A MODEL FOR MUSIC PERCEPTION AND ITS IMPLICATIONS IN MELODIC DICTATION[1]

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JUSTIFICATIONS FOR DICTATION IN THE CURRICULUM?

Why do we teach dictation? What do we hope to develop in our students by playing music for them and asking them to write it down? The practice is certainly well-ensconced in college and university music curricula across the country, but very little has been written concerning the reasons for teaching dictation.[2] Most of what we can learn about the justifications for aural-skills training can only be gleaned from the pages of textbooks designed to teach the subject. In two recent articles,[3] I looked at eight aural-skills texts and among the features I discussed were the purposes they convey to their readers—to teachers and students—for teaching aural skills. Among the justifications for teaching dictation found in these books are broad ones, such as "The skills and understandings called 'ear-training' consist primarily of the establishment of mental relationships between sounds and symbols,"[4] and performance-oriented ones, such as "Intelligent listening is the most important thing a musician does. No matter what high level of dexterity and accuracy is achieved with an instrument or voice, success is inevitably limited and regulated by the ability of the ear to discriminate and guide the musical performance."[5]

While the above descriptions are correct, they fail to recognize all of the cognitive skills that dictation can develop. To justify a place for dictation in the curriculum, we must be sure of those skills we are trying to develop through teaching. Certainly, dictation does not address the kinds of broad-scaled listening skills often taught in music history, literature, analysis, and appreciation classes. While those classes develop a sensitivity to form, texture, style, and compositional devices, ear-training classes are geared towards a kind of fine, detailed listening with attention to the smallest items of pitch and rhythm. Indeed, the typical goal of most melodic dictations is for students to write down a precise notation of the rhythms and pitches in a short melody.

I contend that the skills necessary to achieve that goal are important musical skills. I further contend that melodic dictation—when properly taught—can be the best means of developing those skills as a preliminary to applying them to a variety of listening situations at more advanced levels.

This article will address the question of why we teach dictation by examining the process of tonal melodic dictation as it is typically practiced in American colleges and universities, and by comparing this to the process of music cognition as it is (or should be) practiced by the developing musical mind.

CASE STUDIES: PARALLELS TO CLINICAL SCIENCE (and student stories)

In disciplines such as clinical psychology and medicine, technical discourse is rarely carried on in the abstract. The body of knowledge in such disciplines is based in part upon case studies—narratives that detail information about subjects who exhibit features pertinent to a given study. In contrast, the body of knowledge in aural skills training is mostly based on comparatively vague aphorisms about mental relationships and intelligent listening. I do not mean to denigrate such ideas; developing intelligent listening and mental relationships between sound and symbols is a goal to which we should aspire, but what kind of intelligent listening? Listening to which features of music? Precisely which mental relationships? At the risk of becoming obtuse, let me continue the parallel with medical science a bit further. The prescription of penicillin for an infection is not based on some armchair pronouncement like "... the idea of taking drugs for an illness is an important one." Instead, it is based upon case studies of sick patients, and the experimental and clinical examination of various treatments and success ratios. In aural-skills training, a few researchers have presented data that demonstrate the relative success or failure of a few techniques,[6] but even these few studies have been done in the near complete absence of case studies regarding various difficulties in music perception and the appropriateness of various methods of diagnosis and remediation.

Since our goal is to develop the aural skills of students who are deficient in some way, I feel that I should first present brief case studies of a few students who exhibit representative deficiencies. I have chosen four who produced errors on a prevalent measurement of aural perception—melodic dictation. Adopting a technique used in some psychoanalytical literature, I will—for ethical reasons—use only a single initial to refer to each student.

Ms. W

The first case is not typical; indeed, her problems are rare among music students. Ms. W was a college sophomore who scored poorly on dictation tests, so I asked her to perform a few listening and singing activities (selected from those described later under "Diagnosis and Remediation"). Her achievement was negligible; she even had trouble matching pitches. When I questioned her about her poor performance on these tasks, she confessed that she experienced a constant ringing in her ears that prevented her from hearing accurately. I suggested she seek medical help—that she consult an audiologist—to improve her condition. She eventually stopped attending school; we thus have no follow-up record of her condition and possible treatment.

Mr. D

Mr. D—a college freshman—also scored poorly on dictation tests. He came to me for remedial help and I asked him to sing back some short melodies immediately after I played them. For most melodies of more than a few notes he would sing most pitches incorrectly, although his responses were musical and often followed the shape and rhythm of the original. I then asked him to sing any tune he knew by heart but had not seen in notation; he chose "Twinkle, Twinkle Little Star" and sang it without error. When I asked him to tell me about the rhythms and the scale degrees of the notes in "Twinkle, Twinkle" and various other folk tunes, he was quite accurate. When I asked him to notate several of these tunes, he did quite well—work which would have earned him an "A" on a dictation test.

Ms. J

Ms. J was a college senior who had been struggling with aural-skills courses for years. When I arrived at the institution where she had been a student, I tested her to find out what had been holding her back. She did poorly with dictation, but she was able to sing back novel melodies upon first hearing with great accuracy. In contrast to Mr. D, she could recall dictation-length melodies with impressive precision. However, when asked to supply information about the scale degrees or rhythms of those melodies, she balked. She was unable to identify even the simplest tonal functions or rhythmic proportions. Nevertheless, when given a series of

scale degrees and rhythmic proportions, she was able to notate them properly in various clefs, keys, and meters.

Ms. F

Ms. F—a folksinger—had never worked with music notation before deciding to study aural skills. She expressed a desire to write down the tunes she sang—especially those she composed—and thus embarked on the study of melodic dictation. She was, at first, quite unsuccessful. But when I asked her to sing back some novel melodies, she was up to the task. She even understood the ideas of scale degree and rhythmic proportion, and was able to accurately identify such in those melodies. When called upon to notate what she had identified, however, she was unable to do so.

In all four of the above cases, the final results were similar: unsatisfactory answers to melodic dictations. Yet for each of these cases, the cause of the problem was different. For Ms. W, an inability to hear properly prevented any further processing of the sounds. For Mr. D, an inability to remember even short musical passages left him with nothing to do during dictations; no amount of work on solmization or notation could offer him hope of improvement. For Ms. J, a weakness in discriminatory skills—in this instance, the inability to discern scale-degree function—prevented her from succeeding, despite her knowledge of notation. For Ms. F, the ability to hear, remember, and understand what was heard, was negated by an inability to write the correct answer due to a lack of training in the principles of music notation.

A MODEL FOR MUSIC PERCEPTION: EMPIRICAL AND PHILOSOPHICAL EVIDENCE

These case studies point out there are at least several phases in the process of music perception that need to be carried out while taking melodic dictation. That the practice of taking dictation involves separate phases is not a new idea—Michael Rogers refers to two stages[7] and Ronald Thomas has alluded to more than fifteen[8]—but what follows here is a much more rigorous model for the process based not only on clinical observations of student subjects but also on empirical and philosophical studies of perception performed by scholars in the fields of music theory, music education, and cognitive psychology.

At its broadest, the model is divided into four phases, represented by

the four case studies discussed above: hearing, memory, understanding, and notation. The phases are sequential; each must be performed in turn or subsequent phases will not be viable. Let us first broadly examine those phases in the order students must use them.

A. Hearing

The first phase is hearing. Students must hear the melody before any other activities may be carried out. This should be obvious, yet—as we shall see later—difficulties do arise during this phase.

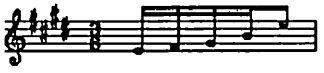
B. Memory

Once it is certain the students have heard the melody, they must remember it in order to do anything with it. Whatever musical material is not remembered correctly will be notated incorrectly no matter how accurately the subsequent phases are carried out. Fortunately—as we shall shortly see—only a portion of the melody needs to be processed after any given playing.

C. Understanding

Once students have extracted such a portion and placed it in their memories, it is time to move on to the next phase in the process of taking dictation. No matter how small or large a portion has been remembered, it is important to *understand* that portion before notating it. Since the goal of most dictations is to notate rhythms and pitches, it is those two elements that must be understood. I will discuss this phase in detail below, but to differentiate it from notation consider the following short example. Students who hear the first measure of the third movement of J. S. Bach's Violin Concerto in E, BWV 1042 (shown in Figure 1) respond "do, re, mi, sol, do; half beat, half beat, half beat, half beat, one beat". We know they have clearly understood the excerpt; we don't yet know whether they can notate it.

Figure 1.



D. Notation

The final phase in taking melodic dictation is notation. It is a relatively straightforward task to translate one's understanding of a melody into traditional notation. Upon being told to use a treble clef, a tonic of E, and the eighth note as a beat unit, every musician should be able to translate the solmization syllables and beat lengths listed above into the notation shown in Figure 1. Of course, a strong knowledge of notational principles is necessary to execute this task. This, too, is an aspect of aural skills as well as written theory training.

THE PROCESS: INVESTIGATION AND CRITIQUE OF CURRENT PRACTICES

Of the four phases, the first and last are improved only indirectly by training in aural skills. This training can merely point to problems in the area of hearing, and only serves as drill and practice in the craft of notation (the essence of which is traditionally taught in the written theory classroom). It is the middle two phases—memory and understanding—that aural training can truly develop. Each of these phases is comprised of smaller steps that must now be examined.

A. Hearing

In my clinical experience I have encountered at least two students who had physical or neural hearing deficiencies. Somehow, they had managed to muddle through pre-college musical activities before entering upon aural-skills training. My diagnosis of their problems at least pointed them in the direction of an audiologist who is equipped to deal with them. In addition, there are students with attention problems; any student who does not pay attention to a dictation *will* find it difficult. This may be a matter of concentration and not medicine, but here too the process of dictation can help at least to make a diagnosis. Attention may also be diverted by nervousness. This is a real problem for many students who take tests in various disciplines; it is a particularly common problem for students of music. I will address nervousness later in this article; other causes of hearing difficulties are mercifully rare in music students.

B. Memory

Memory is an extremely important phase in the process of taking melodic dictation. Indeed, it is extremely important in many musical processes. In the words of one cognitive psychologist,

> The way one hears music is crucially dependent upon what one can remember of past events in the music. A modulation to a new key is heard only if one remembers the previous key. A theme is heard as transformed only if one can remember the original version of which it is a transformation. And so on. A note or chord has no *musical* significance other than in relation to preceding or following events. To perceive an event musically (that is, to recognize at least part of its musical function) is to relate it to past events. It is, therefore, important for us to know how good we are at remembering past musical events, and to know what factors assist our memory.[9]

Despite how important it is, memory as a stage in the process of melodic dictation is often overlooked. One reason is a common misunderstanding of short-term musical memory. Many teachers of melodic dictation forget that short-term musical memory is subject to limitations similar to those that constrain all short-term memory. For instance, consider Bruce Benward's advice to students in his book *Ear Training: A Technique for Listening:* "Only after you have the entire melody memorized should you attempt to write anything on paper!"[10] and "After hearing each melody try immediately to sing it in its entirety in your mind."[11] These sentences precede melodic dictations, including the one shown in Figure 2a and the one shown in Figure 2b.

Figure 2a.[12]

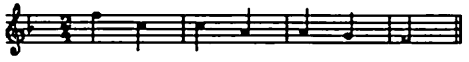
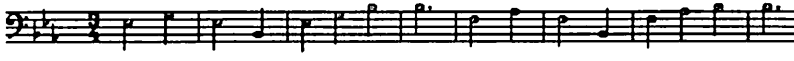


Figure 2b.[13]

There is a fundamental difference between those two melodies in relation to short-term memory. The first one falls within the short-term limit of "seven plus or minus two bits" described by George Miller in his classic study on perception and memory.[14] The second one is much longer; it far exceeds the length of something easily committed to short-term memory.

In practice, the notion of "seven plus or minus two bits" applied to musical information is dependent upon the aural and theoretical training of the listener, as well as their experience with the repertoire. This is due to the fact that listeners can group notes into meaningful units or "chunks."[15] As an example, consider the melody shown in Figure 3.

Figure 3.



The most naive of listeners would perceive this as at least sixteen bits of information (perhaps even thirty-two, if one considers rhythmic information to be processed separately from pitch). In contrast, a listener with a developed sense of harmonic listening might perceive it as two parallel statements of eight bits unfolded over two chords. A listener schooled in music literature would perceive this as one bit, the one named "Beethoven's Third Symphony, first movement, main theme."

Even if teachers write original melodies, similarities between those melodies and familiar literature will contribute to the ease with which the melodies are separated into chunks.[16] Even in the absence of any connections to a repertoire, it should be apparent that there are many factors that contribute to the chunking of melodic material, such as rhythmic repetition, sequential patterns, harmonic function, and so on. We must be cognizant of the chunking abilities of our students when we construct materials for melodic dictation; many of us will find our freshmen surprisingly closer to the naive listener described above than to anyone more sophisticated.[17] In the words of one cognition researcher, "in melodic dictation, for example, consideration should be given to the amount of musical information that a student can be expected to encode, store, and report."[18]

So, what are we trying to accomplish by giving dictations like Benward's second melody (shown in Figure 2b) to our students? It is indeed to misunderstand short-term memory to ask them to sing this melody in its entirety after hearing it. Nonetheless, it is precisely such melodies that

develop an important listening skill: the ability to extract and examine successive *portions* of a composition upon repeated hearings. A mature listener does this all of the time; how else does one answer such questions as "Does the antecedent end on the tonic or dominant?" or "Is this a tonal or real answer?" or "What motive are the violas playing at the beginning of the development?" Dictation melodies that are too long to memorize in the short-term require students to extract portions and work on them individually. This is the primary reason for giving such long melodies and for playing them several times.[19]

Let me also caution that those portions should be extracted as melodic units, with pitch and rhythm remembered as a whole. It is unmusical to remember and process the rhythms of an entire passage over the first several playings, and then return to try to remember and process the pitches after still more playings. Not only does this practice unnaturally divide the rhythms and pitches of the melodic gestalt (which should only—and often must—be separated during the understanding phase which comes next), it also burdens the short-term memory by creating two sets of information to remember instead of a single (if admittedly larger) one.[20]

At this point, I must also warn against suggesting that students write while listening.[21] In a recent article, Gary Potter used ethnographic techniques to examine skilled musicians taking dictation.[22] Among the conclusions of this fascinating study is the following: "While the ability to memorize a melody quickly is a tremendous asset in dictation, those subjects who 'listened first to make a mental tape to be played back at will' did far less well than those who began writing during the first hearing."[23] This conclusion demands scrutiny on two grounds, the first philosophical and the second empirical. Philosophically, we must ask what is the goal of training in dictation—to get the correct answer or to develop a broad slate of skills including hearing, memory, understanding, and notation? If we train students to write while they listen we will develop fleets of musical shorthand-takers, perhaps adept at getting the right thing on paper but lacking in skills such as focussed attention, selective memory, and increased memory capacity. Michael Rogers is critical of such a narrow orientation on similar grounds, noting that "the purpose of dictation, for example, is not to produce correct written transcriptions but to produce a certain kind of listener who can hear sound as meaningful patterns."[24]

On empirical grounds, I suspect that Potter's subjects had not been trained in the proper use of selective and accurate memory. Experimental studies have shown it is helpful for students to correctly repeat—either vocally or mentally—what has been heard before they begin to process it. Indeed, the act of rehearsing a melody has been shown to reinforce one's memory of it. One study compared subjects' memories for melodic details

after immediate recall and after a ten-second rehearsal period. "The rehearsal condition caused rather striking differences in performance .... For the tonal patterns we can see the heightened primacy performance with no difference in the recency position [i.e. those who rehearsed remembered the last notes as well as and the first notes better than those who did not rehearse]. The serial curve has essentially disappeared with performance having reached an 80 percent ceiling. Here is where we would expect the best performance. With free-rehearsal and tonality as an organizer, we should have optimal memory for melody."[25] Another study went further to compare those who rehearsed well with those who rehearsed poorly. Subjects who did not sing a melody correctly after hearing it actually did less well on subsequent same/different responses than those who performed no rehearsal at all. However, for subjects who *did* sing correctly, "91% of their *written* same/different discriminations were correct."[26] Not surprisingly, memory is enhanced by correct rehearsal but degraded by incorrect rehearsal. Perhaps Potter's subjects who made a mental tape were playing it back incorrectly.[27]

I would now like to address the specific procedures through which dictations are presented. These procedures affect how students' short-term memory can handle the music they hear. One aspect involves whether dictations are played in fragments or only in their entirety. Whereas some instructors offer only repeated playings of entire dictations, others follow a procedure similar to that prescribed in Levin and Martin's *Sight Singing and Ear Training Through Literature:*

> Play the dictation in its entirety . . . Perform the dictation in two-measure fragments. . . . Play each fragment three times . . . Play the entire dictation without interruption.[28]

Such procedures minimize any training in selective memory. Students must learn to extract a portion of a musical passage and retain it in short-term memory, but breaking a dictation into short fragments and repeating those fragments several times will not help them learn that skill.[29] The only applications for breaking a dictation into fragments would be: 1) if selective listening is not a goal, or (2) to diagnose those students who have difficulties with selective listening, by testing students' performance with full-length dictations and with fragmentary ones—those who have difficulties with the full-length ones but succeed with the fragments obviously need remedial help with selective listening.[30] To develop students' abilities to listen

selectively, dictations *must* exceed Miller's limit of 5 – 9 bits and be played more than once.

How many times *should* each dictation be played? A typical number of playings is three, but I have seen this range from a single playing to "as many as it takes to get it right." Theoretically, the proper number of playings should be a product of the total number of bits in the melody divided by Miller's limit of 5 – 9 bits (a bit being dependent upon the training and experience of the listener, as described above). Let us assume, for the sake of discussion, that our students' chunking abilities are at present minimal—that one note would equal one bit in their short-term memories. It would follow that a dictation of 5 – 9 notes requires one playing, a dictation of 10 – 18 notes requires two playings, and so on. In practice, when extending beyond a single playing of 5 – 9 notes, an extra playing is usually necessary to account for the task of discerning the relationships between separate remembered portions of the melody. Thus, three playings are appropriate for melodies of 10 – 18 notes. Obviously ten-note melodies are—in general—considerably easier than eighteen-note ones. However, students whose short-term musical memories achieve at the lower end of Miller's limits will be challenged by the ten-note ones; students whose memories meet or exceed Miller's upper limit will breeze through eighteen-note ones. In addition, students whose chunking abilities allow them to group notes into larger meaningful bits will require even longer melodies.

C. Understanding

It is important to keep in mind that the stages of understanding and notation will almost always be carried out on extracted portions of music after each playing, not on an entire dictation melody. Thus, if I refer to a "first pitch" or "all of the notes," I mean of that extracted portion, not the entire melody.

The purpose of separating the end of the process into two phases is to isolate the task of understanding from the complexities of notation. It is extremely important to know that a student hears the functions of the pitches in a melody without regard to their appearance in a particular key. Likewise, it is just as important to know that a student hears that a melody is in, say, triple meter and that the student hears the durations (in terms of beats) of the rhythms in that melody without regard to a particular meter, such as 3/2 or 3/4. To this end, specialized forms of communicating musical understanding must be employed that do not rely on traditional notation. In terms of pitch, we have been using such systems—e.g.,

solmization and scale degree numbers—for years. There are similar, although somewhat less familiar, systems of rhythmic designation as well.

1. Rhythm

I will start by examining rhythm because—once a passage has been remembered—the rhythms and not the pitches should be figured out first. Any suggestion to focus on the pitches first and rhythms later[31] works backwards: once a passage has been remembered, figuring out the rhythms provides a framework in which to place the pitches. Without any metric and rhythmic information, how much good does it do to know that "fa" occurred somewhere in the middle of a passage? In contrast, laying out a temporal framework before figuring out the pitches gives the listener the precise metric location for each pitch. Thus, unlike the memory phase during which rhythms and pitches should be processed together, rhythms should be processed before pitches during the understanding phase.

The most fundamental aspect of understanding rhythm is perception of the pulse. Students should be able to perceive the pulse of a melody without extramusical cues. Perception of the pulse should be quickly followed by grouping those pulses into meter. Students should be able to determine whether the meter of a melody is duple or triple simply by listening. Since we seek to know whether students understand metric groupings without regard to a particular meter sign, we might ask them to simply write "duple" or "triple." But since this is one step in a multi-step process, it is wise to lay the groundwork for subsequent steps at this point. Thus, a metric framework such as Figure 4, with large vertical lines representing primary pulses and smaller vertical lines representing secondary pulses, might be used as a grid within which rhythms can be laid (here representing four measures of triple meter).

Figure 4.

It should be clear by this point that perception of both pulse and meter are fundamental and important aspects of music listening. Why, then, do many of us give out this information instead of testing for it? In revealing

the meter of a melody before playing it we are opting out of developing ability to perceive this most basic of temporal features. This is often done by verbally stating the meter, or by counting the pulses before playing. In textbooks, the ubiquitous method is to print an answer blank comprised of a musical staff with various information including a meter sign and barlines printed on it. As an example, consider Figure 5, taken from Henry and Mobberley's *Musicianship*:

Figure 5.[32] **Instructions:** Observe the given information and notate the pitch and rhythm of the melody played.

This answer blank provides the meter sign, the rhythm of the first note, and the fact that the music begins on an anacrusis. The pulse is also provided: "Small notes preceding each frame tell the student how many metronome taps will [be] heard on the tape. These cues are included in the instructor's manual and should be used for class dictation as well."[33] Henry and Mobberley are not to be singled out here; these practices are typical of most aural-skills texts.

Cues about pulse and meter are sometimes given *during* the performance of a dictation as well. These cues include emphasizing the pulse by foot tapping or by merely accenting certain notes, and revealing the meter by counting on those pulses.

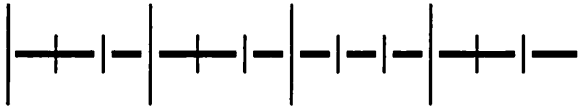
In practice, it is possible to give a dictation without presenting much extra-musical information. We should only reveal those facts that are not audible. Thus, the beat unit or bottom number of the meter sign should be given in all cases (since, for example, 2/4 is audibly indistinguishable from 2/2). In addition, duple and quadruple meters usually sound alike; if it is vital that one or the other be notated, perhaps that information should be given only after the final playing or indicated as a preference only if the meter is discovered not to be triple. Finally, the distinction between compound meters and a "faster" triple meter is not audible. Again, the requirement to notate a melody in compound meter might be given later in the process, or as a stipulation in some cases only if the melody is triple at

some level. In these cases, one might even reveal that a melody should be notated in compound meter but ask the students to determine which one.

Even under these procedures, it is possible that not all correct answers will be identical. By not tapping or counting the pulse before or during the dictation, one risks receiving rhythmic augmentations and diminutions of the "correct" answer. Perhaps surprisingly, this occurs rather infrequently. In any case, it is a small risk to withstand to be sure that students are truly perceiving the pulse and meter and not merely taking their teacher's word for it.

Once the pulse and meter have been determined, it is crucial for the student to understand the rhythmic durations of a passage (in terms of beats) before notating them. To this end, some form of rhythmic syllables or graphic notation is useful. While rhythmic syllables have their uses, they are problematic in written use in that they exclude the opportunity to graphically represent the temporal relationships of rhythm as a framework for the pitches. For this reason, I prefer a form of graphic representation. For example, the opening notes of the first theme from Brahms' Second Symphony may be represented in the manner shown in Figure 6.

Figure 6.



This type of graphic representation is simple and efficient, and it serves the goal of separating rhythmic understanding from notation. In suggesting the use of graphic notation, I do not mean to complicate the process of taking dictation, nor do I intend that students should use it as a form of shorthand. Rather than complicate the process, using graphic notation makes the understanding phase explicit and offers an opportunity for teachers to examine each student's proficiency in that area. And if the use of short-term memory has been properly encouraged and developed, no student should find the need to scribble anything in shorthand while listening intelligently. A student who produces the graph shown in Figure 6 displays an understanding of the meter and rhythms of the Brahms excerpt. What remains is to translate that understanding into traditional rhythmic notation.

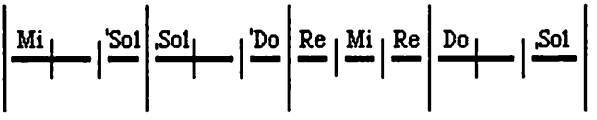
2. Pitch

Pitch must be handled similarly. It is crucial for a student to understand the functions of the pitches in a tonal melody before notating them. However, just as perception of pulse and meter is necessary to understand the rhythms of a melody, so is perception of the tonic necessary to understand the functions of the other pitches.[34] This is one of the most basic skills a listener should have; we should encourage its development from the first day of training.

One practice that prevents students from developing the skill of tonic identification is playing the tonic pitch or chord before performing a dictation. No one plays the tonic chord before an actual performance, so why do it in the aural-skills classroom? If the reason is to "make sure" the students know what the tonic is, then it's time to work on that skill and not dictation. Another practice masking the problem of tonic identification is providing the name of the starting pitch or writing it on a staff before playing a dictation (see, once again, the typical answer blank shown in Figure 5). Students who have a poor sense of tonic but who are given a starting pitch will follow their noses in stepwise passages and make educated guesses about the size of leaps without perceiving the functions of the pitches. Such students may even resort to an intervallic strategy, measuring the distances between successive notes. The problem here—even if students get the right answer—is that the tonal system, the functional relationships between all pitches and the tonic, has not been internalized. Several studies have shown that tonal context plays a more important role in music perception than does interval recognition.[35]

To express those contextual relationships, scale-degree numbers or moveable-*do* solfège syllables are useful.[36] For example, syllables may be added to the Brahms theme as shown in Figure 7 (also note the use of small marks to indicate ascending or descending skips).

Figure 7.



The suggestion of numbers or moveable *do* is not an offhand one. The choice of a solmization system is unequivocally dependent upon the particular musical features one wishes to express. Whereas fixed *do*

expresses absolute pitch names, scale degree numbers and moveable *do* express scale degree.[37] Thus, fixed *do* (or its American equivalent—singing on letter names) is useful during the next phase when translating into notation, but since our current task is functional tonal understanding in the absence of notation—and that takes place without regard to key—it is necessary at this stage to use numbers or moveable *do*.[38]

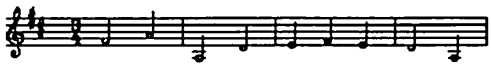
In any case, the following discussion assumes that students have developed proficiency in the use of moveable *do*. In fact, it is very important that students become fluent with some system of functional solmization since it can serve as a tool for exploring and developing their musical understanding and expressing that understanding to others. This is one way training in sightsinging complements listening skills.

To move from identifying tonic to supplying syllables is a big leap. In practice, the process involves a number of steps. Remember that, since only a portion or passage of music has been remembered, the following steps operate only on that passage. First, after the tonic has been inferred, a starting pitch must be reckoned. Working from any point except the beginning of the remembered passage is relatively unmusical (although I don't wish to discourage the practice entirely) and, in any case, is probably unnecessary since the passage is in memory and reproducible from the beginning. Once the starting syllable has been determined, it is a simple matter to apply successive syllables to the stepwise passages and to determine a new starting syllable each time the melody leaps. In this fashion, from starting pitch and leap and through stepwise patterns, the scale degree of each pitch can be determined.

D. Notation

What remains is to take what has been heard, remembered, and understood and to notate the pitches in a particular clef and key, combined with the rhythms in a particular meter. To continue with the Brahms example, given a treble clef, tonic of D, and 3/4 meter, students should be able to take the graphic representation found in Figure 7 and notate it as shown in Figure 8.[39]

Figure 8.



The knowledge and skills necessary to execute this task are typically taught under a rubric such as "written theory," either in a separate course or in separate lectures within a comprehensive musicianship curriculum. Nonetheless, they are integral to the dictation process.

Eventually, all of this—hearing, memory, understanding, and notation—must be integrated so the entire process becomes essentially instantaneous. This results in the ability to hear music and immediately form a mental image of the notation. Perhaps this is why Potter found that the best dictation-takers "began writing during the first hearing"[40]—they had already mastered the individual stages and were combining them into one process. This is an ultimate goal of aural-skills training. When students are ready, challenging and rewarding drills can help them integrate the four phases. These range from calling out scale degrees, pitches, or rhythmic syllables to actually performing *while the music is sounding*.[41] Students, however, who have not mastered the four phases—especially the subtleties of understanding and notation—are not ready to begin this type of mental imagery.

We may, however, move them gradually in that direction by controlling the time between playings and after the final playing. The amount of time allowed for these pauses is important. These durations can range from a fraction of a minute to many minutes, but the proper time to be allotted here is dependent upon the speed with which students can accomplish the tasks involved in memory, understanding, and notation. As students improve with these tasks, the durations between and after playings can be shortened.

It is interesting that the act of performance may be substituted for notation as the final phase in the process, even at the earliest stages of training. Thus, individual students might be asked to perform a melody rather than notate it after hearing it. This practice is valuable: relating hearing, memory, and understanding to performance is perhaps as important as relating them to notation. However, three caveats apply. The first applies to extractive listening: when performance is used as the last phase in aural exercises, human memory must play the role normally served by paper and pencil for storing information while listening. If a phrase is too long to be kept in short-term memory, a performer must find some way—upon repeated hearings—to commit successive portions of music to longer-term memory so as not to lose them while processing new material.[42] The second caveat applies to vocalists: asking them to perform a melody by singing does not involve the understanding phase since no knowledge of pitches or rhythms is necessary to mimic a musical phrase vocally. One solution to this problem is to ask vocalists to sing on functional syllables (making the understanding of scale degrees explicit), letter names (a proc-

ess akin to pitch notation), or rhythmic syllables (making the understanding of rhythmic proportions explicit). The third caveat applies to instrumentalists—for them, performance requires hearing, memory, and understanding of pitches but only hearing and memory of rhythms. In other words, although instrumentalists must understand the absolute pitches they reproduce they do not need any rhythmic understanding to mimic rhythms. Instructors should keep these caveats in mind lest the skills involved in extractive listening, understanding, and notation remain undeveloped.

DIAGNOSIS AND REMEDIATION

Were dictation the only activity foisted on aural-skills students, those who show initial difficulties might never improve. They would most likely produce a string of unsatisfactory papers, perhaps buoyed at some point by an increased ability to guess. But if we view dictation not only as an end in itself but also as an indicator—a sensitive canary in an aural-skills coal mine, ready to curl up and die at the slightest whiff of trouble—then we can identify those students with unsatisfactory papers and lead them to private sessions of diagnosis and remediation.

A. Hearing

Fortunately for the teacher of aural skills, few music students experience difficulties in hearing. As mentioned above, an obstacle in this area can be due to physical problems in the ear or in auditory processing. These problems should be referred to an audiologist, but such a referral should be made only after eliminating hearing problems that are behavioral and not physical. Behavioral difficulties in hearing involve the diversion of attention—as discussed above—usually through a lack of concentration or an overabundance of nervousness. The only tests for this are: 1) an interview with the student in which questions are asked about mindfulness and nerves (an unpredictable exercise, as any ethnographer will confirm), and 2) reproducing the listening experience in as relaxing and encouraging an environment as possible. This second test may be facilitated by eliminating the variables involved in understanding and notation: the student can be asked to sing back portions of a dictation-length melody without concern for syllables, rhythms, pitches, and the like. Unfortunately, the results from such hearing tests will be polluted by any memory difficulties the student might have. This is lamentable, but not prohibitive. At worst, negative results on such tests could lead to remediation for memory skills, which

would be unproductive for a student with attention problems thus leading the teacher to work on attention instead.

A student's difficulties in paying attention can be caused by a host of problems that are well beyond the scope of this article. However, one such problem—nervousness—is so common in a performed art such as ours that it bears addressing upon discovery. I have found that nervousness in the aural-skills classroom frequently correlates with nervousness in other musical activities, especially performance. An early diagnosis of this behavior affords an opportunity to direct students towards various mental and physical relaxation techniques, possibly heading off more serious consequences in other activities in the future.

B. Memory

Before I begin to discuss the diagnosis of memory problems, let me make a few preliminary comments about using the voice as a diagnostic tool. It would be ideal if we could know just what students hear in their minds, but we can't. Thus, singing is necessary for diagnosis.[43] For example, students must sing to repeat a passage if we are to discover whether they can remember it at all. But we must also encourage, no, require our students to internalize this process. They must be able to hear an entire passage in their minds.[44] Indeed, this type of internalization is an essential kind of musical thinking. Well-trained musicians can hear music mentally in the total absence of audible sound,[45] and aural training can develop this ability. However, the importance of internalization notwithstanding, the necessities of diagnosis demand that students sing certain responses.[46]

The most basic form of pitch memory is the recall of single pitches. The simplest test for this skill is to play various pitches and ask students to sing each one after they hear it.[47] This is such a fundamental musical skill, yet a few young musicians have some difficulty with it. A scant few can not recall any pitch, but—of those with problems in this area—most seem to have trouble only in registers other than their own vocal range. Thus, a few women have trouble with pitches in the bass register whereas a few men have trouble with pitches in the treble register. For these students, drills in making the necessary octave adjustments usually cure their problems.

In general, the best test for melodic memory is to ask students to sing back what they have heard. Initial testing should be done with short groups of 5–9 pitches. Upon encountering a student who can repeat single pitches but can not repeat longer groups, one must find the number of pitches that challenges that student. Be it two, three, or four, the student must work on

repeating groups of that length while gradually building up to a level within Miller's limits of 5 – 9.

Subsequent testing must be done to determine if students can perform the kind of extractive listening wherein successive portions of a dictation are remembered upon repeated hearings. Students must be asked to sing back what they can remember correctly from the beginning of a dictation-length melody after one playing, then asked to sing back further portions after more listenings. Some students will show immediate difficulties remembering even the first few pitches of such melodies, even if they were quite able to remember all the pitches of shorter ones. Some have particular trouble remembering even just the starting pitch of such longer melodies.[48] Students who have these problems in the absence of other grave deficiencies often display an ability to recall the shape (and sometimes even general harmonic function) of a melody within a diatonic context without proper placement within the scale. Indeed, research has shown that the mind exhibits "a trend toward differential retention of contour and interval information with contour information more easily encoded and recognized at short [one second] delays."[49] For instance, Figure 9a shows the beginning of a melody presented to Mr. D and Figure 9b shows his sung response. This student had a clear memory of the shape of the melody, but started on the wrong scale degree.

Figure 9a.

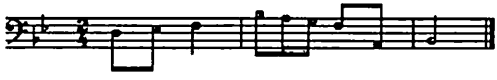
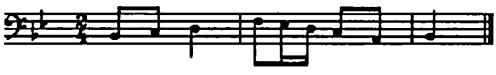


Figure 9b.



This is often remediable through drills aimed specifically at retention of the starting pitch. Some students may even need to hum the starting pitch immediately upon hearing it to get accustomed to remembering it. Through progressively internalizing this process, such students can eventually become competent at retaining the first note of a dictation while expanding their memories to include a reasonably long first portion of the melody.

Nonetheless, some students will learn to retain the starting pitch of a longer melody yet still be unable to recall an adequately long group of notes following that. These students must learn to focus their attention on the opening passage immediately after it has sounded, even while the rest of the melody is sounding. They should become accustomed to this skill initially by beginning to sing the first portion of the melody out loud before the rest is done. For some, this will seem awkward at first—singing one part of a melody while another is being sounded—but through progressive internalization this type of drill can lead to mastery of extractive listening skills. In this fashion, dictations longer than 5 – 9 notes act as a laboratory for developing the processes used by intelligent listeners pondering one passage while the rest of the piece continues to sound.

Related to this skill is the ability to put earlier passages of a dictation out of mind once they have been written on the page. If—after a playing or two—students have correctly notated the beginning of a melody, then keeping that beginning in short-term memory will only reduce their capacity to remember more music. Thus, students who don't stop thinking about what they have already notated find that subsequent portions of dictations become arithmetically more difficult: those who understand, and notate (for instance) the first eight notes of a melody would have to remember a total of sixteen notes to process the next eight, and twenty-four to get the next eight, and so on—unless they learn to let go of what they have already notated. This skill can be tested and drilled easily by asking students to sing back successive portions of a melody upon repeated hearings.

In general, however, students who have difficulty with short-term musical memory fall into two broad categories: 1) those who have trouble with short melodies (within Miller's limits or even shorter), and 2) those who have trouble extracting short portions from longer melodies. Remedial activities designed to increase the capabilities of each type of student differ between these two categories. As discussed above, students who can not remember short melodies must begin with patterns only as long as they can remember and gradually build up to longer ones. The best way to deliver this type of drill is from a tutor who can create melodic fragments and adjust their length as a student becomes more adept. Some students may also find that listening to prepared recordings of many of such fragments and singing them back can also help; two precautions, however, apply here. First, recordings cannot respond to a student's achievement level; they will continue to present fragments of whatever length they contain. Second, some students have an accurate sense of when their short-term memory has failed, but there are others who unwittingly sing incorrect versions of what they have heard. This latter type of student should never be left without an intelligent tutor[50] while doing memory drills lest they develop a false sense

of security. Only after experiencing the feeling of correctly repeating a large number of melodies and showing the ability to discriminate between accurate and inaccurate recall should such students be left to work on their own.

Students who cannot extract portions of longer melodies must begin with drills designed to apply their memory skills to selective listening. These, too, can be provided by a tutor who can play dictation-length melodies and ask students to sing back selected portions. Once again, prepared recordings may be used, with the same reservations. One additional type of exercise can be practiced by students who are able to sense when their short-term memories are working accurately. These students may use recordings of musical works (Haydn symphonies, for instance) as fodder for memory drills, listening for thematic passages and stopping the recording to sing back a portion of what they have heard. Some students benefit from both increased memory skills and greater familiarity with the literature through such exercises.

Research has shown that various features of a melody contribute to variations in pitch memory, including "melody length, tonal structure, melodic contour, and music perception ability."[51] That all of these factors affect the results of dictation tests should be no surprise to aural–skills teachers; that they affect musical *memory* should be instructive. We must take into account all such factors when constructing melodies for dictation and we must realize that difficulty in remembering a musical passage must be remedied through memory drills, not through more dictation.

Research has also shown that factors beyond the features of a melody itself can affect memory. In various experiments, interfering tones have been presented between the time a melody is heard and the time subjects are to respond. One researcher calls the effects of such interfering tones "devastating" since subjects who were presented with such tones "performed for the most part below chance."[52] In general, cognitive psychologists recognize the effects of interference on memory: that any new stimulus received after an initial stimulus will have a detrimental effect upon memory for that initial stimulus.[53] This has several important consequences. Aural–skills students encounter one consequence when music from other classrooms or practice rooms wafts in between playings of a dictation. Another consequence (discussed above) occurs when students must remember the beginning of a dictation that is too long to remember completely; they must concentrate on an initial stimulus (the beginning of the dictation) while a second stimulus (the rest of the dictation) interferes. In both cases, students find the interference of subsequent music a hindrance; in both cases, students must learn to develop their powers of focussed listening—that ability to extract and examine a portion of a

musical experience in the face of interference from more incoming information.

Another consequence of interference occurs when students move between the two stages of memory and understanding. Because a task can interfere with memory in the same way an additional stimulus does, the mental activities necessary during the understanding stage can cause the initial memory of a musical passage to fade. Students who have problems with this typically are able to repeat a passage after hearing it, but at some point during their attempts to find the tonic, calculate the starting pitch, and determine the pulse and meter, they lose some or all memory of the passage itself. Fortunately, there is a simple cure for this problem: be certain to keep the passage in mind by simply repeating the entire item before each new task of the understanding stage is attempted. In this way—cycling between the two stages of memory and understanding—students can counter the interfering effects of intervening tasks on short-term memory.

One final note concerning the relationship between the stages of memory and understanding: while singing back a melody or while mentally repeating it, the ability to change the tempo—especially to slow it down greatly—is an important tool while trying to understand what has been remembered. A new melodic figure or some new rhythm can be figured out only through careful contemplative examination, and such examination is aided by slowing down the tempo.

C. Understanding

1. Rhythm

A teacher must first know if a student having rhythmic difficulties can perceive the pulse. But how to determine this? One might be able to glean some evidence of this skill from the results of a dictation test, but the outcome would be clouded by the vagaries of memory and notation. One might also devise some other written test that asks the student to compare the pulses in various melodies, or to determine the speed of the pulse, or otherwise furnish some written response. My opinion is that any such test would be inadequate. Perception of the pulse is not a paper-and-pencil skill; it should not be tested with paper and pencil.[54] Instead, asking the student to clap or tap or march or somehow keep time with the music is highly effective. Assuming that our goal is to determine perception of the pulse without regard to perception of the meter, marching is somewhat problematic in that it is inherently duple ("left-right-left-right . . ").[55] Other means of expression such as conducting or counting are clearly meter-oriented and

should not be used to isolate this skill. Clapping and tapping are metrically neutral if done evenly, and are perhaps the best tools for the job. Tapping a desk top has the added advantage of providing for a smooth transition into conducting.

Remedying shortcomings in pulse perception can be challenging. Individual attention from a specialist in eurhythmics may be warranted, but this skill is so fundamental that students having trouble with it should seriously consider their suitability for a music degree.

A sense of meter can be tested verbally by asking individual students to count out loud while the music is sounding, in the classic manner with "one" referring to each primary pulse and so on. It might be tested physically through clapping or tapping (with variations of loudness, placement, etc. to represent the differences between primary and secondary pulses), but the most useful and musical application is conducting. One must be certain, however, that students have completely memorized the basic conducting patterns before they can be used as tools.[56] Once learned, the conducting patterns offer a traditional and universal means of expressing musical meter.

Conducting can be applied to metric perception in at least two ways: 1) concurrently—that is, while listening to music; and 2) retrospectively—that is, while remembering music. In the first instance, students can be asked to conduct while they listen to pieces in various meters; in the second, they must sing while conducting (so that instructors may see and hear whether they are matching both pulse and meter to the music).

Like pulse identification, metric perception is difficult to remedy. If students can identify the pulse but not the meter, they must be asked to find a "slower" pulse (i.e., downbeats). If they can switch back and forth between these two levels of stress—pulses on the one hand and downbeats on the other—then the simple act of counting the number of pulses per downbeat will reveal the metric structure. Once mastered, this technique may be abandoned rather quickly as students internalize the feeling of meter.

If students can identify the meters of various melodies, then we must move on to perceiving rhythmic proportions without regard to any specific beat unit (see the discussion of this important distinction under "THE PROCESS"). Students who are unable to graphically represent the rhythms they hear in terms of beats (as shown above in Figure 6) need remedial help. One suggestion is to tap a pencil on each vertical line (representing beats) while repeating the melody, observing the number of notes per beat. Once students have mastered this technique with simple rhythms, more complicated ones usually pose few problems.

2. Pitch

In guiding a student through melodic dictation, one should not proceed to scale degrees, absolute pitches, or notation until certain that the student can infer the tonic in each of various melodies. There is no paper-and-pencil test for this; the most accurate measurement is a student's ability to sing the tonic after listening. Unless identified and remedied, a deficiency in this area will remain and haunt a student during other listening activities.

One might think that every music student at the college level would have no trouble audibly identifying the tonic of a musical passage. For most students this is true; for them it is merely the act of making this step explicit that is valuable. But there are students who do find it difficult; for them there are procedures to recommend. One must first determine whether they can reproduce the pitches of the diatonic collection used in a melody.[57] This can be done by asking them to sing any pitch from what they have heard (perhaps the first or last, primacy and recency exhibiting such strong recall) and to sing up or down through the other pitches.[58] If they are capable of singing those pitches, we know they have retained the diatonic collection but we do not yet know whether they can infer the tonic from the specific passage they have heard.[59] Students who do not correctly sing the tonic pitch can often be helped by a suggestion to sing up or down through the scale, stopping when they reach the tonic.[60] Students who fail at this—in the absence of vocal problems—probably either don't understand the concept of tonic or lack a sufficient amount of acculturation to infer it intuitively.

For some students, discerning the proper scale degree of a starting pitch is at first a difficult task. They may have heard and remembered a passage of music, and they may be able to sing the tonic pitch of a melody, but some students will initially balk at putting a syllable to the first note and other students will merely guess. The task here is to calculate the syllable of an unknown pitch, given the sound of that pitch and the tonic. This is a task for which interval identification seems appropriate: sing the tonic, sing the unknown pitch, and calculate the scale degree based on the distance between the two. If students are well-trained in interval identification, this approach works. However, this asks students to step outside of the tonal system for a moment to measure the absolute distance between the two pitches. For that reason, even though it might seem more awkward, I prefer that students connect the two pitches in a stepwise or triadic fashion using the pitches of the diatonic collection presented in the melody. This keeps them within the pitches of the tonal system and helps to develop their sense of syllable. As that sense develops, they can abandon the stepwise and triadic connections and move directly to naming the scale degree of the unknown pitch.

In connecting an unknown pitch to tonic, it is important for students to move in the proper direction. It seems that many students instinctively try to sing a scale from tonic to the unknown pitch. This often leads to problems because the unknown pitch is usually more unstable in a student's memory. Thus, some students will sing the unknown pitch, sing tonic, then sing a scale and proceed right past the unknown pitch since it is merely one of many in the scale. A much more successful strategy is to sing the unknown pitch and then sing up or down through the scale until the tonic is reached, remembering the number of scale degrees covered.[61] It would be better if the technique of moving from tonic to unknown pitch were more successful since students would be singing the proper syllable for each pitch along the way rather than almost blindly moving through the scale, but in my clinical experience the former process is much less effective because of the instability of the unknown pitch in a student's memory.[62]

Students who have trouble applying syllables to subsequent pitches must first be tested on their ability to ascertain melodic contour. This can be tested by asking individuals to sing the melody while following its shape with their hand in the air or drawing it on a piece of paper.[63]

After it is certain that students understand melodic contour, one must be sure they can distinguish between steps and leaps. Various methods of testing this might be used. I prefer to ask them to continue to trace the shape of the melody with a hand in the air while indicating steps with small motions and leaps with large ones; this method is rather coarse, but effective.

If students understand melodic contour and can distinguish between steps and leaps, then it is a simple matter of treating each leap as a move to a new starting syllable and applying successive ascending or descending syllables to the stepwise materials which might follow them. Upon encountering a leap, students must decide whether to calculate the next syllable from the tonic or from the preceding pitch. In general, it is better to calculate from the tonic: it reinforces a sense of scale-degree function within the tonal system and prevents any earlier errors from affecting syllables after the leap.[64]

Of course, our goal here is for students to develop an automatic sense for the syllable of each pitch. That will come through constantly calculating the syllables of pitches, through frequent sightsinging, and other drills;[65] for now, the process of figuring these syllables will keep students traveling across, pondering, and learning the territory of the diatonic collection.[66]

Eventually, there develops a gestalt process: hearing patterns such as triads, scale patterns, and sequences as units in and of themselves, so that, for instance, students hearing C, E, G wouldn't have to hear a starting pitch and two skips, each of which must be figured as a new starting pitch. This

gestalt process comes later, after students have assimilated and processed enough such figures. There are those who feel that students must assimilate all patterns before perceiving them,[67] but the process of taking apart an unfamiliar pattern and figuring it out is one of the most valuable skills imparted in the aural-skills classroom. Armed with that skill, students leave the classroom ready to tackle any new listening experience rather than waiting to see if it matches one in a taxonomy of many patterns they have already heard.

D. Notation

The very act of writing down what has been properly remembered and understood offers room for mistakes. In the findings of one researcher, "notating was, in fact, a task that seemed to increase dictation errors."[68] Students who are weak in the process of notating a dictation melody usually suffer from one or both of two types of deficiencies: 1) a lack of understanding of some or all of the symbols and theoretical principles involved in notation, and 2) a slowness or inefficiency in translating their understanding of a passage into notation. The first type of problem requires more conceptual training, which should be administered immediately, even if this is under the purview of a separate course in written theory taught by another teacher. The second type requires drill and practice in the skill of quickly and efficiently rendering the music symbols that represent the rhythmic durations and scale degrees ascertained during the understanding phase. Remedial drills in this area can be isolated from the other aspects of dictation by providing students with rhythm and pitch information to be translated into actual music notation. For example, pages of graphic representations like the one found in Figure 7 can be offered, perhaps under timed control, to be written in proper notation. Such drills make efficient use of a student's time, since work is not wasted on hearing, memory, and understanding.

THE DIAGNOSTIC SESSION

One of the problems encountered in diagnosing students' aural skills stems from the major piece of evidence used to evaluate those skills: written notation as a response to dictation. It is often impossible to tell—merely from that written notation—whether errors occur in memory, understanding, or notation. For instance, consider the dictation melody shown in Figure 10a. If a student were to respond with the notation shown in Figure

10b, we would have no way of knowing whether the mistake (albeit a small one!) in measure 6 appeared because the student remembered it that way, remembered it correctly but incorrectly calculated the scale degree of the next–to–last note, or remembered and understood it properly but wrote down the wrong absolute pitch on the staff. All three types of mistakes could result in such a single wrong answer.

Figure 10a.

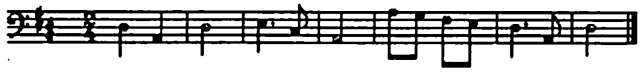
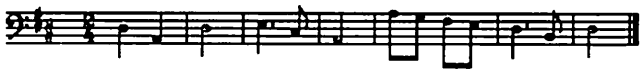


Figure. 10b.



If notation as a response to dictation is so impoverished as to produce evidence only that a problem exists—but not which one—then two questions arise: 1) why are we using written dictation at all; and 2) what should we do in addition to (or instead of) written dictation to get more evidence?

In answer to the first question, dictation serves at least two important roles that cannot be left unfilled. First, it is the only activity that combines all four phases of perception into a single operation. This is no small accomplishment. In many respects, it remains our best stepping stone towards that ideal goal of integrating listening with understanding and notation. Second, since dictation combines all four phases into one activity, it provides a means of drilling and testing large groups of students (by "large" I mean "greater than one") on all the cognitive skills involved in those four phases. In this manner it can serve as a kind of pedagogical triage, separating those who have no difficulty from those who do.

Once we have identified students with difficulties, the second question still remains: what can we do next? The answer is to apply all of the techniques discussed above under the heading "DIAGNOSIS AND REMEDIATION." I schedule individual meetings with students who do not perform well on dictation tests. At those meetings, I ask them to perform the following tasks (distilled from all the methods of diagnosis discussed above):

MELODIC DICTATION

Memory of Pitch and Rhythm

Repeat pitches after one listening.

Repeat short pitch patterns (3 – 5 notes) after one listening.

Repeat short melodies (5 – 9 notes) after one listening.

Repeat short sections (5 – 9 notes) of longer melodies (10 – 18 notes)—the first part after one listening, and later part(s) after subsequent listenings.

Understanding of Pitch

Find the tonic from each of various short melodies (5 – 9 notes).

Identify the scale degrees (solfège syllables) of starting pitches from various short melodies (5 – 9 notes).

Identify the scale degrees of all pitches in short melodies (5 – 9 notes).

Notation of Pitch.

Notate the pitches of short melodies (5 – 9 notes) in various keys and clefs.

Understanding of Rhythm

Tap the pulse on a desk top while repeating short melodies (5 – 9 notes).

Conduct the meter while repeating short melodies (5 – 9 notes).

Indicate the rhythmic proportions of short melodies (5 – 9 notes) using the proportional notation shown in Figure 6.

Notation of Rhythm

Notate the rhythms of short melodies (5 – 9 notes) in various meters.

Notation of Rhythm & Pitch

Notate the rhythms and pitches of longer melodies (10–18 notes) upon successive listenings in various keys, clefs, and meters.

Students must perform each of these tasks in order; I stop them when they cannot consistently perform one of the tasks. When that occurs, it is clear that they have yet to develop that particular skill and thus remediation is in order—specific, goal-oriented remediation that will develop that skill. I have discussed at least one type (and in some cases several types) of remedial activity for each of the tasks/skills listed above. Readers may wish to invent others. Regardless of which particular activity is chosen, it must improve the skill needing development.[69] Simply prescribing more practice dictation will leave the skill buried in a complex series of processes; in addition, students can perform many more task-oriented drills in the time it takes to work out one practice dictation. Remedying individual skills is both effective and efficient.

PROPOSALS FOR MORE EFFECTIVE AURAL-SKILLS PEDAGOGY

I suspect that many of the typical dictation practices criticized in this article have been passed on for generations without a great deal of reconsideration on the part of their practitioners. But now that we have a better understanding of at least some of the skills that dictation can develop, a summary of how those findings should affect our teaching seems in order. We should:

Excerpt or compose dictation melodies with attention to the following factors: the restrictions of short-term memory, chunking, the number of playings, and the time between and after playings.

Know the pedagogical goal of a particular dictation. If the dictation won't achieve that goal, find a technique that will.

Break the process into component stages; when a student makes a mistake, be able to tell whether that mistake was due to an error of memory, understanding, or notation.

Perform diagnosis on students who aren't doing as well as they ought to.

Start with the basics, but know what the basics are when it comes to aural perception of tonal music (e.g., the tonic, pulse, and meter rather than intervals and quarter notes).

Remedy only those areas that need remediation; use reliable and profitable remediation techniques.

Some readers might be put off by the elementary level of some of this, but teachers are encountering problems in aural training even at leading music schools in the country. One writer has noted that, "unlike the English major, who enters college with many years of technical study of language behind him, the freshman who enrolls in a theory class quite possibly has had no exposure to even the descriptive vocabulary of music."[70] Certainly, most freshmen have had even less explicit training in aural skills. If all students were competent at taking dictation when they began their studies, then this article—and at least some of the research on which it is based—would never have been undertaken. But since we must deal with aspiring professionals who have yet to develop many of the skills discussed here, starting with the fundamentals and remedying when necessary offer the best means of developing those skills.

RENEWED JUSTIFICATIONS FOR DICTATION IN THE CURRICULUM

At the beginning of this article, I contended that the skills necessary to take melodic dictation are important musical skills. I further contended that melodic dictation—when properly taught—can be the best means of developing those skills as a preliminary to applying them to a variety of listening situations at more advanced levels.

The first of those skills—an ability to hear attentively—is obviously crucial to all musicians. The second skill—actually a group of skills involving musical memory—is equally important. The third skill—an even more complex group loosely labeled "understanding"—is necessary for any intelligent listener. And the last skill—notation—is fundamental to Western musical communication. Each of these skills is necessary for survival not only in the aural-skills classroom but in the musical world at large. Each skill must be tested, developed, and tested again to be sure of its cultivation.

We now see that dictation helps to develop attentive hearing, short-

term musical memory, focussed concentration on specific passages, and an understanding of the fundamentals of pulse, meter, and tonality, as well as traditional notions of rhythm and pitch discrimination and notation. By bringing the presentation of dictation melodies closer to realistic musical experiences—by not providing a starting pitch or sounding the tonic before playing, by not counting the meter while playing, by not breaking the dictation down into short sections—we offer the opportunity for our students to develop listening skills they may use in their lives beyond the doors of the aural-skills classroom.

NOTES

[1]This article is based in part on a paper entitled "Melodic Dictation and Music Cognition" delivered to the annual meeting of the Society for Music Theory, Austin, 1989.

[2]The most comprehensive discussion appears in Michael Rogers, *Teaching Approaches in Music Theory* (Carbondale, IL: Southern Illinois University Press, 1984), 100-126.

[3]Gary S. Karpinski, "Five Recent Sight Singing Texts," *Journal of Music Theory Pedagogy* 2 (1988): 275-96; and "Ear Training and Integrated Aural Skills: Three Recent Texts," *Journal of Music Theory Pedagogy* 3 (1989): 127-49.

[4]Leo Horacek and Gerald Lefkoff, *Programmed Ear Training*, 2nd edition (San Diego: Harcourt Brace Jovanovich, 1989), vol. I, p. 1.

[5]Bruce Benward, *Ear Training: A Technique for Listening* (Dubuque, IA: Wm. C. Brown, 1987), *Instructor's Manual*, p. xiii.

[6]See, for example, Gary Potter, "Identifying Successful Dictation Strategies," *Journal of Music Theory Pedagogy* 4 (1990): 63-71; and Rosemary N. Killam, "An Effective Computer-Assisted Learning Environment for Aural Skill Development," *Music Theory Spectrum* 6 (1984): 52-62.

[7]Rogers, *Teaching Approaches*, 116-17.

[8]Ronald Thomas, "CAI—Its Current Status and Uses," Paper presented at the MENC Northwest Division conference, 1989.

[9]John A. Sloboda, *The Musical Mind: The Cognitive Psychology of Music* (Oxford: The Clarendon Press, 1985), 174-75.

[10]Benward, *Ear Training*, 2.

[11]Benward, *Ear Training*, 65.

[12]Benward, *Ear Training, Instructor's Manual*, 49, no. 6.

[13]Benward, *Ear Training, Instructor's Manual*, 82, no. 15.

[14]George Miller, "The Magical Number Seven plus or minus two. Some Limits On Our Capacity For Processing Information," *Psychological Review* 63 (1956): 81-97. One experimental study that tested Miller's limit in a musical context is reported by Hugo D. Marple in "Short Term Memory and Musical Stimuli," in *Psychology and Acoustics of Music: A Collection of Papers*, ed. Edward P. Asmus, Jr. (Lawrence, Kansas: Division of Continuing Education, University of Kansas, n.d.): 74-93. Marple found that "the retention of new musical materials for most children and adults falls within the expected limits for short term memory as defined by Miller" (p. 78).

[15]Miller, "The Magical Number Seven," postulates the idea of chunking. Peggy A. Long discusses the musical implications of chunking in "Relationships Between Pitch Memory in Short Melodies and Selected Factors," *Journal of Research in Music Education* 25 (1977): 272-82. See especially p. 273.

[16]For some instructive examples of chunking in connection to the repertoire see Potter, "Dictation Strategies," 68.

[17]Marple, "Short Term Memory and Musical Stimuli," reports that "a relatively small percentage of persons are capable of chunking melodic materials at first hearing in order to exceed Miller's limits" (p. 80).

[18]David B. Williams, "Short-Term Retention of Pitch Sequence," *Journal of Research in Music Education* 23 (1975): 64.

[19]The discussion below concerning the number of times a dictation is played addresses the specific relationship between melody length and number of playings.

[20]Marple reports in "Short Term Memory" that "it would appear that rhythm added to a musical phrase enables a person to retain one additional melodic bit in short term memory" (p. 78). Thus, it is *easier* to remember both pitches and rhythms than to remember pitches alone.

[21]A typical suggestion of this type can be found in Robert D. Levin and Louis Martin, *Sight Singing and Ear Training Through Literature* (Englewood Cliffs, NJ: Prentice-Hall, 1988), 17: "Develop the habit of writing while each fragment is played."

[22]Potter, "Dictation Strategies."

[23]Ibid., 68.

[24]Rogers, *Teaching Approaches*, 100.

[25]David B. Williams, "Auditory Cognition: A Study of the Similarities in Memory Processing for Music Tones and Spoken Words," *Council for Research in Music Education Bulletin* 71 (Summer, 1982):40.

[26]Randall G. Pembrook, "The Effect of Vocalization on Melodic Memory Conservation" (Tallahassee, FL: Center for Music Research, Florida State University, n.d.), typewritten.

[27]In spite of my criticisms of this single conclusion, I highly recommend Potter's informative article to any interested reader.

[28]Levin and Martin, *Sight Singing and Ear Training*, Teacher's Manual, 16-17.

[29]Also see my comments regarding Levin and Martin's procedures in Karpinski, "Ear Training and Integrated Aural Skills," 139-41.

[30]Also see the discussion under "Diagnosis and Remediation" below.

[31]For example: "The student concentrates on the pitches the first time and the rhythm on the second," Levin and Martin, *Sight Singing and Ear Training, Teacher's Manual*, 17.

[32]Earl Henry and James Mobberley, *Musicianship: Ear Training, Rhythmic Reading, and Sight Singing*, 2 volumes (Englewood Cliffs, NJ: Prentice-Hall, 1986), 104 [No. 2].

[33]Henry and Mobberley, *Musicianship, Instructor's Manual*, 16.

[34]Those who possess absolute pitch can, of course, immediately label pitches without understanding their functions. I would nonetheless argue that even they gain an invaluable, richer understanding of tonal music through the kind of functional listening described here.

[35]Merton Shatzkin—after surveying a dozen experimental studies of contextual and intervallic perception—reports that "because these studies, with the exception of Johnson, found significant context effects, it is surprising that both research and ear-training methods still concentrate on interval perception outside, rather than inside, a context." See "Interval and Pitch Recognition in and out of Immediate Context," *Journal of Research in Music Education* 29 (1981): 111-12. In "Context Effects on Melody Recognition: Scale-Step versus Interval Representations," *Music Perception* 3 (1986), W. Jay Dowling found that "the scale steps of melodic pitches are inseparable from their tonal functions, which in the diatonic tonal system carry their musical meanings. Thus, it seems reasonable to suppose that the moderately experienced listeners have access via scale-step representation to deeper levels of musical meaning than inexperienced listeners using surface-level interval representations." (p. 294) In *Advanced Music Reading* (Tucson, AZ: Sonora Music, 1975), William Thomson concludes that "attempting to imagine the two pitches of an interval exclusive of any context beyond themselves is like trying to imagine two points in vision without spatial reference. Rigorous attempts at either seem equally fruitless; both must occupy positions in some form of auditory or visual background of space-time." (p. x) For more on the subject of intervallic versus functional listening, see Rogers, *Teaching Approaches*,, 110, 112, 114-15; and Michael Rogers, "Beyond Intervals: The Teaching of Tonal Hearing," *Indiana Theory Review* (Spring 1983): 18-34. Also see the brief discussion of calculating starting notes under "Diagnosis and Remediation" below. Of course, intervallic strategies play a much more important role in atonal music, but this entire article assumes the tonal system as a primary goal of teaching.

[36]Although the two systems are functionally equivalent, for the purpose of discussion I will use moveable *do*.

[37]Steve Larson presented an exhaustive investigation of the various solfège systems and how they explicitly model various aspects of pitch structure in "Solfège Systems and Integrated Music Learning," a paper presented to the twelfth annual meeting of the Society for Music Theory, Austin, Texas, October, 1989.

[38]It is not impossible to employ both types of systems—one for understanding and another for notation—but one must be careful about precisely which form of each type is taught. Using both fixed and moveable *do* courts disaster since they use the same labels for different purposes. Using letter names and either numbers or moveable *do* applies distinct labels in separate circumstances, and is therefore preferable. Letter names are also preferable to fixed *do* in English-speaking countries since letter names are the labels English speakers normally use. Indeed, the fixed-*do* labels of Romance languages literally translate from "do, re, mi" to "C, D, E." In other words, when a native speaker of a Romance language says "do," that label is inextricably tied up with a particular absolute pitch, the one we call "C" in English. Therefore, unless fluent communication with speakers of Romance languages is a primary goal, English-speaking students should learn letter names for absolute pitches.

[39]The reader should recall that this entire process has been applied to a remembered chunk of music. While taking dictation, the process may now restart with a new chunk after another playing.

[40]Potter, "Dictation Strategies," 68.

[41]This is a process called "shadowing" (nearly simultaneous repetition) by cognitive psychologists, distinguished from "echoing" (imitation after the fact). See J.M. Pickett, "Shadows, Echoes, and Auditory Analysis of Speech," *Speech Communication* 4 (1985): 19-30. William D. Marslen-Wilson, "Speech Shadowing and Speech Comprehension," *Speech Communication* 4 (1985): 55-77 concludes that "mapping from sound onto meaning is rapid, efficient, and apparently continuous; that, in effect, we can understand speech word by word as we hear it" (p. 72). Shadowing is also used in training simultaneous translators. At the beginning of their studies, they practice repeating what speakers say in the same language at the same time. Translation instructors recognize the dangers of this exercise, however: Wilhelm K. Weber, *Training Translators and Conference Interpreters* (Orlando: Harcourt Brace Jovanovich, 1984), notes that it "must not be carried on for too long, as it consists of a word-for-word repetition, which is precisely what we expect the accomplished interpreter to avoid" (p. 41). When working with notation, students taking dictation are similar to language translators—in this case they are translating sound into symbol. Thus, when taking dictation, students must—like simultaneous translators—lag somewhat behind as they make sense of what they hear. They should avoid writing while listening as the translator avoids word-for-word repetition.

[42]John A. Sloboda and David H. H. Parker, found that—on successive repetitions of long melodies (the example central to their report contains twenty-nine notes)—"subjects do not show an improvement in performance over the six trials on any of our measures. Some recalls get longer, but they do not get any better," in "Immediate Recall of Melodies," in *Musical Structure and Cognition*, ed. Peter Howell, Ian Cross, and Robert West (London: Academic Press, 1985), 160.

[43]With this requirement, we run the risk of letting vocal limitations interfere with the process. However, once students adjust to the fact that no one in the aural-skills classroom must sound like a professional singer, and once those with small vocal problems (like difficulties making register adjustments) overcome those obstacles, the mechanism of the voice rarely gets in the way of diagnosis. In any case, the singing voice is an important tool for all musicians; music students must therefore learn to use it well.

[44]Internalization applies to other processes as well, such as remembering single pitches and finding the tonic.

[45]Cf. the notion of "audiation" in Edwin Gordon, *Learning Sequences in Music: Skill, Content, and Patterns*, 1989 edition (Chicago: GIA Publications), 7-18.

[46]Using the voice as a diagnostic tool for *harmonic* listening is much more problematic. Although beyond the scope of this article, let me mention that even while teaching harmonic dictation one can use the voice as a means of checking at least some of what students have heard and remembered.

[47]This is slightly different from the skill of matching pitches, which involves simultaneous feedback and correction. Repeating pitches also requires a small amount of pitch memory. If necessary, students should be tested for pitch matching as well pitch memory.

[48]On the basis of his research presented in "Short-Term Retention of Pitch," David B. Williams concludes that "A musician's accuracy of recall for the first pitch (primacy) in a melody . . . is dependent not as much on the time as on the item decay. . . . The amount of information loss due to time is small compared to the amount of loss due to an increase in melody length" (p. 63).

[49]Lucinda A. DeWitt and Robert G. Crowder, "Recognition of Novel Melodies after Brief Delays," *Music Perception* 3 (1986): 271. See also W. J. Dowling and J. C. Bartlett, "The Importance of Interval Information in Long-Term Memory for Melodies," *Psychomusicology* 1 (1981): 30-49.

[50]To date, with regard to such memory drills, the term "intelligent tutor" refers only to human beings. It is my express hope that pitch-tracking devices controlled by artificially intelligent computer software will soon be able to evaluate the sung responses of students and react accordingly. I presented a paper on this topic entitled "The Pedagogical Uses of Pitch-Tracking Hardware in Computer-Assisted Instruction in Music" at the thirty-second annual meeting of the College Music Society, St. Louis, 1989.

[51]Long, "Relationships Between Selected Factors," 272.

[52] Williams, "Auditory Cognition," 41.

[53]Indeed, research has shown that interference and not merely the passage of time causes forgetting. See Judith Spencer Reitman, "Mechanisms of Forgetting in Short-Term Memory," *Cognitive Psychology* 2 (1971): 185-95.

[54]In fact, paper-and-pencil tests would be inadequate for many of the skills discussed here. This critical view of written tests in relation to musical skills is derived from Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic Books, 1985). See especially pp. 3-4.

[55]Roger Graybill offers one solution (after Lisa Parker) which may give marching a triple feel in "Towards a Pedagogy of Gestural Rhythm," *Journal of Music Theory Pedagogy* 4 (1990): 18. Nonetheless, our goal at this point is to test perception of the pulse without perception of meter; neither duple nor triple marching can do that.

[56]Potter, "Dictation Strategies," 67.

[57]Because much of the diagnosis concerning matters of pitch uses the voice as a tool, the following discussions assume that students have been tested for basic pitch-matching and sightsinging abilities.

[58]This can be asked in a number of ways. The findings of ethnographers—and my clinical experience—suggest something neutral such as "Sing up or down from there."

[59]For a summary of research into just *how* a listener infers the tonic of a passage, see David Butler, "Describing the Perception of Tonality in Music: A Critique of the Tonal Hierarchy Theory and a Proposal for a Theory of Intervallic Rivalry," *Music Perception* 6 (1989): 219-41. Regardless of whether the reader agrees with Butler's proposed theory, this article offers an excellent review of the literature on the topic. A recent study by Robert J. West and Roz Fryer, "Ratings of Suitability of Probe Tones As Tonics after Random Orderings of Notes of the Diatonic Scale," *Music Perception* 7 (1990): 253-58, concludes that "the diatonic set does not reliably lead to recognition of the tonic regardless of the order of the notes" (p. 258). Thus it seems that the order—and presumably metric placement and other structural relations—of the notes in a melody creates tonal function. Once again the onus falls on aural-skills teachers to create or excerpt melodies carefully, with special attention to tonal clarity or ambiguity in relation to the achievement level of their students.

[60]Although either up or down will work, singing down to the tonic is often less problematic. Perhaps this has to do with the fact that many students think of a scale as beginning (i.e., moving away from the tonic) while ascending, and ending (i.e., approaching the tonic) while descending.

[61]As noted above in the discussion on inferring the tonic, proceeding either up or down to the tonic will work but descending seems to work better.

[62]Once students are comfortable with finding the tonic and determining the scale degree of the starting pitch, these two steps may be combined. Students can sing the starting pitch and connect it to the tonic in one pass—thereby finding the tonic and measuring the distance to it from the starting pitch.

[63]I have encountered only a few students who made frequent mistakes of direction (not due to memory) while taking dictation. Of those students, only one sought to correct her problems in a concerted way. It turned out—upon diagnosis by moving her hand to follow the melodic shape—that she was what might be called dyslexic with respect to pitch. She overcame her problem through drills during which she paid careful attention to the physical changes in her larynx in relation to the direction of her hand motions. She was able to continue her success even after abandoning her vocalizations and hand motions, internalizing the entire process.

[64]During diagnosis, it is often more preferable for students to sing while applying solfège syllables to a melody than to have them rattle off a spoken or written list of those syllables. Not only is it more musical, but—if they are careful and correct—it will reinforce the connections between sound and syllable.

[65]See the suggestions in Rogers, *Teaching Approaches*, 114-15.

[66]For students who need work on understanding but not on memory, see the drill called "familiar-tune dictation" in Rogers, *Teaching Approaches*, 117.

[67]The main proponent of this idea is Edwin Gordon. See, for example, Gordon, *Learning Sequences*.

[68]Jack A. Taylor and Randall G. Pembrook, "Strategies in Memory for Short Melodies: An Extension of Otto Ortmann's 1933 Study," *Psychomusicology* 3 (1984): 33.

[69]More experimental and clinical research is needed with regard to particular methods of remediation. Perhaps the pages of this and other journals will see such studies in the future.

[70]Bruce B. Campbell, review of *Guidelines for College Teaching*, by John D. White, in *Journal of Music Theory* 26 (1982): 356.