What Are We Going to Plant in the Musical Garden of the Early Years?

VERONIKA COHEN & MICHAL HEFER

Informal observations have suggested to the authors that very young children respond to and are challenged by exposure to complex music in an educational setting where the teacher serves as an intermediary between the child and the musical stimulation. In order to gain some insights as to how toddlers process complex music mediated by the teacher's activity, we analyzed the actions of several children and then describe in detail the responses of two toddlers who participate in a music program developed and taught by one of the authors, Dr. Michal Hefer. The complex music elicited concentration and rich movement reaction to the music. The movements of the toddlers suggest an unexpected level of sensitivity to underlying structure and subtle rhythmic changes, as well as a sense of preparation and arrival to climax.

This paper is based on observations conducted on videotaped segments of music lessons taught to infants and toddlers by one of the authors, Dr. Michal Hefer. In order to study infants' and toddlers' responses to complex music, a number of lessons in this ongoing music program were videotaped for the purpose of this (as well as future) study, with parental consent.

The musical curriculum described in this paper is based on two approaches that share basic beliefs about the nature of musical experience, musical cognitive development, and methodology: the approach of Edwin Gordon and one of the other authors of this paper, Veronika Cohen.

Shared Principles of the Two Methods

1. The primary goal of early music education should be to facilitate the development of musical cognitive skills—rather than the acquisition of familiarity with symbols (such as notation) or terminology or technical skills of performance. Gordon defines the cognitive process as "audiation"—the inner hearing of the music that guides all outward behavior (Gordon 1997a).
2. Young children are capable of dealing with music that is complex (in terms of duration, rhythmic, melodic, and timbral content) when such music is presented to them in an appropriate fashion; i.e. when they feel personally addressed by the musical events.
3. Children's creative thinking in all its manifestation (instrumental and vocal improvisation, unique movement and verbal responses to songs and compositions), must be encouraged and valued
4. The body is viewed as the source of musical thinking; therefore, movement is constantly used as a tool for teaching and encouraged as a means of self-expression on the part of the children.
5. Methodology: Children learn by both imitation and creation—therefore the learning environment needs to allow for both.

6. The teacher's role is to present musical challenges that encourage growth and development—musical material that is sufficiently challenging to encourage children to reach beyond their existing cognitive level.

Methodological Practices from Gordon (Gordon 1997a; Gordon 1997b; Gordon 1998; Valerio, Reynolds, Bolton, Taggart & Gordon 1998)

1. The use of songs with no text.
2. An early childhood music program usually includes songs, chants, and recorded music. However, there is a need to use natural singing when we interact musically with children. Through natural singing, we create a singing model for children; we can respond to their musical expressions and can navigate their singing abilities individually. Gordon states that: "Although typical children hear music through the media, and may even hear live music on occasion, adults need to sing to them as a mean of teaching them to use their singing voice, in the same way speaking to them provides a model in the use of their speaking voices" (Gordon 1997b, 6).
3. Use of vocal dialogue with individual infants (babbling, vocalization**)** using the infants' vocal utterances as a point of departure.
4. Chants/rhythms with and also without words to encourage development of rhythmic aptitude.
5. Use of complex rhythms: use of a variety of meters and rhythmic patterns in chants and songs. Use of complex rhythms: use of a variety of meters and rhythmic patterns in chants and songs.
6. Use of a variety of tonalities and modes in songs sung for children.
7. Movement activities according to the principal of Rudolf Laban (1971), focusing on time, space, flow, and weight.

Principles from Cohen **(**Cohen 1980; Cohen 1986/87; Cohen 1997)

1. Focus on grouping: awakening sensitivity to boundary points (phrasing). Grouping is created by means of rest points, and/or by means of comparison (i.e. searching for sameness or change).
2. Encourage sensitivity to a sense of direction, i.e. a sense of motion—moving up or down, away from or toward stability.
3. Focus on expectation—surprise.
4. Focus on perceived energy contour of music, i.e. the specific preparation-fruition-rest configuration of a given musical unit that is influenced by the presence or absence of effort, and the continuity or interruption in flow.
5. Use of musical mirrors as a way to communicate about complex music.
6. Musical mirrors are simple motions that unite musical gestures with their kinesthetic roots. The simple movement of the musical mirror provides a focus of attention for the listener and enables him/her to grasp aspects of the grouping, directionality, and energy flow of the music (Cohen 1997).
7. Musical mirrors are analogous to musical conversations in that they convey information, challenges to stretch the child, expand his cognitive world, but in a non-proscriptive way; the child absorbs in an intuitive fashion, both from a

> musical conversation and a mirror, the information that is appropriate to him at the particular moment. In terms of Vygotski's theories,[1] both the conversation and the mirror function as scaffolding. He can find his optimum "zone of proximal development" in the challenges posed by the mirror or the teacher's musical gestures in a musical conversation.

Why Complex Music in Early Years?

Recent research has brought to light the musical capacities that appear to be inborn or to develop shortly after birth (Hannon & Trehub 2005; Hefer 2008; Hefer, Weitraub, & Cohen 2009; Ilari & Polka 2006; Krumhansl & Jusczyk 1990; Lynch 1994; Mazataka 1999; Trehub 2003; Trevarthen 1999).

Even newborn infants were observed reacting to tension—release cycles through hand and arm motions (Hefer at al. 2009).

Gordon emphasizes the importance of musical experience in the early stages:

> …our potential to learn is never greater than at the moment of birth, …after that it gradually decreases. The most important time for learning, however, is from birth (if not before) until eighteen months, a period during which a child learns through exploration and from unstructured guidance by parents and other caretakers. (Gordon 1997b, 1)

In order to acquire a habit or a need for experiencing complex music—which is more deeply involving and, the authors therefore believe, ultimately more satisfying—it is wise to introduce the very young child to music that challenges musical cognitive growth and development at an age when the child is open and receptive to all experiences.

Gordon suggests that music learning is acquired in very much the same way as language (Gordon 1997b). He stresses the importance of variety when introducing the language of music to children:

> …unless children experience arich and varied exposure to music before they are eighteen month of age, they will become preliminary preoccupied with language acquisition, and music will take place of little or no place importance in their later life. (Gordon 1997b, 6).

Gordon (1998) discusses the parallel between musical learning and language acquisition, and states that playing recordings of Shakespeare's works to infants will not result in superior language acquisition. It is the speech that is directed at the infant that nurtures language development. In the same manner, all the activities in the curriculum address the child, whether in the context of rhymes, songs, musical

[1] The zone of proximal development has been defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky 1978, 86).

conversations or mirrors, which function in a manner that turns music listening into a mediated, child-directed experience.

Since exposure to stimuli in general and musical stimuli in the early years in particular is critical to the infant's general development, the question is what kind of musical stimuli is appropriate for them?

Recent research has suggested that more complex, child-directed speech encourages language development. For example, in discussing fathers' significant contribution to the language development of their children, Pancsofar & Lynne (2006) write: "fathers' speech was characterized by greater use of rare vocabulary and lower use of common vocabulary than was mothers' speech" (574). In the same article the author states that there is evidence, though perhaps not as yet conclusive, that "the complexity of maternal language input to young children has been associated with young children's language development" (575).

In the spoken rhymes and songs (accompanied by movement activities), children are presented with relatively simple musical encounters that nevertheless embody structural principles that are also the backbone of more complex music. Bamberger (1991) discusses the recurring pitch time relationships, i.e. the structural principles that are common both to simple songs (" Simples") and complex art works, (presumably within the same culture).

Bamberger calls these principles "Structural Simples" and proposes that:

> structural simples as they are embodied by and most directly expressed in the Simples of our culture form the generative scaffolding for making meaning and for instant perceptual problem solving as we construct coherence in the common music around us. (Bamberger 1991, 11)

While the curriculum under study in this paper creates opportunities for interacting with simpler music, it also exposes children (using songs that encompass a wide variety of rhythmic and pitch relationships, and through listening to art music accompanied by musical mirrors) to more complex music in a *parallel*—rather in a *sequential* fashion**.**

The question arises whether the ability to transfer what is apprehended from musical simples to works that are more complex is dependent on maturation and, if so, if the infant can relate to complex pieces. This may lead us to a question as to whether we extract the rules of structural simples from our environment or whether they express schemas with which we are in fact born.

If the former is the case, one may argue that long periods of internalizing the rules from "Simples" are needed before they can be apprehended and related to in works that are more complex. However, if they make uses of innate schemas, then young children may detect them not only in their simple guises but also within works that are more complex.

In our research (Hefer, Weintraub, & Cohen 2009), we reported on day-old infants' responses to tension release cycles in the music of Mozart. In the classes conducted by one of the authors, Michal Hefer, she observed that children attended with great concentration to complex art music when it was presented with a musical mirror.

We will now examine through an in-depth analysis of selected children's behavior whether children in fact respond to complex musical experiences and, if so, to what aspects of the music they appear to be responding.

In Hefer's videotaped lessons, infants and toddlers participated with a caregiver present. On initial analysis, the responses of all the infants and toddlers were noted.

In choosing the children for in-depth study, we decided to focus on children whose external movement responses are sufficiently visible to allow description and analysis. We believe that movement is not the only way to respond. In fact, the parents of one child in Hefer's class, who hardly ever responds through movement, reported that he constantly asks to listen to complex music.

> Mother: "Do you know *Le Paladin*"?
> Teacher: "It is an Opera by Rameau, why do you ask?"
> Mother: "My son (Aviv, 20 months old) does not stop watching the DVD of this piece, all day long."

We note the level of concentration of all the children, and use this information—as well as parent reporting—to gauge the level of interest aroused by a particular musical work and the mediating activity associated with it. However, it is the children who invent movements of their own—either variations on the teacher's movements or completely original ones—who, through their movements, allow us a glimpse into their inner world. Vocalization singing, or humming along with familiar music, has rarely been observed with this age group—0-16 months. It is movement responses that we observe as the widespread response to musical experience.

Analysis of Selected Children's Movement Responses

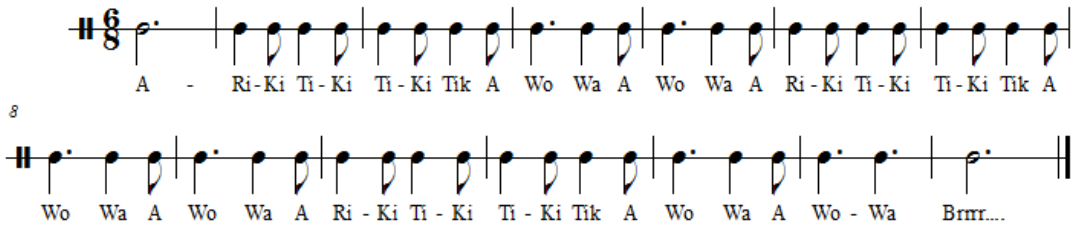
Within the lessons, children move from relatively simple experiences, such as listening to spoken rhymes, to more complex ones, such as listening to compositions, like the waltz by Chopin that we will discuss below. Yet the "simple" experiences contain within themselves kernels and principles that lay the foundation for sensitivity, to complex music where these same seeds are presented in a more developed manner over longer time periods.

We will look at Inbar, 16 months old (has been attending classes for eight months), first as she relates to a rhyme chanted by her parents and the teacher, and later to a Chopin Waltz.

The teacher is reciting a rhyme about a watch with many nonsense syllables:

Riki Tiki

Youngmee Kim



On the repeating patterns of: "Ri ki Ti ki Ti ki tik," the teacher and the mothers do hand movements. On **"***A Woo Wa A Woo Wa* ," the mothers touch (gently poke) the children's cheek on the downbeat (Woo). The whole pattern repeats three times, and ends with a "surprise" pattern of descending sounds and movements.

This simple rhyme includes several kernels for future musical development:

- The concept, or repetition and change;
- The building up of expectations, with the attendant pleasure when the anticipated event occurs;
- The surprise when the pattern is broken (at the end).

We observe Inbar, at first standing and observing**,** and letting her mother do the motions to her—then she tries to join in.

- She does some tentative finger motions and on: "A Woo Wa"—after her mother touches her cheek, she also touches it;
- On the next repetition of this pattern she does something extraordinary: she *claps on the upbeat and then touches her cheek together with her mother on the downbeat.*

(At this point, unfortunately, the recording is interrupted.)

- On the next repetition of the rhyme, Inbar is sitting—she tries to do the finger motions.
- When we get to the "A Woo Wa," several things happen:
- first time; the mother does it alone—next time, Inbar joins in, poking her cheek on the downbeat (Woo);
- second time: she opens her mouth on "Woo" and pokes herself on "Wa"! in a very deliberate motion. She keeps her fingers there for the next round of "A Woo Wa";

She seems to have given a new interpretation to the pattern:

"Woo" = open up—"Wa"= accent/poke!

third time: she repeats her previous action—poking of "Wa"! with no activity on the repeat.

As the final downward pattern is performed, she lowers her arms and sits with two hands perfectly balanced at the conclusion.

As the teacher prepares for the third repetition of the rhyme by raising her voice in an anticipatory vocal gesture, and also by raising her arm, Inbar also prepares herself by raising her arm.

- She does some finger motions—and this time she anticipates the "Poking the cheek," and does it with a smile.
- She seems to have internalized the pattern and does not wait to hear it but acts it out ahead of time.
- She waits until her mother performs the poking motions and then anticipates the finger motions, also ahead of time!
- On the next repetition she again anticipates, and then does it in time, *poking her cheek on "Wa," not on "Woo."* This is the third time she has done it this way.
- On the final repetition of the rhyme, the camera unfortunately moves but it looks like Inbar anticipates the "poking" on time, and this time pokes her cheek on "Woo."
- She brings her body to a state of rest as the rhyme ends.

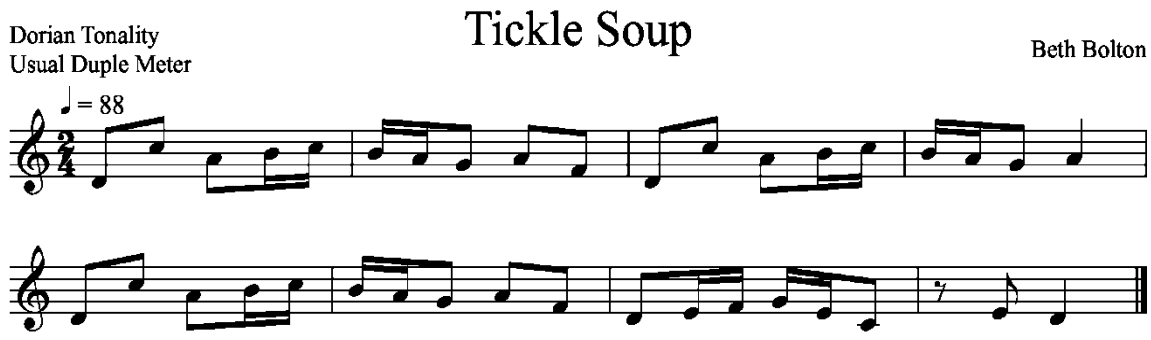
In this short segment we can actually see development taking place, confirming the following claim by Vygotsky: "Any psychological process, whether the development of thought or voluntary behavior, is a process undergoing changes right before one's eyes" (Vygotsky 1978, 1).

The most salient changes we observe are:

- We see that she has internalized the pattern by the fact that, on the repetition of the rhyme, she *anticipates events.*
- She is experimenting with the question of where the accent expressed by a poke in the cheek should be in the "A Woo A" pattern. On the long downbeat of "Woo," or the more sharp "A," which is performed by the teacher with a *loud upward inflection*?
- Her decision to assign an open mouth to "Woo" and the "poke" to the "A" is noteworthy. Her open mouth for "Woo" derives perhaps from trying to feel in her mouth how the "Woo" feels. In fact, her rounded mouth is precisely how one's mouth looks saying "Woo."
- She seems to search her kinesthetic memory in a serious way to establish a fit between what she hears and the way her body can accommodate to it.

Incidentally, we can also see the pleasure that can be derived from her anticipation—fulfillment in her facial expression.

Before seeing how Inbar reacts to a complex piece, let us analyze children's reaction to another relatively simple song—sung to them first by their teacher, then sung to them by the teacher while the parents provide an ostinato accompaniment.



This song, composed by Beth Bolton, an associate of Edwin Gordon, which was sung with natural syllables (bah, pah), is even richer in elements that are the basis for dealing with complex music, such as:

Expectation
Surprise
Repetition—change
Enriched texture—melody and ostinato accompaniment (sung by the parents)

The first three phrases are similar, in terms of both rhythm and pitch. The fourth phrase suddenly breaks with the established patterns—both in rhythm and in pitch. The last measure also includes a surprising silence on the downbeat, creating a syncopated feeling.

The melody is Dorian, in line with Gordon's principles that infants should be exposed to music of varied modality—a principle well supported by research that shows how infants adopt much more easily than adults to unusual melodic and rhythmic organization (see for example Hannon & Trehub 2005).

The children hear the melody sung by the teacher, then accompanied by the parents' ostinato, and finally the melody is played on the recorder while the parents chant the ostinato and tickle their children.

Analysis of Children's Responses

The first time through, we will focus our attention on the 8-month-old infant, **Noya**. The video begins in the third measure of the song.

- The child is sitting motionless, attentive.
- In measure 6 she begins to move her feet on the beat
- *In measure 7, the last phrase that breaks with the pattern of the rest of the song, she adds a "flying" motion with her arms* for one cycle, then points with her right hand,
- On the last two notes of the song, she makes two forceful gestures in full synchronization with the teachers singing and holds her closing position.

Given the very young age of the child, it is remarkable that she shows sensitivity to pattern change and closure.

Next, we will focus on **Alma**, both because her movements are so interesting and because we will shortly analyze her movements to a recorded performance of the "Minute Waltz" by Chopin, in D flat Major op. 64 #1.

- The camera focuses on Alma only on the third repetition (recorder and ostinato).
- Alma—who is visibly not very steady on her feet but insists on standing, sways from side to side and takes a few sideways steps that are more or less synchronized with the rhythm of the song. However, it is not clear whether she means to take these steps or is trying to keep her balance.
- What is a very clearly intentional movement, however, is the change from swaying and stepping *to raising and lowering herself on her toes to the beat in the last phrase*—the "surprising" phrase.
- On the last beat of the measure, she makes a half turn. She looks up at the ending—possibly surprised by the fact that the melody has come to an end, but some of the parents (less aware than her[?]) begin the ostinato and then stop, realizing that the song has come to an end.

Like Noya, she shows sensitivity to *change* and she anticipates the *ending.*

We will now describe and analyze Inbar and Alma reactions to a much more complex musical experience—listening to a recording of Chopin's "Minute Waltz" in D flat Major op. 64 #1, and watching by the teacher's mirror.

Inbar's Group

Out of the six children (ranging in age from 8 to 16 months) who are visible in the video, five react with absolute concentration The sixth child is also involved, but from time to time interacts with her mother—by looking at her, and leaning into her lap.

The camera mainly focuses on Inbar and the baby in the center, Yali. The baby **(**Yali) has absolute concentration for the duration of the entire piece. He is on his stomach, raising himself on his hands, looking toward the teacher. The baby's concentration is so total that he remains in this position during the entire piece without even blinking.

Would he also watch the movement if there were no music? This needs to be tested, but we are quite certain that he would not. The movement itself is not that interesting or varied. We feel that it is the fit between the music and the movement that holds his attention so completely.

Inbar

For most of the segment, though unfortunately not until the end, the camera focuses on Inbar.

We will analyze her movements in an attempt to arrive at some understanding of the musical experience she undergoes during her hearing of the piece, and her approach to dealing with the challenges posed by the piece.

- She spends a considerable amount of time observing and listening before she moves. She seems to feel the need to listen and watch before she expresses what she hears in her movement.
- Throughout the segment she chooses to stand still, using only hands, arm and head motion to react to the music. Her hand motions are varied, and include very small finger movements as well as clapping motions.
- These motions are entirely her own. The teacher's mirror seems to focus her attention, but she looks for appropriate movements within herself— which in fact are often more complex than the mirror. The direction of arm motions (raising, lowering expanding and contracting) sometimes reflects the movements she observes, but not always.

Chopin: Waltz in D flat Major ("Minute Waltz") op. 64 #1—Brief Analysis

The piece consist of two sections with the first section **(A)** built on two slightly different 8 bar phrases and the B section on one 8 bar phrase. These ideas are repeated many times with subtle variations.

The salient feature that characterizes both sections are their energy contours: long stretches of preparation leading by a skip to a high arrival note.

A section. The piece consists of the following sections:

A1 (measures 1-20)

4 bar introduction

8 bar phrase

8 bar phrase repeated with changed ending

Nonstop motion of motive, circling in on itself, leading through scale-wise pattern to energy exploding on highest note (B flat), and again arriving at same note two bars later.

The overall feeling is that of long preparation—raising the tension, the suspense as we wait for the arrival of the explosive skip that resolves the tension. Throughout, the melody moves in small intervals, over a tonic-dominant harmony, and introduces triplet eight figures, longer scale-wise patterns that do not come to any rest points until the end.

A2 (measures 21-37)

8 bar phrase

8 bar phrase, 4 bars repeated, but ending on the highest note of the section (f), then descending over 4 bars to the tonic.

This section is similar to A1, with the addition of triplet eight figures, longer scale-wise patterns that do not come to any rest points until the end. Tension is even higher in this section because the expected jump to a high note, on which the melody is expected to arrive on a short unaccented note, offers no rest or resolution of tension. The melody still uses small intervals; many scale-wise patterns over a slightly more adventurous harmony.

A2 repeated

B (measures 38- 69), complete change; rhythmic activity slows down.

6 bars (measures 38-53)

The main motive consists of a quarter note on the third beat, pushing the melody to the next note on the downbeat of the next measure. There are however rhythmic surprises.

Sometimes the upbeat and the following downbeat are the same note and are tied, over-creating a slight sense of elongation in time (measures 38, 42). There is a four beat melodic pattern against the three beats of the accompaniment—creating a rhythmic tension (measure 45).

The climax of the section comes at the end, with the tension caused by the two beat motive A-B flat; G-A; G flat–A flat: F-f against the three-quarter meter—a loss of clear sense of meter; is it 2 is it 3? (measures 51-53). This is also accompanied by a lot of chromatic alterations.

B' 16 bars (measures 54-69). Repetition of **B** without the rhythmic "surprises," with the addition of high grace notes

Bridge 8 (measures 70-77) repeat of the introduction

Return of: A1, A2, A2 codetta

The Mirror

The teacher uses a long streamer on a stick

Introduction and A1- (measures 1-20)

The nonstop motion of the A section is expressed through nonstop spiral motion of the streamer. On the high B flat note on measures 9 and 11, 17 and 19, the streamer quickly jumps up and down.

A2- (measures 21-37)

The streamer is quickly swirling up and down according to the direction of the melody.

B1- (measures 38-69)

Expressed by swaying movement from side to side; each arc is equivalent to one measure.

Bridge, and return of A section (measures 70-121) expressed as before

Codetta (measures 122-123) coming down in a curved motion.

Inbar's Movements

A section

- We do not see her during the first part of the piece but, from the reaction of the mother of the child next to her, we know that she is doing some movements.
- When A2 comes to a rest the first time (measure 36), she stops her movement with arms upraised—right higher than the left.
- As A2 repeats she remains this way for one bar then begins to move right hand with small finger motions (from measure 19)—then adds head motion: she shakes her head very gently with small motions, at the same time both hands are gradually lowered as the melody descends.
- Hand motions stop at the end of the 8 bar phrase (measure 28).

- During the next 8 bars (measures 29-36). which are a varied repetition of the previous 8 bars, she stands still with some very small, tentative head motions that come to end also before the end of section.

When the section ends, she points her left hand downward on the note that serves as the upbeat to the B section.

B section

- Waits, listens, then begins to move 5 measures into this new section (measure 42)
- Her movements "act out" the downward↘ pattern of: F, C; E flat ↘ D flat (measures 43-44)
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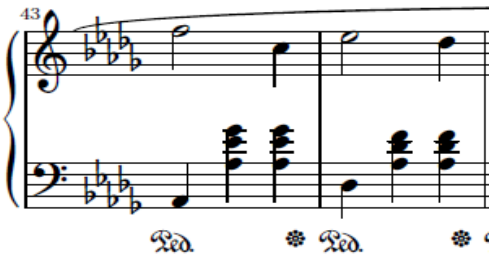
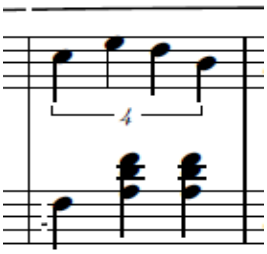
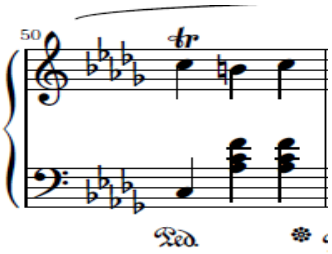


- Hand circles in "4 against 3" circular motive (C E D B, measure 45).

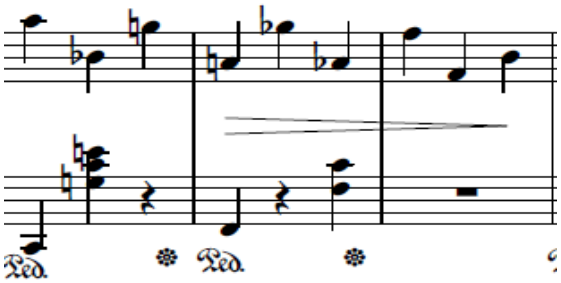


- In the following bars (46, 47) she raises her hand on the downbeat, then slaps her thigh on the upbeat. She uses the slaps as a preparation to fly up on the downbeat—her movement is acting out both the rhythm and the melodic direction.
- This is followed by 4 claps more or less equally distributed over the next two measures (48, 49), including the long sustained high note ("F").

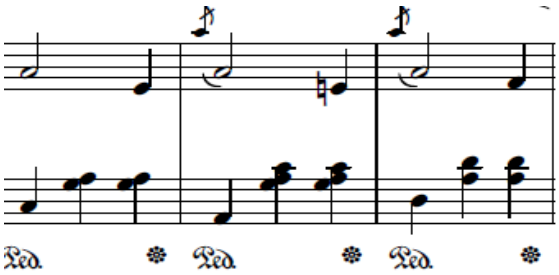


- In measure 50 on the circular melodic pattern: C_B_C (with the trill), she moves with a two arm outward circular and upward motion, preparing her for the next movements which are:

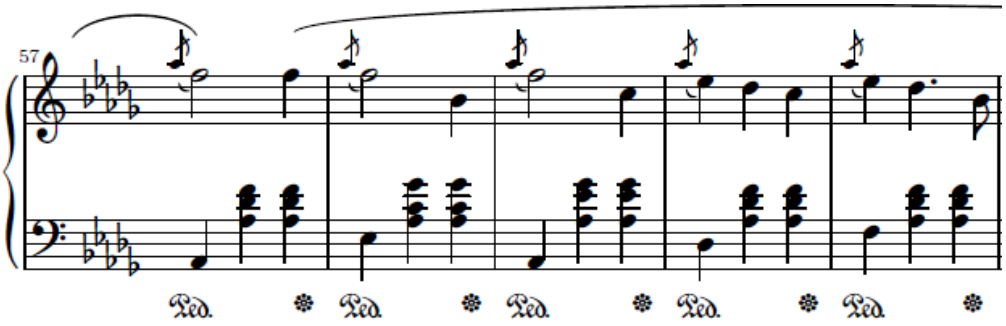
- Two arm motions, slowly raising and lowering her arms, corresponding to the descending two-note motive (measures 51-53), ending with slap on thigh.



- In the following section (measures 54-56), she continues to move to the downbeat first with alternating left /right hands drumming on her thigh then both hands drumming on her stomach.



- When the melody moves to the high note "F" she introduces a new movement—pointing upwards—as if throwing a ball upwards (measures 57-61). She repeats this movement five times .



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elody moves back down to A flat as the center (measure 62), she goes back to clapping.
- As the melody comes to a rest point on "F" (measure 65) she stops and raises her arms.

- She appears to be raising her arm continuously toward the end of the section, where the melody rises to the high A flat. (She can't be seen toward the end—the camera has moved).

Let us Look at How and to What Musical Events She Relates? She appears to be very sensitive to rhythm, feeling the beat and the meter, and rhythmic patterns. However, it is not a mechanical expression of the beat or the meter that is impressive. Rather, we note sensitivity to preparation arrival cycles—even when these movements are tentative.

Her rhythmic sensitivity reminds us of Langer's definition of rhythmic movement:

> The essence of rhythm is the preparation of a new event by the ending of the previous one. A person who moves rhythmically need not repeat a single motion exactly. His movements, however, must be in complete gestures, so that one can sense a beginning, intent and consummation. (Langer 1953, 126)

The fact that she changes movement at the unusual or surprising sections: 4 against 3 (measure 45), or 2 beat motives vs. three-quarter meter (measures 51-53), is quite astonishing.

Perhaps the most interesting movement is the motion suggestive of "throwing a ball upwards" or lifting something held in her arm—something light, gentle. This movement is not even hinted at by the teacher's mirror (which consists mostly of sideways swaying movements). Throwing a ball must be something she has experienced in play with her family.

What seems amazing to us is that she appears to search her kinesthetic memory for a movement that matches the feeling awakened in her by the musical pattern. In terms of melodic directionality, it is an upward focused pattern.

Melodic Sensitivity. She appears to feel the melodic contour as expressed by rising and falling motions in most of her movements. This aspect of the music is also perhaps emphasized by the teacher's mirror.

What is more remarkable is that she consistently uses different movements when the melody centers on "A flat" as opposed to the sections that center on the higher "F." Not only is the movement for the "F" centered segment different, but it is a gesture that is pointing upward!

Form: Repetition, Change and Arrival Points

Inbar Shows Arrival through Two-arm Motions. We see her at the first ending of A2 with two arms raised; at the second, more conclusive end she has two hands clasped over her stomach. At the end of the B section (which leads into the bridge and the return of "A") we again see her with two arms raised.

She Shows Change in the Music by Making Use of a New Motion:

- In the "A" section which is made up of very small intervals, she uses smaller motions (finger movements and very gentle head motion) whereas

in the B section, which is predominantly made up of the larger intervals of 4th and 5th, she uses larger motions.

- The B section is divided into segments that revolve around A flat or F as the pivotal pitch. She uses one movement (slapping her body) for the A flat centered melody, and a different movement (throwing a ball) for the "F" centered melody.

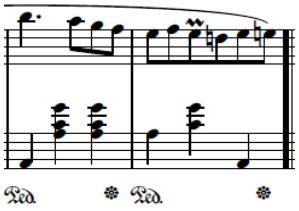
Alma's Movements. Alma is 15 months old and she has been attending music class for 8 months. She has heard this piece many times in previous lessons. Alma is wearing a red striped shirt and is waving a black scarf.

Like Inbar, she also alternates movement with absorbed standing still—watching, listening before she resumes moving.

The video recording starts ten bars into the piece.

A1 We see Alma moving right from the start of the recording.

- She holds the scarf away from her body and engages in a movement that we will see is her characteristic movement for the "A" section of this piece: she bends her legs, and lowers her torso in a kind of "bouncing motion." It is a movement that brings preparation for a jump to mind.
  However, a child Alma's age cannot yet "jump" so, as we will see, she goes down rather than jumping up on the arrival points.
- We see this as analogous to Inbar's "ball throwing" movement; her movement cannot be seen as an adaptation of the mirror, rather a search within herself for a movement she can fit to the constant feeling of preparation for a jump in the melody, which sometimes arrives and sometimes does not.
- We see Alma taking the bouncing position and lowering her whole torso on the high B flat. She slightly lowers her body again on the downbeat of the next measure (which is the last bar of A1), measures19-20.



A2

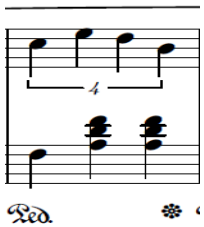
Alma changes her movement:

- As we discussed in the analysis of the piece, the change between A1 and A2 is not very great. Yet Alma changes her movement. She straightens out, she takes 4 steps in exact time with the beat, then stands in place for the next two bars;
- She waves the scarf in a very rhythmic fashion—though seemingly expressing more the mounting excitement than the beat. She raises the scarf on the highest note and her left arm also flies up for a second. She begins to walk forward on the descending scale. The scarf is lowered, though not gradually as in the melody.
- As the second 8 bars (varied repetition of the first 8 bars) begin at measure 29, she continues walking forward for one bar, then stops and looks around. The fact that this section is so highly repetitious makes it difficult to remember, and one wonders whether at this point Alma feels "lost."
- At the end of the section, as the melody rests, she takes two steps backwards.

- As A2 repeats, she stands in place, slightly swaying from one foot to the other. On the descending scale, she reverts back to her bouncing motions from A1 (measure 25).
- However, since in this section there is no resolution or arrival, she does not do the movement for the preparation that she did earlier, lowering her whole torso (as she did on the high B flat in A1). She merely keeps up the preparatory bouncing, just as the melody does not arrive at the promised resolution until the end of the section.
- While she is bouncing with her torso, she adds a vigorous and even wild waving of the scarf in her right hand—and, as the melody moves on without resolution, the left hand joins the right (measure 29), waving energetically. The arm motions stop a split second before the melody actually comes to rest.
- She stands erect with arms dangling at her side (measure 37). Her ability to stop exactly on time suggests that she remembers and anticipates the arrival point.

B section. Swaying motion from side to side—she lifts her foot as she sways.

- This is a variation on the mirror, using full body motion.
- What she is in fact doing is transferring her weight from foot to foot.
- She has approximately one transfer per measure, but we can see that she is not in complete control in balancing her body.
- In measure 45, on 4 against 3 figure, she adds extra steps and turns!!!



She uses a circular motion, just as Inbar did!

- On the long high note "F" (measure 49), she stops and waves her scarf.
- She continues with this swaying movement in measure 50 where on the trill and the circular motive she intensifies, speeds up both the full-body (foot to foot weight transfer) and the shaking of the scarf.
- At this point, she is with her back to the teacher. It is true that she can see the mirror performed by the parents, but one has the feeling that she is not watching anyone, just listening to the music.
- *On measures 51-53, she reacts to the two against three pattern by changing* her motions to coincide with the motive, both in her foot/torso movements and the waving of the scarf!

This too reminds us of Inbar's movements.

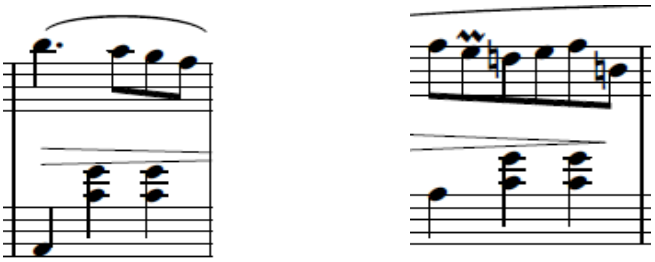
- In measure 54 she goes back to the swaying motion—first of the scarf then her whole body joins in, in measure 57 when the melody moves to the F center. She continues with both the full-body and the scarf motion, sometimes together sometimes only one then the other

- On the high note F (measure 65) she stops the swaying motion. She walks, turns, and for the next 4 measures as the B section is coming to an end, she stops and moves only the scarf

Bridge back to A (Measures 69-78). She does not move her feet, but her arms are flapping up and down faster and faster—in measure 75 she adds her bouncing motions (getting ready to jump) that she previously used for the A section.

A1

- She does her bouncing motion waving the scarf. She does not react to the first arrival point (measure 82), but she does react to the second one (measure 84) by slowly lowering herself to the downbeat—just as she did at the beginning of the piece.
- The movements are repeated—again she lowers herself into the arrival points. Measures 84-85 -



- In measure 90 she again lowers herself into the downbeat, but this time it looks like she almost manages to get it to lead into an upward jump!!! At the next arrival point (measure 92), she is still involved in the previous near jump so this arrival, on the B flat ,is not expressed in her movement.

A2

- She turns and shakes the scarf in an up-down motion. She makes one complete turn during the 8-measure phrase, lowering her body on the last measure. She is in continuous motion from beginning of the phrase until the end. Even though there is no rest point at the end of the phrase, she demarcates the end by lowering her body. *The melody goes up but she relates to the function of "ending" rather than the melodic direction.*
- During the next phrase, her feet are mostly static but she waves the scarf, with the left arm also joining the movement in parallel motion. The waving gets energetic, almost wild toward the end.
- She stops moving at the arrival, rest point (measure 109).
- For the next 8 bars (repetition of the beginning of A2), she again stands in place, waving the scarf with left arm sometimes joining in.
- The following 8 bars, she again begins to move in circle, and stops on the long note putting her left hand to her head (ear?), where she keeps it while she begins to move forward, sideways.
- On the penultimate emphatic, loud chord, she raises the scarf to her right ear, and lowers it on the final note.

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To What Musical Events does Alma Appear to Relate?

Rhythmic Aspects. Like Inbar, her movements are rhythmical; while she expresses beat, meter and at times actual rhythmic patterns. The astonishing thing is that she, like Inbar, expresses preparation arrival cycles, rather than some mechanical sense of the division of time. Like Inbar, she reacts to the "out of the ordinary" patterns of 4 against 3 (measure 45) and the two against three motive division (measures 51-53).

Form and Structure. Alma shows arrival by lowering her entire body, stopping movement, and lowering her arms to her sides, and pointing downwards with the scarf. Not only does Alma show arrival points, she several times anticipates them!!! Like Inbar, Alma has one set of movements for the A section and a different set of movements for the B section.

Energy Contour. By lowering her body on the high B flat (for example, measure 17), she expresses the feeling of accented arrival. Melodic direction is apparently of lesser or no importance to her feeling of the piece. Incidentally, she is ignoring the mirror, which does focus on melodic direction. What apparently catches her attention is the much more salient aspect of the piece—its energy flow—the long preparation for arrival points that sometimes arrive and sometimes do not. Her bouncing, as if getting ready to jump (something she almost accomplishes near the end), is truly breathtaking. She senses what the long preparation is, and what the arrival point is in the cycle.

When we compare Inbar and Alma's reactions, we see many similarities, not in terms of actual movements performed, but rather in the aspect of the piece that captures their attention. The aspects of the music that captures their attention are:

- Grouping e.g. arrival points, repetition and change. Their sense of grouping is primarily influenced by rhythmic events in the music;
- Energy contour: e.g. preparation arrival cycles, the buildup of tension by long preparation passages, which in the end do or don't reach fruition;
- Expectation—the presence of interruption of patterns the listener had learned to expect to continue

Directionality in terms of melodic/harmonic motion is something that we noted more in Inbar's than in Alma's movements.

Conclusion

We have set out to investigate whether and how very young children react to relatively complex music. By analyzing some of the movements of a few children, we were privileged to see how, even at this very young age, listening to a composition "is a *performance* which involves a process of active, sense-making occurring in real-time**"** (Bamberger 2006, 70).

We were able to observe how the game of "poke in the cheek" sensitizes, i.e. awakens sensitivity to expectations and the interruption of patterns, which are then found in the more complex piece.

It is important to point out that there was no "before" and "after," in the sense of a period of learning simpler songs or rhymes preceding interaction with more complex music like the Chopin Waltz—as can be seen in the video. Both take place in the same lessons.

This study was even more rewarding than we had hoped. The complex music elicited concentration and reaction; the reaction of the toddlers was sensitive to the underlying structure: grouping and energy contour to an unexpected level. Their "active sense-making" was through the translation of their cognitive process into movement.

The research of Morehead and Pond (1942) concluded that movement and musical thinking are closely intertwined. In 1980, through studying the musical improvisation of kindergarten children, Cohen (1980) came to the conclusion that musical cognition has kinesthetic sources. This latter conclusion has been buttressed by much current research **(**Alibali & Goldin-Meadow 1993; Cohen & Trehaub 1998; Dogotan-Dack 2006; Gorali-Turel 1997; Johnson 2007; McNeill 1992; Reybrouck 2005; Rizolatti 2006 ; Trevarthen 2006).

Our findings also reaffirm our belief in the efficacy of musical mirrors as a teaching device (Cohen 1997), since the combination of musical grouping and energy contours are instinctively identified by toddlers with similar motion contours. The toddlers whose movements we studied sought out this connection as a response to music experienced.[2]

The mirror is necessary to focus their attention, to turn the recorded music into the equivalent of "child-directed speech," but it was also crucially important that the toddlers were encouraged (by smiles, looks of approval) to express what they heard through their unique, full-body kinesthetic expression. The combination of Cohen's and Gordon's theory and pedagogy as adopted by Hefer blended seamlessly into a comprehensive curriculum.

Analyzing the children's responses showed us that the videos in our hands are a rich source of knowledge we have just barely begun to mine. In this paper, we have focused our investigation on the movement responses of two toddlers to one piece of music. In our future research, we hope to provide answers to further questions, such as: Would analyzing toddler's responses to a variety of pieces yield a pattern of consistent responses to similar musical events? We noted in passing that infants placed on their stomach, with their ability to move limited to upper arm and head movement, reacted differently from infants lying on their backs who engaged in a great deal of arm, leg and even full torso movement. Were the latter as focused on the music as the former? or more focused on movement per se? We noted that some of the toddlers listened and watched the teacher's movement with great concentration but did not engage in overt movement. Do children who listen with attention but with minimal movement responses hear the music the same way as the children who move?

Other intriguing questions that come to mind relate to the significance of parental attitude to music, as well as parental encouragement of independence in children's musical development. Finally, as we stated at the outset, longitudinal study of the children in these tapes could yield valuable information regarding stages of musical development.

[2] Johnson (2006), relying on the theories of Suzanne Langer (1953), states: "when we are actively listening to music we imaginatively enter into its 'motion,' experiencing all of the ways it moves, swells, hops, rushes.… We feel it in our vital, tactile-kinesthetic bodies" (Johnson 2006, 239.

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