not rhythmically organised into specific metres or phrase lengths. This procedure of familiarisation with the musical possibilities of the sound resources available is consistent with parts one and two of Webster's Measure of Creative Thinking in Music (MCTM) (Webster, 1987a). In this measure children focus initially on issues of 'exploration' and 'application' in order to become familiar with the instruments used in the measure and the musical parameters of high/low, fast/slow and loud/soft (Webster, 1987, p. 170).

After the exploration and familiarisation experiences, children were asked to 'compose, or make up' a pattern of sounds. (Children were familiar with the notion of pattern from work completed in the area of maths) Subsequently they were asked to 'find a way of writing down the pattern' so that they could remember it (the intended reader was the child). On completing this task children were asked to perform the pattern again. As each child completed a notation these were collected and annotated. From an
analysis of these notations in conjunction with the observational records collected during the development of the notations, the following categories have emerged.

**Categories of Symbolisation**

1. **Exploration**

A number of notations consist of random 'drawings' in which there is little discernible relationship between the sound event, and the recording of that event (Figure 1 - John).

![Figure 1 - John: Drum](image)

2. **Representation of instrument**

A number of notations consist of simple representations or sketches of the instrument (Figure 2 - Shaun).

![Figure 2 - Shaun: Agogo Bells](image)

In one case, the child's strategy for recording was to trace around the instrument, a strategy she employed every time she completed the task, (five in total) (Figure 3 - Sabrina).

![Figure 3 - Sabrina: Tambourine](image)
3. Representation of instrument with some reference to musical elements
A number of notations consist of a series of sketches of the instrument with some modification to indicate one of the musical parameters of pitch, dynamics, or duration (Figure 4 - Caitlin, Figure 5 - Belinda).

![Figure 4 - Caitlin](dynamic change is indicated through varying size of the sketch)

Figure 4 - Caitlin
![Figure 5 - Belinda](changes in pitch are indicated through varying size of the sketch)

Figure 5 - Belinda: Agogo Bells

4. Representation of gesture
A number of notations were produced as a result of imitating on paper the gestures involved in performing the pattern. For example, a pattern of alternating tremolos and single strikes on the maracas was depicted as a jagged line, followed by a series of dots, recorded as a result of imitating the gestures used to produce the sounds (Figure 6 - Laura). Consequently, the focus of the notation appears to be duration of sound.

![Figure 6 - Laura](Maracas)

Figure 6 - Laura: Maracas

5. Symbolic representation
A number of notations consist of patterns of symbols (lines, circles, dots, triangular shapes) each representing discrete sounds, showing a one-to-one correspondence between sound and symbol (Figure 7 - Frances).

![Figure 7 - Frances](Agogo Bells)

Figure 7 - Frances: Agogo Bells
As a variation on this strategy an abstract symbol may be varied in size in order to represent changes in dynamics and/or pitch. In some instances colour coding was also used to indicate changes in pitch.

In addition to the above categories, one child drew a pattern of alphabetic letter names in which the letter 'W' always represented the rhythmic pattern of paired quavers and a crotchet. All other letter names represented single crotchets (Figure 8 - Emma). This child appeared to be using the letter names as a mnemonic device, a strategy that she used on each occasion that she completed the task. On being asked to read and perform notations from previous weeks, her decoding strategy was always consistent.

![Figure 8 - Emma: Claves](image)

Generally, when children were asked to play their sound event from the notation, there was a significant correspondence between the original event and the post-notation performance. This may be attributed to the children's capacity to remember the sound event, rather than their ability to decode their notation. However, in one case a child collected her notation from a previous session (two weeks before), selected the instrument originally used (cabasa), and performed the rhythm accurately. On completion of this performance, she commented “But I can play it on this as well”, and performed the rhythm on a different instrument. This child seems to have acquired the notion that representation of sound patterns may exist independently of the context in which they were originally produced.

**Interpretation**

A range of interpretations may be developed concerning the emerging categories described above. For example, those notations that are placed in the first category, (Exploration) suggest that the child has made a connection between the sound event and the act of symbolisation, however, it is difficult to establish this with any certainty from examination of the notation alone.

Those notations placed in the second category, 'Representation of instrument', in which the symbolisation consists of a pictorial representation of the instrument used, indicate that these children are able to relate the sound event and the instrumentation to the process of recording that event. However, there is little evidence in these notations that these children are able to record any of the musical parameters of that sound event beyond that of instrumentation. This suggests that, for these children, instrumentation is the most important dimension of their work.

Those notations placed in the third category, 'Representation of instrument with some reference to musical elements' may be seen as a development beyond the simple depiction of the instrument. In these notations, a common strategy employed was to sketch the instrument a number of times, varying the size of the representation (see Figures 4 & 5) in order to record another musical dimension such as dynamics or pitch. For these children, the method of recording the sound event displays an awareness of a range of dimensions of sound (duration, dynamics, pitch and instrumentation), and a desire to record these in some way. In this category of notation, a clear one-to-one correspondence between sound and symbol was evident.
Whilst the fourth category suggested above may be seen as a focus on symbolising the physical act of producing the sound rather than a focus on symbolising the sound itself, this should not necessarily be construed as a less sophisticated 'hearing' or 'reading' of the music/symbolisation act. There is some correspondence between this strategy and notational strategies used by contemporary adult composers. For example, the notation of artificial harmonics is derived from a depiction of the action needed to produce the sound, rather than a depiction of the sound itself. This is achieved by referring to the placement of fingers on the instrument, rather than the identification of specific pitches. However, whilst children who have recorded in this way seem to display an understanding of differences in sound quality, it is not clear if their intention was to record the musical dimension of the sounds (duration) or the action by which the sounds were produced. However, a clear one-to-one correspondence between sound and symbol was evident in these notations.

The final category described above in which children employ discrete symbols to record their compositions, indicates a progression of musical thinking. Children employing this strategy appear to have grasped the notion that the intangible element of sound may be represented in two-dimensional form by a series of non-pictorial symbols. For these children the musical qualities of the sound event were a focus of the notation, as they attempted to record patterns of sound in which variation in these qualities was demonstrated, and a clear one-to-one correspondence between sound and symbol was evident. A small number of the notations placed in this category conform to Bamberger’s ‘figural’ classification, a ‘type’ of drawing that Bamberger considers to be most common in the work of six - seven year olds. Interestingly, in this study, this type of representation occurred in the work of children aged from four years ten months to five years nine months.

Whilst a small number of children consistently used the same means of notating their compositions throughout the period of the study (for example, both Emma - Figure 8, and Sabrina - Figure 3, appear to have ‘discovered’ a strategy and used that strategy consistently) many children used several strategies for notating over the period of the study, and in some instances combined strategies in a single notation. For example, on the same day, Frances completed a gestural or 'enactive' notation of a composition for maracas, and produced a second notation of a composition for claves that combined 'enactive' symbols, representation of instrument, and directional lines to indicate the method of playing the instrument. In subsequent weeks Frances produced a notation of a composition for agogo bells in which abstract symbols were used to represent a repeating pattern of alternating pitches.

Conclusion

A number of categories of symbolisation have emerged from the data collected and some of these categories correspond to those identified in the literature. For example, various researchers (Bamberger, 1982, 1991, 1994; Davidson & Scripp, 1988, 1989, 1992) have commented on forms of 'enactive' or 'action equivalent' notations, and suggest that this type of notation is characteristic of the work of children aged approximately six years. It is interesting to note that whilst a number of children in the present study have used 'enactive' notations this is not the only strategy evident in individual children's work (see Frances' work).

Those notations in which children have depicted the instrument may be seen to correspond to Bamberger's classification of 'primitives', or 'iconic' symbols, and to a lesser extent to Davidson and Scripp's 'pictorial' images where pictures are derived from the libretto of the song. However, it is interesting to note the modifications enacted on these pictures by some children in the present study in order to represent musical dimensions beyond instrumentation. The symbolic representations developed by children in this study, where children use discrete symbols to represent the rhythmic features of a sound
event may be seen to correspond to Davidson and Scripp's invented or adopted symbol systems (1989, p. 63).

Upitis reminds us that children draw on 'a vast variety of symbol' in recording their original compositions, using conventional letters, numbers, explicit written instructions, icons, pictures, directional symbols, ways of balancing symbols with blank space, conventional music symbols and colour coding. It is interesting to note that, with the exception of Emma's appropriation of letter names as a mnemonic device, none of the children in this study used numbers, written instructions or conventional musical symbols. These children's lack of exposure to conventional music notation may account for the absence of such symbols in their work. However, the absence of words and numbers is less easily accounted for as all of the children had been exposed to both written language and numbers, and were able to use these symbols as evidenced in their recording of names, and in some cases, ages, on their notations. It may be speculated that these children viewed the development of symbols for the notation of musical sound as a separate symbol system, rather than one in which existing symbols may be appropriated for different uses.

These children's lack of experience in exploring instrumental and vocal sounds, and compositional and notational tasks may account for some of the limitations in their symbol choice. Yet, despite the more limited repertoire of symbols evident in these children's work, the analysis of the ways in which these children have used symbols to record their compositional ideas reveals that their musical thinking is complex and demonstrates an understanding of a range of musical dimensions including instrumentation, pitch, duration, and dynamics.

Whilst there are some parallels between the patterns of notation identified by Upitis (1992) and those evident in the work of the children involved in this study, it would be misleading to overly emphasise these links. Upitis' work is predicated on the notion that children have been exposed to conventional western notation and are moving progressively from 'invented' forms of notation to more conventional usages. The categories of symbolisation that have emerged from this study demonstrate that, despite a lack of exposure to musical notation in any form, these children demonstrated an understanding of the need for and purpose of musical notation, and were able to invent personalised symbol systems that recorded a range of musical dimensions.

A preliminary analysis of the data suggests that as individual children become more experienced, their recordings become less context-bound and more concerned with musical ideas and concepts. This is evident in those notations in which children move beyond the simple representation of the instrument and choose non-pictorial symbols to represent their musical ideas. Cohen comments of the work of six year old children that they do not use notations as 'problem-solving tools', as symbol-meaning relationships change for children between encoding and decoding (Cohen, 1985, p. 194). It is interesting to note that in a number of examples contained within this study, children were able to 'read' their notations producing an accurate performance over a distance of a week and in some cases, longer periods of time. This suggests that children are able to establish and retain symbol-meaning relationships both within and across contexts.

Hargreaves maintains that children's drawings '...form a parallel symbol system whose explanation can shed light on musical development' (1986, pp. 94 - 95). In making judgements concerning children's musical thinking as revealed through their notations of musical structures we should examine the ways in which children notate their own compositions. Children have an immediate interest in their own compositions, as they evolve from their own experience. Furthermore, such works are directly revealing of children's musical understanding and ability to use the materials of music. It may be argued that children's notations of their own works provide a more accurate view of children's developing musical knowledge as such notations record those elements that are seen to be most important by the child. Whilst the notations collected during the course of this research project are limited in number, the range of response that is evident in the
work of this small group of 4 - 5 year old musically naive children suggests that we still have much to learn about children's musical thinking as evidenced in their notational strategies.

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