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# Thinking In Sound: A Qualitative Study of Metaphors for Pitch Perfection □

Kathy A. Thompson

## ABSTRACT

The mission for aural skills instruction is to enable students to think in sound. Each fall college teachers meet freshmen with varying levels of experience and ability in music reading and listening. Selecting appropriate strategies for teaching students to auralize, to “hear” how notated music sounds in the absence of physical sound, is difficult not only because of students’ different skill levels but also because research in aural skills pedagogy has not indicated an ideal sequence of instruction. Most textbooks present a good variety of exercises but little conceptual framework, leaving that to the teacher’s discretion. This qualitative study was initiated to help an aural skills teacher with absolute pitch understand how relative pitch skills develops. Participants were 23 undergraduate students enrolled in aural skills classes at a liberal arts university. Based on students’ previous experiences, their responses to auralization tasks, and evaluation of their sight-singing, metaphors were suggested to characterize strategies to internalize pitch from musical notation. Students assessed their own strategies and then evaluated the effectiveness of the metaphors for discussing their process for internalizing pitch. Findings provided observations about the development of relative pitch and raised issues about the use of solmization.

## INTRODUCTION

“Tonal imagery is a condition for learning, for retention, for recall, for recognition, and for the anticipation of musical facts. Take out the image from the musical mind and you take out its very essence.”<sup>1</sup> Carl Seashore’s words aptly describe the mission statement for aural skills instruction: to teach students to think in sound. A great frustration in teaching music theory is finding that students do not always connect sound with their analysis of musical notation. Bruce

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<sup>1</sup> Carl Seashore, *Psychology of Music* (New York: McGraw Hill, 1938), 6.

Benward called this necessary reciprocal relationship “the hearing eye.”<sup>2</sup> Various other terms have been suggested, including inner hearing, aural imagery, pitch internalization, and audiation. Gary Karpinski suggested the term *auralization*, “the process of hearing music mentally in the absence of physical sound,”<sup>3</sup> because of its analogy with visualization. Though auralization is a multi-faceted concept, including pitch, rhythm, instrumentation, articulation, texture, form, etc., the focus for this study was the auralization of pitch from musical notation.

Musicians use either absolute pitch (AP) or relative pitch (RP) strategies to auralize pitch from musical notation. Those with AP, sometimes called “perfect pitch,” easily auralize individual pitches from an internal standard, while others auralize pitches in contextual relationships. The starting point for auralization is fundamentally opposite for the two types of perception; one typically auralizes before analyzing, while the other must analyze before auralizing. Because the analysis of musical relationships is vital for understanding music, aural skills instruction is necessarily concerned with RP processes for all students. However, the teachers’ own perception, whether AP or RP, can make it difficult to know first-hand how to teach students with the opposite strategy for auralization. My desire to understand how RP skills develop without AP perception was the basis for studying the auralization strategies of my undergraduate students.

My prior teaching experience had indicated various levels of skill in music reading and listening among college freshmen. A few already knew how to auralize from previous music lesson and ensemble experiences, while those with AP auralized individual pitches easily.<sup>4</sup> Some, usually vocalists, learned to use tonal syllables or numbers, perhaps reinforced with hand signs or body movements. Others, especially pianists, recognized intervals between pitches. Yet quite a few knew how a melody sounded only after playing

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<sup>2</sup> Bruce Benward, and Maureen Carr, *Sight Singing Complete*, 6<sup>th</sup> Ed. (Boston: McGraw Hill, 1999), xii.

<sup>3</sup> Gary Karpinski, *Aural Skills Acquisition* (New York: Oxford University Press, 2000), 49.

<sup>4</sup> Peter K. Gregersen, Elena Kowalski, Nina Kohn, and Elizabeth West Marvin, “Absolute Pitch: Prevalence, Ethnic Variation, and Estimation of the Genetic Component,” *American Journal of Human Genetics* 65 (1999): 911-913. This study estimated the prevalence of college music students with absolute pitch to range from 4.5% in liberal arts colleges to 24.6% in conservatories.

it on an instrument or hearing it performed. Most aural skills textbooks contain a great variety of exercises but little conceptual framework, leaving the construction of such a framework to the teacher's discretion. My search for how to teach RP skills more effectively began with trying to understand the strategies freshmen already knew how to use.

## LITERATURE REVIEW

Designing an aural skills curriculum is difficult not only because of the diversity in students' skills, but also because of the complexity of the cognitive process. Michael Rogers stated that the goal of music theory training is the "interdependence of thinking and listening."<sup>5</sup> For music teachers whose thinking and listening have become inseparable and intuitive, it is difficult to recall the way we learned, even if we assume that our approach might be a good sequence for instruction. One popular approach is to integrate aural skills instruction with the music theory curriculum. Edward Klonoski recently challenged this approach: "There is a tacit assumption here that needs to be examined more explicitly; namely, that the sequence of topics typically found in tonal theory texts, normally a highly refined and logical conceptual ordering, also represents the optimal perceptual ordering."<sup>6</sup>

Klonoski also called for teachers to address vocal production in connection with pitch internalization.<sup>7</sup> Karpinski likewise discussed many early skills, including matching and remembering pitches, hearing melodic contour, discriminating stepwise motion from leaps, inferring tonic function, and identifying scale degrees. He argued for teachers to choose solmization systems based on how musicians learn and what we want them to learn, rather than rationalizing, "I was trained that way."<sup>8</sup> Rogers also thoroughly discussed solmization options and admitted that all have various strengths and limitations for musical mind training.<sup>9</sup> Though many

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<sup>5</sup> Michael R. Rogers, *Teaching Approaches in Music Theory* (Carbondale, IL: Southern Illinois University Press, 1984), 8.

<sup>6</sup> Edward Klonoski, "A Perceptual Learning Hierarchy: An Imperative for Aural Skills Pedagogy," *College Music Symposium* 40 (2000): page?.

<sup>7</sup> Edward Klonoski, "Teaching Pitch Internalization Processes," *Journal of Music Theory Pedagogy* 12 (1998): 91-96.

<sup>8</sup> Karpinski, 168.

<sup>9</sup> Rogers, *Teaching Approaches*, 132-6

opinions and issues about solmization have been raised previously in this journal,<sup>10</sup> research has not yet proven one solmization method superior to another, or indicated how several systems might be used in combination or in sequence. Both Rogers and Karpinski warned against teaching students to read by intervals before they have acquired a sense of tonal function. Rogers argued that putting too much emphasis on intervals “reduces the hearing process to a chain of localized hops from point-to point—all somehow equivalent,”<sup>11</sup> rather than contributing to understanding tonality or performing with good intonation. These pedagogical concerns provided direction for this study.

Gary Potter’s qualitative study of melodic dictation among several experts stimulated my interest in studying the development of auralization.<sup>12</sup> Potter studied his subjects’ actions and explanations during dictation sessions, following Lincoln and Guba’s guidelines for naturalistic inquiry.<sup>13</sup> Their description of the researcher-teacher as the data-gathering instrument involved observing students in a natural setting and using inductive data analysis. Bogdan and Biklen’s model for effective practitioner research likewise included listening well, questioning closely, and observing details: “The symbolic interactionist emphasis on understanding how many people make sense out of what is happening to them encourages an empathetic understanding of different people’s points of view.”<sup>14</sup> Shank and Abelson proposed script theory as a way of understanding how humans use past experience to interpret new situations,<sup>15</sup> and Nelson discussed using students’ scripts for analytic purposes.<sup>16</sup> These resources have influenced my qualitative research design.

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<sup>10</sup> Tim Smith debated various issues concerning solmization with Michael Houlahan and Philip Tacka in the *Journal of Music Theory Pedagogy*, Vols. 4-8 (1990-94).

<sup>11</sup> Rogers, *Teaching Approaches*, 131

<sup>12</sup> Gary Potter, “Identifying Successful Dictation Strategies,” *Journal of Music Theory Pedagogy* 4:1 (1990): 63-71.

<sup>13</sup> Yvonne Lincoln and Egan Guba, *Naturalistic Inquiry* (Beverly Hills, CA: Sage Publications, 1985), 216-217.

<sup>14</sup> Robert C. Bogdan and Sari Knopp Biklen, *Qualitative Research for Education* (Boston: Allyn and Bacon, 1998), 233-238.

<sup>15</sup> R.C. Shank and R. P. Abelson, *Scripts, Plans, Goals and Understanding: An Inquiry into Human Knowledge Structures* (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1977).

<sup>16</sup> Katherine Nelson, *Event Knowledge: Structure and Function in Development* (Hillsdale, N. J.: Lawrence Erlbaum Associates, 1986), 2.

## PURPOSE

The purpose of my study was to listen through my students' ears, examine their reflections, and characterize their strategies for insights into developing a more effective aural skills curriculum. Three questions guided my research:

1. What can I learn from my students about relative pitch strategies?
2. What perceptual patterns had students' previous musical experiences provided?
3. Are these perceptions hierarchical stages of development along one path, or are they different paths to relative pitch auralization?

## DESIGN

The research design included a brief test for absolute pitch,<sup>17</sup> interviews to document previous musical experience, discussions about sight-singing, and multiple-choice tasks to identify which of several notated tonal patterns was played. For sight-singing I selected four diatonic melodies from a sight-singing textbook.<sup>18</sup> Participants were allowed to choose any preparation and process they wished, i.e., to sing tonal syllables (with or without hand signs), numbers, or neutral syllables like *doo* or *la*, and to play a starting pitch on the piano or begin singing on any pitch in their vocal range. After singing they described their strategies for hearing and evaluated their performance.

## PARTICIPANTS AND SETTING

Participants were 23 undergraduate students between the ages of 18 and 22 enrolled in music theory classes at a liberal arts university in a South Central state. I share the aural skills

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<sup>17</sup>To check for absolute pitch and to see if participants recognized even common tuning pitches, I chose the pitches F, B<sup>b</sup>, C<sup>1</sup>, F<sup>#</sup>, and A<sup>1</sup>, for students to identify by letter name. If students recognized these I checked further to see if students related other tones to any of these fixed anchors.

<sup>18</sup>Earl Henry, *Sight Singing* (Upper Saddle River, NJ: Prentice-Hall, 1997), 23, 24, 55, 73.

instruction at this university with one colleague, who contributed insights and allowed some class time for the study. The research evolved through four stages over two semesters. (See Tables A1 and A2 in the Appendix for participants' major instrument, pre-college experience, and various evaluations.) Participants received no special consideration for grading purposes in any course. They agreed to have their interviews audio-taped and were assured confidentiality; the names used in this report are pseudonyms. One particular commonality among these participants was that all but two had attended church regularly, so they had repeated exposure to congregational singing. In fact, all but four participants had attended congregations that traditionally sing in four-part harmony without instrumental accompaniment. These participants had more experience with unaccompanied singing and vocal harmonizing than might be expected for the majority of freshman music students at most universities.

Several techniques ensured the trustworthiness of the data. I encouraged participants to share both insights and frustrations, and we continually discussed my interpretations of their responses. The privacy of the interviews enabled us to talk freely about their strategies; they seemed generally at ease and responded favorably to my clear intention to learn from them. I verified what they thought about during their preparation, and allowed them to repeat part or all of each sight-singing task as we focused on their cognitive process. To provide multiple measures of assessment I considered participants' sight-singing and auralization tasks, scripts of strategies, and evaluation of suggested metaphors for their strategies. Though the sample was small, the three different groups of participants provided some breadth in the research, and each of the four stages helped to refine my conclusions. My colleague also participated by evaluating participants' scripts, describing her own pitch processing strategies, and discussing both in the light of the proposed metaphors.

## PROCEDURES

In the initial stage all ten students enrolled in Music Reading agreed to participate.<sup>19</sup> I administered the AP test and first auralization task (AT1) during the first class session. I then conducted four individual interviews with each student, approximately four weeks apart. In the first interview, students described previous music experiences and also demonstrated rudimentary knowledge by identifying pitch names, key signatures, and chord names. At each interview I asked students to sight-sing a short tonal melody, discuss their approach in singing the melody, and evaluate their own performance. I also asked probing questions based on accuracy or problems in singing the melody and usually suggested a strategy to correct mistakes, or asked them to suggest one. The final exam included a second auralization task (AT2), slightly more difficult than AT1, with additional instructions to “write what you heard that made you decide your answer.” Examples of these tasks may be found in Appendix C.

The second stage evolved because of my desire to compare the strategies of the Music Reading students with those of more advanced students. Toward the end of the semester, I interviewed eight students enrolled in their third-semester aural skills class to document their pre-college experience and discuss one sight-singing task. On their final exam, these students indicated which of two notated tonal melodies was played, or notated what they heard if the melody was different from either, and described what they heard that made them choose their answers. Though this auralization/dictation task (AT3) was more difficult than the tasks for the freshmen, the scripts provided similar process information.

Participants in the third stage were five freshman music students enrolled in Music Theory I in the spring term who had been exempt from Music Reading in the fall. I interviewed each one for background information, administered the AP test and AT2, and discussed one sight-singing task. Including this group of participants allowed observation of the entire class of freshman music majors for the year.

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<sup>19</sup> This class was required for students whose placement exams indicated that their music reading skills had not met the level of competency required for admission into the first harmony/aural skills course at this university. All but one of these ten students were required to enroll concurrently in Rudiments of Music, which met for two fifty-minute periods each week and was taught by my colleague.



## DATA ANALYSIS

I analyzed five strategies through coding participants' oral and written scripts from the sight-singing interviews and auralization tasks. From this analysis, along with insights from personal experience and literature review, I proposed six metaphors to characterize strategies for pitch perception. (See Appendix B.)<sup>20</sup> The following discussion illustrates the thinking and behaviors among the participants which led to the metaphorical characterizations.

### THE FOLLOWER

Several students admitted following other singers or instruments when they were not required to sight-sing independently; previously they had learned songs only by rote or with instrumental accompaniment. Sally was a typical Follower: "Usually I have something, even if it's like an accompaniment tape or something, and I can hear it in the piano. I don't do a lot of singing just in my head because it's hard for me, and I just choose not to." Though insecure in her sight-singing, Sally had considerable vocal ensemble experience that had developed her musical intuition. "I have to learn songs quick and all they have to do is sing in my ear and I can get it really fast, but I think I just have a pretty good ear at hearing."

When asked if he could look at music and know how it sounds, Jim missed the point and said, "With instrument yes, without it, no." He also expressed typical frustration with his sight-singing: "I did it right at first when I was thinking about it, but now when I try to do it, I can't." Kate, a pianist, was convinced that she could sight-read vocal music, but her comment illustrated her Follower behavior. "I can sight read some, like if I'm in a group and there's one other person with my part so that it keeps me kind of on tune, but I've never been able to do it by myself." Though Followers tended to attribute their mistakes primarily to insecure vocal production, the auralization task responses showed at least part of the difficulty was in auralization for Sally, Jim, and Kate.

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<sup>20</sup> The definitions offered here include slight modifications described in subsequent research: Kathy A. Thompson, "Pitch Internalization Strategies of Professional Musicians," (Ph.D. diss., University of Oklahoma, 2003). An additional metaphor, "The Chunker," was evaluated in that research but is not included here.

### **THE BUTTON-PUSHER**

Instrumentalists were considerably beyond Followers in their ability to understand notation for instrumental sight-reading, but not necessarily for sight-singing. The Button-pusher metaphor characterizes the skill to go from notation to fingering, but does not imply anticipation of the sound before a tone is played. Button-pushing is often a Pavlovian response to notation. Notation stimulates the behavior to play rather than to imagine sound. Sam was the quintessential Button-pusher. Though his saxophone reading skills were quite good, he had little vocal control, leading me to wonder if that were the issue rather than his aural image. Sam's stepwise pitches were not in tune, though they roughly matched the contour. He readily sensed inaccurate scale steps after he heard himself sing. Eager to improve his sight-singing skills, Sam brought in a flute one morning to see if he could sing more in tune if he pretended to finger a flute. Another time he claimed, "When I sing from bass clef, I think of slide trombone position." These kinesthetic crutches did not seem to help appreciably. Sam's auralization test indicated that vocal production was not the only issue.

### **THE CONTOUR-SINGER**

Though all participants could follow rises and falls in notation as they sang, the real melody was out-of-focus for Contour-singers, as described in Sam's case above. Nell also entered college as a Contour-singer with good intuition for what sounded correct. On the first sight-singing task she sang three measures of steps and easy tonal skips accurately until she missed the last two notes of the phrase. She sensed that her melody was wrong and stopped. When she tried to sing it again, she maintained the contour, but missed notes she had previously sung correctly. When asked how she was thinking, she replied, "Just thinking of the notes going up and down."

### **THE TONAL-THINKER**

Showing more accuracy than their Contour-singer classmates, Barry, Anna, Vince, and Vivian were already on the path to

understanding tonal function from pre-college experience with syllables. Vince claimed that tonal syllables were “the root of everything in choir. It helped a ton!” Vivian was less confident and sang very slowly, but her thought process was evident. Often I began class with a mystery tune to coax students to auralize. Students were to sing the tune “in their head,” and then write the name of the tune. One morning Vivian claimed she had never heard the song, but after correcting her solmization, she easily sang and recognized the first phrase of the “Star Spangled Banner.” Incorrect location of the tonic pitch caused her initial confusion, but she was able to use her tonal-thinking to solve the mystery.

Tonal-thinkers usually demonstrated the importance of the tonic triad by humming a triad or scale in preparation to sight-sing. Most said they looked for *do-mi-sol* patterns in the notation. Anna had learned to sing shaped-notes from the hymnal: “It’s much easier to look at the shapes than to remember where the *do-mi-sol* is located.” Though shaped-notes were a crutch, they had launched her RP skills. Barry credited his effective Tonal-thinker strategy to his high school experience with “Scalesthenics,”<sup>21</sup> a system of body movement along with numbers and imagery to reinforce tonal function. Tonal-thinkers could generally assess where uncertainty began; they instinctively knew if they lost the tonal center, and even if they recovered, most readily indicated where they had made a mistake. However, students were much less likely to detect an error if it sounded correct to their musical intuition. For example, one melody had a descending leap: *sol-ti,-do*. Several students sang the tones *sol-sol,-do*, but with the syllables *sol-ti,-do*. Nell repeated the incorrect leap when asked to sing the phrase a second time. She did not recognize her mistake until we actually sang *sol-sol,-do*. Both patterns have dominant-to-tonic cadential sounds, so that did not offend her musical intuition.

## THE BUILDER

The Builder metaphor came from the idea of measuring distance from one note to the next, as if choosing interval sizes from a tool box. Heeding the warnings about reliance on intervals for sight-singing, I was on the alert for scripts that referred to intervals. Though Ben

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<sup>21</sup> M. J. Milford, *Scalesthenics: A New Adventure in Sight-Singing*, (Santa Fe, Texas: Panorama Publishing and Production, 1992).

mentioned the tonic pitch in preparation for sight-singing, his strategy signaled concern: "I hum a *do* sound, and then off of that I just use intervals to hum or imagine the melody." His sight-singing showed contour, but inaccurate scale steps. He stopped and started several times because what he sang did not sound correct, though he always returned to the tonic pitch. That Ben perfectly identified each auralization question indicated that he could discriminate among similar patterns, i.e., internalize the pitch accurately, but the Builder strategy was ineffective for accurate sight-singing. Ben had already recognized his difficulty in vocal production:

I have this problem where, like when I wrote a piece for band in my senior year, I could hear the chords or the line of music but I couldn't sing it. But I could hear it in my mind, but it took me...going up the scale chromatically until I got it, but then after that I could sing it no problem, but I had to hear it from some instruments other than my mind first, but I could hear it consistently.

#### COMBINATIONS OF STRATEGIES

Several freshmen demonstrated the Builder strategy along with other strategies. Vince's responses showed interval and tonal-thinking. "For the skips I just think I look at how big the skip is. I do go back to *do* an awful lot, but I also go note-to-note." His first auralization task response was that of a Builder: "I heard a third and then just a second." His next comment indicated a Tonal-thinker, "I heard *do* and the third note was *re*." Jane's responses demonstrated four strategies. Her comment about reading saxophone music revealed classic Button-pusher behavior, "I just think of the fingerings for the different notes. I don't do the listening for what sounds right at all." When I asked if she could look at her saxophone music and know what it would sound like, she responded in Contour-singer fashion, "I can tell the shapes of the phrases, if they're going up and down, and if they're going to skip around a lot, but I can't look at it and really sing it that well." Jane explained that her preparation for sight-singing involved interval thinking: "Really I just try to look at the exercise beforehand and see if I can pick out intervals because I can sing the intervals, but I'd have to count it all out and do things like, (sings) 'Here Comes the Bride,' and that's the fourth and stuff like that." She described

the Builder strategy to think every interval, but when she prepared to sight-sing, she turned Tonal-thinker and quickly hummed a major pentachord and tonic triad, then sang perfectly in syllables. Obviously Jane's strategies had begun to merge.

Etta also mixed strategies effectively, and she provided a harmonic dimension to Tonal-thinker and Builder perceptions. When asked at what point she could hear in her head how notation would sound, Etta answered, "When I started singing alto... and I think I realized how it fit into the chord as well. Having the alto line with the soprano—it's like seeing the interval. If it's a third, I know where the third sounds below it...it's not so much independent of it." However, her thoughts about the way she was taught intervals seemed an extreme case to fuel Karpinski's and Rogers' concerns about acontextual intervals, and also exemplified Klonoski's dilemma for perceptual vs. conceptual ordering in the music curriculum:

I didn't learn intervals in the key signature even to begin with, like that's a relatively new thing for me to learn. I did it with using steps. I learned that in a perfect fifth there are seven steps, and a major sixth has nine steps. I learned it all very 'this is this, and this is this,' and now it all fits together, and I hated it at the beginning because it didn't fit together.

### **THE TONE-BUILDER**

In the midst of working with these metaphors, I discussed them with a senior student whose comment suggested a "mixed metaphor," the Tone-Builder:

Student: "I'm trying to figure out where I am right now."

KT: "I think you are a Tonal-thinker because you sight-sing so well with syllables."

Student: "But I think I'm changing to a Builder because of my repertoire this semester. I'm singing some Bernstein and Ives pieces that the syllables don't work for. I have to think intervals."

KT: "Do you think the intervals from a tonal reference or purely from interval names?"

Student: "Oh, I definitely learned them from intervals within the scale."

That conversation provided the impetus to study students in my third-semester aural skills class for blended strategies, and also to address the hierarchical-path or different-paths question. The older students completed their auralization tasks (AT3) with few mistakes. They used multiple strategies, in some cases blended and quite refined. Most used syllables in their sight-singing, and preparation usually involved the Tonal-thinker script that Mandy described: "I look to see where *do-mi-sol*, where those three notes are, and they're kind of my anchor points and then I go off of those." Connections between scale-steps and intervals also appeared in Mandy's auralization script: "I could hear the third between *do* and *mi* and I knew the second note was a step higher than *mi*." Often students were not even aware of the merger. Cindy, for example, claimed she thought intervals rather than syllables, but when asked if she kept tonic in mind, she betrayed her own thinking, "Yes, that helps me find weird intervals like ti." Angel's Builder responses were, "The third note didn't go down a fourth, only a third," and another, "It only goes up a fifth," but then a Tonal-thinker response, "The last note was part of the tonic triad."

Builder strategies were mentioned more with auralization tasks than in sight-singing scripts. Judy's mostly correct AT3 responses showed both Tonal-thinker and Builder strategies: "Step motion and then I heard a sixth," and "I heard a fourth and *sol-do*." Judy indicated that she also sang more from intervals than from scale-steps. Her sight-singing showed good contour but some inaccurate pitches, indicating the need for tonal anchoring. Bill, on the other hand, seemed to use several strategies equally well on his perfect auralization task. First was a typical Builder response, "I counted the intervals," and then, "In my head sang the scale," with dots drawn between the notes to indicate the scale steps of a Tonal-thinker. Finally was his Button-pusher, or kinesthetic, perception: "I pretended I had a trumpet and played it out." His experienced musical intuition associated a sound with the way he knew to produce tone.

The Pitcher metaphor was not challenged by students in this study, for no one claimed to have AP or demonstrated AP thinking. My definition came from personal and teaching experience, discussions with my colleague, and study of relevant literature. My colleague indicated an interesting blend of AP and RP. She used Pitcher strategy for auralizing and identifying tones on the piano, but Tonal-thinker strategies for singing. Like Etta, she had learned to sing the alto line in church as a child through intervallic and

tonal thinking. She did not know about AP until college instruction began, when it was clear by comparison with other students that her thought process was different. We speculated that her life-long congregational *a cappella* singing, often in out-of-key contexts, likely resulted in Tonal-thinker perception for vocal music, while her piano playing reinforced her AP in instrumental contexts.

### VALIDATION OF THE METAPHORS

The final stage of this study involved the 20 students who had participated in one of the previous stages and were still enrolled in music theory classes in the spring semester. Halfway through the semester, we discussed the proposed metaphors for pitch perception during a regular class period. To focus attention on their cognitive strategies, I asked them to auralize a phrase of a diatonic melody and then to write down what they were thinking. After writing their scripts the class attempted to sing the melody, and then I played it correctly on the piano. They responded with how the correct melody compared to their initial auralization. After reading the descriptions of the six metaphors, they were asked to decide which pattern or combination of patterns most accurately described their own thought process, or to suggest a different process or metaphor if they could think of a better way to describe their thinking. Finally, they indicated how their strategies had changed since college instruction began.

Students suggested no additional metaphors, and all could see their strategies in one or more of the metaphors. (Refer to Tables A1 and A2 for their self-assessments.) Except for the Pitcher, one or more of the metaphors characterized the perceptual patterns of all students in this study. They readily adopted the metaphors in subsequent discussion. Ben even quantified his own mixture of strategies: "70% Button-pusher, 10% Contour-singer, 10% Tonal-thinker, and 10% Builder." (He saw the need to develop the Tonal-thinker strategy, and increased that percentage by the end of the semester.)

### CONCLUSIONS

Data indicated that each of the metaphors except the Pitcher played some role in RP development. Following an external sound had served the auralization process by informing students' musical intuition. The infusion of rudiments of notation had helped some students to perceive relationships between tones but had only led

others to “push the right buttons” on their instruments. Noticing the contour of a melody was the introduction to auralizing for all before college, but to focus their aural image they learned to relate tones through intervals, scale-steps, or both. Most indicated a change in the direction of tonal-thinking since they had come to college. In this small-scale study the freshmen who had more accurate auralization responses used either tonal-thinking or a combination of strategies. Second-year students indicated more combinations of strategies and also identified more metaphors to describe their strategies.

The Tone-Builder combination, which recognizes intervals within a tonal framework, provided the most secure anchors in this study. Assuming this combination to be at the top of an auralization hierarchy, entry points and paths to the Tone-Builder goal appeared somewhat different for instrumentalists and vocalists. The progression for vocalists appeared to be straightforward: Follower—Contour-singer—Tonal-thinker—Tone-Builder. However, data indicated no simple linear model for instrumentalists who had learned to push buttons without learning to auralize. At some point a strong dose of tonal-thinking was necessary to move the Button-pusher from an unfocused Contour-singer strategy toward the more effective Tone-Builder combination. Solmization was the catalyst for some, but not all. That the Builder strategy alone was less accurate than the Tonal-thinker was consistent with the concern in the literature about isolated interval identification.

The small number of instrumentalists without much vocal experience in this sample provided only a limited glimpse of purely instrumental perception. Instrumentalists Sam, Molly, and Kate had learned to read primarily from visual clues (letter names or fingerings) without making effective aural connections, while Vince, Barry, Jane and Etta, all instrumentalists with choral experience as well, had successfully merged visual, kinesthetic, and aural connections. These students with both instrumental and vocal experience were ahead of those with only one type of pre-college experience. Jane’s considerable early vocal experience along with her instrumental experience had established strong reading and aural connections, even without all the rudimentary labels. About computer interval assignments she stated confidently:



I've already done all the [interval] levels for the semester. I can pick out all of that stuff. My ears have been trained for a long time but I haven't really known it. I've heard things, but I haven't known, 'that's a tritone.' I just knew what it sounded like, so when I started learning what those were, it just kind of made sense because they all had names, not just sounds.

This description of her skill development echoed the three-step, "preparation, presentation, and practice" approach to tonal patterns in Kodály methodology.<sup>22</sup> The sound came before the label. Her tonal memory from earlier instrumental and vocal experiences had prepared her to label the sound once it was made conscious. Then she was able to apply it to new situations. Similarly, Anna mentioned struggling to sing a song with several *do-la* (descending minor third) intervals, which were initially hard to hear, but easy to identify and sing since then in other songs.

That several students found it difficult to sight-sing the mostly stepwise melodies in tune confirmed Klonoski's admonition that aural skills instruction should address vocal production along with pitch internalization. Freshmen Jim, Molly, and Kate had to be coaxed to sing with tone strong enough for me to evaluate. They tried to judge whether their quiet singing sounded right to their intuition before they committed to singing aloud. Ben's comment about his singing only with instruments before college was interesting in this context: "As a result I really didn't have to listen all that much, and when I came here I realized how far off I was in my singing. Vocal control wasn't that good." Klonoski cited internalization of pitch as one of the most significant determinants of future success with aural skills.<sup>23</sup> This study also underscored the important goal for young children to "find their singing voices" and to learn to sing independently of instruments in elementary music instruction.<sup>24</sup> It should also stimulate instrumental teachers to incorporate singing along with rudiments of notation and to encourage auralization as they teach students to read music.

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<sup>22</sup> Rita Klinger, *A Guide to Lesson Planning in a Kodály Setting* (Cleveland State University, 1990), 2.

<sup>23</sup> Klonoski, "Teaching Pitch Internalization Processes," 95

<sup>24</sup> *National Standards for Arts Education and The School Music Program: A New Vision*. Music Educators National Conference. Available <http://www.menc.org/publication/books/standards.htm>.

### APPLICATIONS FOR AURAL SKILLS PEDAGOGY

This effort was a valuable step in my search for effective aural skills instruction. The design of this study allowed me to analyze my students' strategies in a more structured way than in previous semesters. To other teachers I would recommend taking time for individual interviews and having students discuss or write their strategies. These are practices I plan to continue. Studying my students provided several understandings which bear on aural skills pedagogy.

The first understanding is that most students have not been expected to auralize in previous instruction. Teachers at all levels should create opportunities for students to think about the sound of notation before hearing it performed. Allowing silence for internalizing pitch before sight-singing is recommended, as is alternating the singing of one measure or phrase and auralizing the next. Mystery tunes, described previously in this article, stimulate silent hearing (and serve as a handy attendance-taking activity). Sight-singing with others may reinforce tonal patterns, but it often encourages Follower behavior, especially if the teacher sings along. Opportunity for individual singing is necessary to help students move beyond the Follower for sight-singing and beyond the unfocused Contour-singer for auralization.

A second observation is that students need encouragement to focus on specific strategies for aural tasks and sight-singing. That many music students fear ear-training is common knowledge. Intelligent students with fine performance skills far too often change degree programs because they become discouraged in music theory courses. Troubling observations in this study have been students' negative evaluations of their sight-singing. Students' initial judgments often were, "Poor," "Bad!" or "Not very good," even if they made a small mistake or tripped over a syllable. Though at first they found it hard to keep their focus on strategies and away from negative judgments, several mentioned that writing scripts nudged them to think rather than guess. Scripts can also help teachers identify students who need remediation.

A third observation involves the ineffectiveness of the Builder strategy alone in comparison with the effectiveness of the Tone-Builder merger. Intervals could be grounded in tonal function before students are expected to identify isolated intervals out of context. Because the perception of intervals (and even the intonation away

from equal temperament) is different depending on their function in the scale, identifying intervals and tonal patterns within a given scale should precede interval-identification exercises where consecutive intervals require constant reinterpretation of tonality.

Even with the limited number of students in this study it is apparent that an effective curriculum at the college level must address students with diverse ways of knowing. Assessing the metaphors helped both my students and myself to understand RP tools. The metaphors provided a way of seeing paths to higher levels of understanding. Discussing the limitations of Button-pushing and Builder strategies provided direction and motivation to grow toward the Tone-Builder goal, which the most accurate students demonstrated in this study.

Following Klonoski's suggestion for a curriculum based on perception, teachers should plan exercises that are challenging but not developmentally inappropriate for inexperienced ears and minds. Successful students like Judy and Etta in this study had already internalized sound patterns which they were easily able to recognize and label. Other students had not defined such a storehouse of tonal patterns in their memory, though they had an intuitive sense of what sounded right or wrong. In the past I have been too quick to apply syllables to notation before students had connected them with sound apart from notation. The perceptual way to make this connection would be to hear sound patterns with tonal relationships, label them with *solfege* or numbers by ear, and then discover how the patterns are notated. Figuring *solfege* or numbers for familiar tunes by ear is one way to promote dependence on sound, rather than notation, for determining function. In essence this is the process for melodic dictation, that most dreaded of all activities for students. If the teacher plays or sings melodic fragments with neutral syllables for students to echo with syllables or numbers, students will begin to hear function away from the complexities of staff notation. To exercise auralization in a similar way, the teacher can "sign" the pitches with Curwen hand signs or *Scalesthenics* body motions for students to sing. These signs for sound can then be transferred easily to the staff. At the college level, the process can be taught quickly and efficiently, giving students the vital sound-to-symbol connection that even experienced Button-pushers and Pitchers might not have grasped in previous instruction.

Several issues surfaced concerning solmization, leaving me with more questions than answers about its role. Certainly it has great

value in introducing tonal function, but for sight-singing, students in this study resisted using tonal syllables for a variety of reasons. Eight of the fifteen freshman participants had sung tonal syllables before college, yet several chose not to use them for their sight-singing here. Sally lazily preferred staying at the Follower stage because she liked singing “by ear:” “It’s just easier for me just to do a *doo doo*... and if I don’t know a song, I *doo doo* it, and I can find things easy like that.” Aside from laziness, several students blamed insecurity in using the syllables. When I asked Judy to try again with syllables after an inaccurate sight-singing attempt, she was surprised at how readily she could stay within the key: “It does help me a lot. I’m just always afraid to do it because I can’t think the syllables fast enough when I’m going down or when I have to skip.” I also found it common for students to sing the wrong syllable on the right pitch. Sometimes they did not even realize it, but other times the wrong syllables subsequently made them stumble even though pitches were correct. In that respect Barry liked using numbers more than syllables: “Maybe that’s because of all the math I had. It’s easier to think in numbers, especially when the notes go down.”

Other solmization questions need to be studied more seriously. What is its appropriate developmental role in relation to the rudiments of notation? I expressed astonishment at Jane’s correct tonal syllables after she had no more than a quick introduction to them. She responded: “Well I’m not [good with syllables], but when I can look at it and say the G is *do* and stay in the five-to-six note range, B is *mi*, and I can just memorize that every C is going to be *fa*, ... I just kind of memorized it real quick.” Since she had already internalized the pitch through letter names, she was not using tonal syllables as a tool to auralize. When does solmization become overly cumbersome or unnecessary for those who learn to auralize with syllables? Other questions would be interesting to pursue as well. Do we really need the syllables other than for the tonic triad, since all other pitches fall only a step or half-step away? In that regard, Rogers has promoted the Jersild approach for sight-

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<sup>25</sup> Michael Rogers, “The Jersild approach: A Sightsinging Method from Denmark,” *College Music Symposium* 36 (1996): 149-169.

singing, which suggested tendency and resolution patterns based on the tonic triad, because they “reinforce tonal bearings.”<sup>25</sup> When can syllables or numbers eventually fade into the background for musicians with good RP skills, allowing them simply to think in sound?

### IMPLICATIONS FOR FUTURE RESEARCH

More research is definitely warranted to understand best practices for solmization systems. Additional research with more subjects is also encouraged to validate these metaphors and possibly to probe for other strategies. More difficult aural tasks and perspectives from more experienced musicians might provide additional metaphors for higher levels of cognition. One student’s high school experience with *Scalesthenics* led me to look for information on this method.<sup>26</sup> My students and I have found its tonal imagery compelling. The kinesthetic references to tonal tension have been helpful for internalizing pitch. I would like to experiment further with this approach as an introduction to tonal-thinking. Finally, I recommend that teachers study their students’ ways of knowing, especially those with different experiences and perceptions from our own. I have indeed learned from my students’ perspectives about thinking in sound and anticipate continuing this kind of qualitative analysis.

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<sup>26</sup> Milford’s “Scalesthenics” method is described on-line (<http://www.scalesthenics.com>).

APPENDIX A1

Table A1. Freshman participants		Pre-college experience		Aural task scores		Self-assessed metaphor(s)	
Major	Instrument		Solmization				
	voice	P, V					
	bassoon	I	movable-do	yes	Tt	Tt	Tt
	voice	V	numbers	yes	F/Cs	F/Cs	Cs
	voice	V	movable-do	yes	Tt	Tt	Tt
	cello	I	movable-do	no	**	**	**
	voice	C	none	no	*	**	**
	voice	O	none	yes	F	F	Cs
	voice	C	movable-do	yes	**	**	**

APPENDIX A2

Table A2. Participants from third-semester aural skills class

Major instrument	Pre-college experience	Solmization	Aural task score	Self-assessed metaphor(s)
			AT3	
voice	P, V	C	10/11	yes Tt F/
trumpet	I	B, C	11/11	yes Bp/B
bone	P	B	8/11	yes F/Bp
voice	P, V	C	11/11	yes Bp/Tt Tt/B

## APPENDIX B

### METAPHORS FOR PITCH PERCEPTION

#### THE FOLLOWER

Followers usually follow another singer or an instrument to sing unfamiliar music accurately; they do not fully depend on the music notation even while looking at it. Followers are quite adept at making instinctive split-second adjustments to match a stronger singer or an instrumental accompaniment.

#### THE BUTTON-PUSHER

Button-pushers readily recognize pitch names or associate pitches with fingerings as they play melodies on an instrument, but may have difficulty imagining how the notes will sound *before* they play. From musical experience Button-pushers usually can tell intuitively if they play or sing a wrong note *after* it sounds. Button-pushers may visualize a keyboard or pretend to use their fingers to play a melody on an instrument to help them internalize pitch.

#### THE CONTOUR-SINGER

Contour-singers know to move their voices up or down with the notes on the staff, but scale steps and skips range from approximate to inconsistently accurate and sometimes do not stay within the key. Contour-singers may sense that their tones do not match the notes after they sing them, but may or may not have a good sense of where the tonic pitch is, either aurally or visually. Some may try to anchor their singing by comparison with a reference pitch that is prominent in the melody.

#### THE TONAL-THINKER

Tonal-thinkers usually prepare to sight-sing by thinking through the scale or the tonic triad. They recognize the tones of the tonic triad while they are singing and relate other pitches to these tonal anchors. Tonal-thinkers hear larger intervals by thinking of tendencies and tonal function rather than thinking about the size of an interval. Most Tonal-thinkers learned to internalize pitch with



movable-do syllables or numbers, or they know how to spell scales so well that they are able to think through the letter names within a key.

### **THE BUILDER**

Builders measure intervals from one pitch to the next, or to another pitch in close proximity. They recognize isolated intervals and note names, i.e., in the key of A, they might see A to E, and think, “perfect 5<sup>th</sup>” rather than “do-so.” They sight sing primarily by thinking about the size of the interval, not about how the next tone functions in the scale. Builders may have a good sense of tonic but may not always use it to guide them. If they miss one interval in singing or dictation, they will likely miss several pitches because they are relating to a previous pitch, rather than to an overall sense of key.

### **THE PITCHER**

Pitchers have absolute pitch recall. Their target is a sound associated with the letter name in their memory. Pitchers do not need to use tonal syllables, functional relationships, or intervals to sight-sing or internalize pitch in the key in which it is written, but find it difficult to read and sing music in a key other than the notation indicates. They also find it difficult to play an instrument tuned as much as one half-step sharp or flat. In coping with out-of-key contexts they must learn to transpose through intervallic reasoning or tonal thinking.

APPENDIX C

Examples from AT1 and AT2: For each four-measure set, circle the measure that is played. (Additional instructions for AT2: Write what you heard that made you decide the answer.)

A musical score consisting of three staves. The top staff is in treble clef with a key signature of one flat (Bb) and a 4/4 time signature. It contains four measures of music, each with a different sequence of notes: Measure 1: G4, A4, Bb4, C5; Measure 2: G4, A4, Bb4, C5; Measure 3: G4, A4, Bb4, C5; Measure 4: G4, A4, Bb4, C5. The middle staff is in treble clef with a key signature of one flat (Bb) and a 4/4 time signature. It contains four measures of music: Measure 1: G4, A4, Bb4, C5; Measure 2: G4, A4, Bb4, C5; Measure 3: G4, A4, Bb4, C5; Measure 4: G4, A4, Bb4, C5. The bottom staff is in bass clef with a key signature of one flat (Bb) and a 4/4 time signature. It contains four measures of music: Measure 1: G3, A3, Bb3, C4; Measure 2: G3, A3, Bb3, C4; Measure 3: G3, A3, Bb3, C4; Measure 4: G3, A3, Bb3, C4.

Examples from AT 3: For each three-measure set, circle which of the two examples is played, or if neither is correct, notate what you heard in the third measure. (The given note is notated correctly.) Below each example, write what you heard that made you decide the answer.

Two musical staves in treble clef with a key signature of two flats (Bb, Eb) and a 4/4 time signature. The top staff shows a three-measure sequence: Measure 1: G4, A4, Bb4, C5; Measure 2: G4, A4, Bb4, C5; Measure 3: G4, A4, Bb4, C5. The bottom staff shows a three-measure sequence: Measure 1: G4, A4, Bb4, C5; Measure 2: G4, A4, Bb4, C5; Measure 3: G4, A4, Bb4, C5.

Sight-singing task: Prepare to sing the melody below.

A single musical staff in treble clef with a key signature of two flats (Bb, Eb) and a 4/4 time signature. It contains a melody of eight notes: G4, A4, Bb4, C5, G4, A4, Bb4, C5.

Read the descriptions of the metaphors for music reading strategies.

a) Do any of the metaphors describe the way you usually **sight-read** music on an instrument?

b) Do any of the metaphors describe the way you approach **sight-singing** or **auralizing**?

c) Is there a different or better way you might describe your thought process?

d) How have your strategies changed since you began college instruction?

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