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ATTENTIONAL DIRECTION IN TWO-PART CONTRAPUNTAL DICTATION

by

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May, 1993

A Thesis submitted to
The Faculty of Graduate Studies and Research
in partial fulfilment of the requirements of the degree of
Doctor of Philosophy in Music Education

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ABSTRACT

This study explored undergraduate music majors' strategies in two-part dictation. Sixty volunteers answered a questionnaire on their musical background, learning styles, and dictation methods. They then took part in three dictation sessions. Two sessions directed attention to rhythm first or pitch first, and one session was a non-directed control dictation. Treatments were counterbalanced across 6 groups ($n = 10$). Dependent measures were pitch and rhythm accuracy scores on dictations. Analysis of variance showed no order effects. A repeated measures MANOVA (pitch and rhythm by 3 conditions) showed a significant effect for condition ($p < .0001$). Higher rhythm accuracy resulted from the rhythm-first condition, compared to the non-directed ($p < .05$) and pitch-first ($p < .0001$) conditions. Pitch accuracy was not affected by condition. Accuracy was unrelated to any of the covariates examined (instrumental information, years of theory and counterpoint study, keyboard skill, learning style and private strategy). Results suggest that in polyphonic dictation, attending to rhythm first and pitch afterwards may be an effective way of maximizing rhythmic accuracy.

PRECIS

Cette étude a examiné les stratégies utilisées par 60 étudiants d'université au premier cycle en musique, au cours d'une dictée à deux voix. Les volontaires ont rempli un questionnaire concernant leur formation musicale, leurs styles d'apprentissage, et leurs méthodes de prise de dictée. Ils ont ensuite participé à 3 rencontres consacrées à la dictée, comprenant 2 séances où leur attention était dirigée sur les hauteurs ou sur le rythme en premier lieu, et 1 séance de contrôle sans directives précises. Les conditions expérimentales ont été contrebalancées (6 groupes, n = 10). Les mesures dépendantes étaient la précision des hauteurs et la précision des rythmes selon les dictées écrites. L'analyse de variance n'a révélé aucun effet d'ordre. Une analyse de variance multiple aux mesures répétées (MANOVA) a indiqué un effet significatif de condition ($\underline{p} < .0001$). On a observé une précision élevée du rythme lors de l'audition des rythmes en premier, comparée avec la séance non-dirigée, $\underline{p} < .05$, et l'audition des notes en premier, $\underline{p} < .0001$). La précision des hauteurs n'a pas varié selon les conditions. Les résultats n'ont montré aucune corrélation avec les covariables examinés, i.e., l'instrument pratiqué, le nombre d'années d'étude de théorie et de contrepoint, la capacité d'utiliser le clavier comme outil de pensée musicale, le style d'apprentissage et les stratégies personelles. Les résultats suggèrent que, durant la dictée polyphonique, noter d'abord le rythme et écouter par la suite les hauteurs serait un bon moyen de maximiser la précision des rythmes.

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INTRODUCTION

Statement of the Problem

The purpose of this study was to investigate attentional strategies used for contrapuntal dictation by undergraduate music majors. Ear training, a core subject for music students, normally includes dictation of "two-part melodies", or counterpoint. The research question was whether two-part contrapuntal dictation accuracy would be increased by attending first to rhythm followed by pitch, or to pitch followed by rhythm. Test scores obtained under these strategies were compared to scores gained when the same subjects received no specific attentional direction. A second intent was to gain knowledge of strategies subjects used in a non-directed condition.

This is the first study to extend counterpoint perception research into the area of ear training pedagogy (Francès, 1958; Gabrielsson, 1973; Gregory, 1990; Huron, 1989, 1990; Huron and Fantini, 1989; Rasch, 1978, 1979; Sloboda and Edworthy, 1981). It is also the first study to apply work on single line melodic perception, memory, and dictation strategies to the area of contrapuntal dictation (Dowling and Bartlett, 1981; Ortmann, 1933; Oura, 1987; Pembrook, 1986 and 1987; Taylor and Pembrook, 1983).

The existence of many texts attests to the fact that the pedagogy of contrapuntal composition and analysis is well documented (Fux, 1725; Jeppesen, 1931; Krenek, 1940; Morris, 1922; Rollinson, 1959; Salzer and Schachter, 1969; Schenker, 1910, 1922). However, musicians' means of aural perception of and memory for counterpoint are not well understood. There exists little specific pedagogy for these tasks. Student distress can become extreme in any sort of dictation task. This is the subject of a desensitization study by Frkovich (1984). Two-part melodic dictation is an ear training task that students and teachers alike find particularly hard. Teacher perplexity is perpetuated by the lack of ear training research related to the perception and pedagogy of counterpoint. Generalization from studies on single-line melody or smaller musical units (intervals, tone sequences and the like) is risky because research results may be highly context-dependent. Counterpoint research is not much more satisfactory. It reveals a debate concerning simultaneous perception versus figure and ground (Francès, 1958; Gregory, 1990; Sloboda and Edworthy, 1981) and a more recent preoccupation with "denumerability" (how many lines a listener can accurately count; Huron, 1989). These issues are worthwhile but they have not yet been explored with a view to yielding pragmatic suggestions which might improve student musicians' accuracy of perception and memory for counterpoint during a dictation task.

Review of Literature

Counterpoint: Psychophysical studies Work on auditory streaming showed that perception can affect cognition of auditory events (Bregman and Campbell, 1971; Bregman and Dannenbring, 1973; Bregman, 1978a and b; Bregman, 1979). Streaming refers to the phenomenon of a single melodic line being perceived as two, depending on the tempo and frequency range distribution of the melody. This effect seems to be understood by composers, who induce percepts of counterpoint from a single line of compound melody; many examples can be found in the works of Bach. It is the relationship of pitch changes to the speed of presentation that determines whether a sequence will stream or not. A sequence with wide pitch changes presented quickly streams more readily than the same sequence presented slowly, or a sequence with smaller pitch variations. Of interest to music perception is the fact that when a sequence streams, subjects perceive the order of events in each separate stream but may have difficulty perceiving and remembering the temporal relationship of the two lines. In two-part dictation, such confusion results in what I call "bent barline syndrome", or the failure to place both voices rhythmically correctly relative to the downbeat and to each other. One question in the present study was whether directing initial attention towards rhythmic detail would increase rhythmic accuracy and the relation of parts.

Dowling (1973a) examined perception of "interleaved" melodies. These were simple nursery rhymes interspersed with laboratory generated distracter notes--not exactly counterpoint, but similar in that two different types of events happen at once. The results demonstrated that general melodic expectancies have effects on the perception of melodies embedded in confusing contexts. Andrews and Dowling (1989) studied developmental aspects of attentional control. Children and adults identified familiar melodies that were either accurate or wandering in pitch, with and without two types of interference similar to Dowling's 1973a interleaved melodies.

The authors speculated that what adults have that children do not is precise temporal control of attention and expectancy, with rhythmic attention being somewhat more difficult to control. This raises the intriguing question of whether university age music students might benefit from specific training of their temporal attentional control. For instance, in addition to pure rhythm tasks, emphasis might be placed on attention to rhythm in polyphonic contexts.

> The temporal organization of attention requires knowledge of rhythmic structures in the world. Such structures are well-specified in music... attention is controlled differently over different time spans... [and] is relatively accessible to declarative control for events of relatively long duration (of the order of seconds).
>
> (Dowling, 1978, p. 330.)

Counterpoint: Music studies There are two striking aspects of musicians' experiments with counterpoint. First, there is a general, though not exclusive, tendency to make the assumption that listening is done in a unilinear fashion. By this I mean that many researchers study how listeners scan horizontally line by line (Gregory, 1990; Sloboda and Edworthy, 1981), rather than by perceiving several concurrent lines vertically by harmonic relationships (no one seems to have studied this yet), or by tracking diagonally through successive motivic presentations (Francès, 1958). This assumption has led to use of paradigms employing discrimination tasks such as recognition, identification, and error detection, but not paradigms using activities such as singing back, playing back, or dictation. Second, the debate as to how humans hear counterpoint seems very number-centred, i.e., the types of questions posed concern the number of lines involved: how many lines we can hear at once; and how many lines we can count as present in a texture ("denumerability", Huron, 1989). The question of how listeners perceive counterpoint is obviously central to the present study, but unilinear assumptions and numerical concerns are less important than feature considerations such as the effect of listening rhythm-first or pitch-first, regardless of the particular line or lines attended.

Research has already suggested several factors that influence how listeners can distinguish single lines within polyphonic textures. These include relative loudness, mistuning, and timing of attack onsets. Timbral and spectral cues probably also play a role, and there may remain other variables to explore in this regard.

Rasch (1978) did an intriguing experiment on the perception of two notes at once, as in polyphonic music, using a masking paradigm. Strictly speaking this was a psychoacoustic experiment, but I think it warrants inclusion here because of its relationship to Rasch (1979) and to Gabrielsson (1973). Rasch (1978) studied the interplay of onset timing, volume in dB, and tuning or mistuning of the intervals. A 250 Hz masker was presented with a high tone that leapt from 500 Hz to 750 Hz, or vice versa. The subjects' task was to say if the high note went up or down. When the high note attacked 30 ms before the masker, the high note could be reduced by 40 dB with no worsening of performance on the task, compared to presentation of simultaneous onsets. Mistuning the high notes by 6.4% was also found to lower threshold by 20 dB.

These results suggest that performers can make their lines stand out by mistuning, playing louder, or attacking asynchronously. Deliberately playing out of tune in order to stand out from the other players is not a recommended performance practice; however, it has been known to happen. (For example, violin soloists are notorious among orchestral players for playing ever-so-slightly sharp. They have even been blamed as the source of the gradual rise of concert pitch from A435 to A440 and higher.) Playing louder in order to be heard (or telling the others to play softer!) is a frequent occurrence. Most players, though, would probably deny that they don't play together. Two studies have shown that, in fact, players do attack early or late, and neither they nor listeners are aware of the slight asynchrony.

Gabrielsson (1973) investigated rhythmic aspects of polyphony using live players. From carefully made recordings, he compared note attacks between pairs of performers playing supposedly simultaneous notes, and found that attacks followed a subtle but distinct pattern of slight asynchrony. Specifically, players of higher pitched instruments with melodic lines entered about a mean of 30 ms earlier than players of inner and bass lines. However, when middle or lower voices had the melody they entered early. In his analysis, this non-simultaneity of onset was unconsciously done, and permitted both players and listeners to distinguish the lines better than would simultaneity of onset. Another, perhaps equally logical interpretation of asynchronous onsets might be that because lower pitched instruments tend to speak slower and be heard later in the acoustic space of live performance, they often tend to lag behind higher pitched melodic instruments. However, when players of lower pitched instruments do have the melody or a particularly salient bass gesture, they deliberately compensate by attacking earlier than normal. Instructions to do so are common enough in ensemble and orchestral rehearsals that one might expect to find the effect in commercial recordings, but to the best of my knowledge such a research study has yet to be done.

Findings similar to Gabrielsson's were reported by Rasch (1979) who studied note onsets using a similar paradigm. Polyphonic works performed by trios (recorders, woodwinds, and strings) were taped in an anechoic chamber, and the recordings analysed. The soprano melodic line and the bass line were most commonly attacked earlier than the inner voice. Rasch (1979) suggested that one of the reasons why asynchronous onsets were not perceived as such was that listeners' attention was on the horizontal elements of melodic events within one voice.

It is possible that attending to a line at a time may be aided by salient musical material in the attended line which relegates the rest of the lines to the background. It was not the main point of Gabrielsson's (1973) and Rasch's (1978) work to ask what those other features might be because they were not overtly studying figure and background aspects of subjects' perceptions of differing lines. The temporal distinction they demonstrated is clearly linked to listeners' ability to perceive and follow separate parts. This having been shown, it becomes important to ask if (apart from acoustical features such as rise times, relative dB levels, onsets and the like) the musical character of separate lines might help listeners to distinguish between them. For instance, motivic entries may draw the ear from line to line, and thus delineate lines from each other by rhythmic relations and range. Neither Gabrielsson (1973) nor Rasch (1978) was in a position to ask a question which preoccupied later researchers--whether it is possible to attend to and comprehend two or more voices at once.

Sloboda and Edworthy (1981) tackled the issue of whether two lines can be attended to simultaneously. They used an error-detection paradigm. Subjects, mostly university music majors, listened to a well learned piece of counterpoint and tried to find errors when the two parts were either in the same key, in closely related keys, or in a distant key compared to each other. If subjects heard only one part at a time, a 50% accuracy rate was predicted. Overall, 57% of the errors were detected, which was not significantly better than 50%. The authors concluded that two lines are not actually heard at once, but rather as figure and ground. Accuracy of error detection was significantly higher, though, for presentations in the same key (69%) or closely related keys (56%), compared to presentation in unrelated keys (47%). This would seem to indicate that when a piece presents its voices in the same tonality (which is almost always), many listeners can attend to more than a single voice at least part of the time. Sloboda and Edworthy cite "introspective experience" in favour of the figure and ground interpretation. Perhaps the fact that their subjects initially learned the voices of the counterpoint as separate single-line melodies made it more difficult to hear the resultant counterpoint as a relational whole. The learning process might have caused subjects to have an introspective experience of figure and ground as they alternated between well-known single-line tunes.

Gregory (1990) used a recognition paradigm to determine if it is possible to attend to more than one line at a time. His subjects, mostly teenagers, listened to short excerpts of polyphonic music, and then decided whether a subsequent melody had been present in them. Excerpts were presented in several conditions: (a) uniform or contrasting timbres between parts; (b) simultaneous or asynchronous onsets; (c) same, closely related, or remote keys; (d) voices in similar or distinct ranges; and (e) at a variety of tempi. Recognition was more accurate when melodies (a) were differentiated by timbre; (b) had simultaneous note onsets (in contrast to Gabrielsson, 1973, and Rasch, 1978); (c) were closely related in key (confirmation of Sloboda and Edworthy, 1981); and (d) were in the same pitch range, especially at the same tempo. When melodies were not in the same pitch range, contrasting tempi improved recognition accuracy. Also higher pitch range melodies were more accurately recognized than lower pitch range melodies. Overall, Gregory interpreted his results to mean that different melodic lines in polyphony can be attended simultaneously. This seemed to be as true for material in three lines as for examples of two lines.

Huron (1989) studied "denumerability", or the question of how many lines listeners could accurately count in increasingly thick polyphonic textures. Up to three line textures, musicians were relatively accurate at counting the number of lines. When a fourth line entered, estimation accuracy dropped significantly, and dropped even lower for five line textures. Most errors were underestimations. Non-musicians were significantly less accurate than musicians at this task, suggesting that sensitivity to contrapuntal density is a musical skill. Huron (1989) also found that entries were more clearly perceived than exits, and outer lines more clearly than inner. Following up these points, Huron and Fantini (1989) noted Bach's tendency to avoid inner voice entries in five line textures. Also, Huron (1990) examined 195 contrapuntal works in terms of the voice entry/voice exit patterns, and found that while lines typically entered one at a time, they tended to exit several at a time. Overall, Huron's work suggests that contrapuntal textures of five, four, and even three lines (for the non-musician) can lead to perceptual confusion. As the purpose of the present study was not to count the lines but to perceive precise rhythmic and tonal details in all parts, it was thought appropriate to use two-part exercises similar to those studied in course work by subjects.

Francès (1958) conducted the earliest research dealing with perception of counterpoint but in some ways was far ahead of his time. In Experiment 13 of La Perception de la Musique, he asked listeners to indicate by a hand sign the exact moment when they recognized a fugue subject while listening to a work by Bach. Inexperienced listeners recognized the subject about 59% of the time. Experienced listeners recognized it between 80% and 87% of the time.

This deceptively simple task in fact involved the complex activity of linear tracking between parts, i.e., being sufficiently aware of what is happening in non-attended lines so as to switch the main focus of attention to a new line when salient material such as a fugue subject occurs. The underlying assumption, based on empirical observation, was that somehow listeners do hear more than one line at a time. The question was not "how many lines?", but "how do we do it?", i.e., what is the process by which we take in information from multiple parts?

Francès stated that a likely method of hearing polyphony was "successive sweeps through different registers, each drawing attention to the initial exposition of a motive in one of the parts" (p. 203), and that "with practice or education we should expect two sorts of development", "multiplicity of attentional shifts", and "selective activity directed by the subject at the acoustic message" (p. 204). His emphasis was on the process of applied selective attention. In contrast to studies discussed above, in which emphasis was on stimulus features (timing onsets, voice entries/exits, tonal relationships of keys of presentation) Francès' early work alone questioned how listeners attend to music. Sweeps through registers are linked to the arousal of attention. Training should help listeners to shift attention quickly, and to focus attention selectively on the music. However, attention research on music lagged behind attention studies of vision or language perception. Only since the mid-1970's have several researchers started to investigate attentional aspects of music perception but to the best of my knowledge no one has yet attempted an attentional study of counterpoint dictation. There have been, however, many dictation studies which are relevant to the present work.

<u>Dictation research</u> Some of the earliest research on melodic dictation was done by Ortmann (1933). He studied memory for tonal variants of five-note melodies, in an attempt to establish a teaching taxonomy for melodies. Based on his results, Ortmann

established a taxonomy of "tonal determinants" such as stepwise or leaping motion, and number of changes of direction in contour. From the tonal determinants he constructed a dictation teaching sequence for progressively more difficult melodies.

Taylor and Pembrook's 1983 cognition study of memory strategies for short melodies extended Ortmann's work in two ways. First, using Ortmann's dictation sequence, they compared subjects of varying musical experience. Second, they assessed different response strategies, which involved writing or singing during listening or afterward. They substantially confirmed the existence of Ortmanns's tonal determinants. However, the degree to which the determinants affect melodic memory varied according to subject experience and response method.

Pembrook (1986) investigated perceptual strategies and interference in single-line melodic dictation. He compared the effects of three strategies on melodic short-term memory: (1) writing while listening; (2) writing after listening; and (3) writing after listening and singing back. Subjects heard the melodies either once only, or twice, while doing dictation. Only subjects who wrote during or after listening to melodies twice gained significantly higher scores. Subjects who sang had below average scores, their written responses matched their vocalizations only 61% of the time, and their group dictation accuracy scores were only 43% compared to 48% for non-singing groups. Pembrook concluded that singing before responding is not useful for dictation. This finding was confirmed in subsequent research (Pembrook, 1987). Among Pembrook's suggestions are: (a) the best way to improve dictation accuracy is to increase the number of hearings (errors are apparently more a function of insufficient memory than of notational difficulty); and (b) writing while listening (the so-called progressive method) may be more fruitful than previously thought. A second question posed by the present study was whether directing initial attention toward pitch information would increase pitch accuracy.

> Overall, the progressive technique resulted in the highest scores. If the progressive technique is implemented using only note heads... the subject may be able to notate the melody as it is sounding in all but the quickest of examples.
>
> (Pembrook, 1986, p. 260).

There has been investigation of stylistic bases for melodic dictation (Maslenkova, 1980). Lack of stylistic consistency had a direct effect on subjects' dictation precision. Accuracy fell when exercises were in inconsistent or unfamiliar styles. This result suggests that dictation studies should be controlled carefully for stylistic consistency. Maslenkova's results also suggest that ear training programmes should expose students to as wide a range of styles as possible. This would serve two purposes. First, few styles would remain unfamiliar to students, thus raising the accuracy of their perceptions in general. Second, use of many styles may dispel a possible bias which artificially raises the accuracy of students familiar with "conservatory style exercises" often used for ear training.

<u>Melody research</u> Many non-dictation studies on melodic perception and memory have provided evidence consistent with Ortmann's (1933) that music cognition is based

partly on subjects' knowledge of the rules, materials, and context of the music itself (Deutsch, 1982; Dowling, 1971; Halpern and Bower, 1982; Pollard-Gott, 1983; Sloboda and Parker, 1985; Smith and Cuddy, 1989; Taylor, 1976). For example, Dowling and Fujitani (1971) and Dowling and Bartlett (1981) examined musical memory for melody. They found that while contour information dominates memory over a short delay, interval information, which is relatively more difficult to encode, dominates memory over a longer delay. Dowling (1971) studied recognition of inversions of melodies and of their contours. Melodies were most easily and accurately recognized by their exact pitches, whereas transposed and inverted melodies relied more importantly on contour recognition. Among distorted melody presentations those that preserved the contour were easier to recognize. Dowling (1978) also found interdependence of scale and contour in memory for tonal and atonal melodies. This suggests that varied subject attention to different musical attributes is appropriate, indeed unavoidable, depending on the task. Wang and Sogin (1990) found that musical structure is important to melody recognition, consistent with a notion of limited processing capacity that is assisted by musical grouping. Oura's work (1983, 1987) indicated that the longer the musical structure, the more stylistic rule-structure knowledge became important for subjects' memory accuracy, which supports Maslenkova (1980). Also, musically experienced subjects demonstrated superior recall of tonal melodies regardless of age. Musically experienced children had more accurate recall than musically naive adults. This suggests that musical memory abilities correlate more strongly to musical experience than to general cognitive development or age (Oura and Hatano, 1988). Oura's studies suggest that research on perception and memory for music (a) should be controlled for consistent stylistic features in musical examples, and (b) should either use subjects of roughly similar experience in music or be prepared to analyse for differences of experience among subjects.

Studies that examined aspects of melodic timing--rhythm, tempo, rate of note activity, and rate of subject response--have a variety of approaches. In a study of rhythmic effects on tempo perception, Wang (1984) found that subjects took longer to perceive solo than accompanied melody. Kuhn (1987) and Kuhn and Booth (1988) studied melodic activity. Plain activity and ornamented activity had different effects on subjects' perception of tempo changes. They suggested that instruction on melodic activity and on tempo perception be given separate attention. Duke, Geringer and Madsen (1988) noted that when musical excerpts differed from previous examples in tempo, pitch, or both, tempo changes were perceived more accurately than pitch changes by musicians and nonmusicians. Sink (1983) examined the effects of rhythmic and melodic alteration on rhythmic perception of university music majors. She found that both types of changes can alter perception of rhythmic dissimilarities. Of particular relevance to the present study is her observation that the presence of melody may result in reduced attention to absolute rhythmic structure, compared to presentation of rhythmic sequences alone.

Overall, these studies suggest that melody perception is influenced by prior knowledge. Also, melody perception might consist of a set of unrelated skills. In order to improve any one skill, a learner may have to isolate a given musical feature. Teaching and learning might best be done by specific instructional and attentional strategies for that feature alone, and only afterwards in combination with other music features.

Harmony research Studies of harmonic perception are relevant to the present study because harmonic expectancies play a role in perception of melody. For example, Humphreys (1986) found a high correlation between melodic echo-playing and the ability to mentally anticipate harmonic relations.

Krumhansl has studied pitch perception both alone (1979) and with a variety of colleagues (three studies in 1982, see end of this paragraph). She has found "direct music theory correlates" (a recurrent phrase in her work) for subjects' representations of pitch in tonal contexts and their perceptions of relationships among chords from related keys. Her work demonstrated that musicians' harmonic perception parallels theory rules which have been analytically developed to describe composition. Her subjects may have learned harmonic principles so well that they were keeping these rules constantly in mind while listening. Krumhansl, however, suggested that there are underlying, basic psychological perceptual principles governing the organization of harmony in composition, theory, and listening. Work by Krumhansl and her associates supports the view that theory rules are reflected in perception (Krumhansl, Bharucha and Castellano, 1982; Krumhansl, Bharucha and Kessler, 1982; Krumhansl and Kessler, 1982; Krumhansl and Schmuckler, 1986 and 1987). Implicit harmonic organization is obviously extremely important in two-part counterpoint. Given that the present study did not have as a goal to investigate harmonic strategies, it was considered most appropriate to avoid unlikely or remote progressions that might violate harmonic expectancies.

Bharucha (1988) and Bharucha and Stoeckig (1986) have developed a connectionist framework for understanding harmonic perception and processing. Hierarchical concepts from Lerdahl and Jackendoff (1983) and Deutsch and Feroe (1981) were applied to explain schematic representations in music. Bharucha (1988) applied his 1987 work to explain "veridical" expectancies, which are activated by specific memory traces or by explicit prior knowledge (knowing the piece of music, for instance). On the basis of these schematic and veridical expectancies, he compared how his connectionist model applied to Western music and to Indian ragas. Bharucha also created a computer simulation of the model. The computer programme handled analysis as well as prediction, and could also serve as a subject. Bharucha concluded that in Western vertical harmonies, a given key is a representational unit from which chords derive connected meaning in a hierarchy of relatedness (a conclusion which, clearly, is irrelevant to Indian classical ragas). His theory suggests that in listening to Western music, (1) harmonic and melodic information is processed simultaneously; (2) musical context facilitates perception of some events more than others; and (3) the more prior knowledge one has, the better one will perceive the harmonic structure of a given work.

In a study which combined investigation of melody and harmony, Schmuckler (1989) ran experiments which demonstrated evidence for the existence of musical expectancies based on music theory constructs. Subjects did listening tasks first and performance tasks afterwards. Results indicated that melody and harmony are perceptually independent, and additive rather than interactive in expectancy formation. Schmuckler cited Kulpe (1904) who stated that there is an increase in accuracy when listeners are instructed to attend to any one attribute of a stimulus, compared to no specific instructions. For the present study, the issue is whether there are comparative advantages in overall perceptual accuracy and recall depending on which attribute subjects attend.

The processes of attention, expectancy and memory are clearly central to counterpoint perception. Cognitive psychology research on these topics has produced much literature, to which we now turn.

Attention research: Psychology Kahneman (1973) wrote that the great popularity of behaviourism made attention a neglected subject in psychology for nearly half a century, from about 1910 on. Around 1955, cognitive psychologists, intrigued that one cannot predict individual behaviour by stimulus considerations alone, credited the spontaneity and autonomy of their subjects to "internal mechanisms" which they equated with attention. Since then, much research has been conducted dealing with human attention.

Many models of attention have been proposed. Basic to their understanding is the concept of interference, which can be defined as the deterioration of performance on one task caused by distraction to a different task or stimulus. Examples from studies of verbal behaviour demonstrate that forgetting over time is more severe if subjects engage in an interfering task such as counting backwards by threes between encoding and recall of verbal stimuli (Zatorre and Beckett, 1989). Interference is also studied in musical contexts (Deutsch, 1973; Pembrook, 1986). In Broadbent's (1958) filter theory, a structural bottleneck model, the same mechanism is needed to do two things at once, causing specific interference. In Kahneman's capacity allocation theory (1973), the demands of two incompatible activities exceed available general capacity, causing nonspecific interference. Because both types of interference have been observed to occur, "A comprehensive treatment of attention must incorporate considerations of both structure and capacity" (Kahneman, 1973, p.11). From memory theory has come an alternative view. Norman and Bobrow (1976) proposed that incoming signals are processed as an interaction between perception, attention, and a flexible pool of "memory schemata". While these theories differ in fundamental ways, they share certain common features.

It is generally agreed that attention is both selective and intensive, and can be either voluntary or involuntary. Kahneman (1973) uses the analogy of a spotlight. The beam can be dim or bright (intensity), wide or narrow (selectivity), can move quickly or slowly over a small or wide area (effects of both selectivity and intensity), and can be moved consciously by the subject (voluntary) or be made to move automatically by external events in combination with naturally occurring human tendencies (involuntary). Finally, to pay attention is to exert effort.

Involuntary attention is an exertion of effort in activities selected by enduring dispositions--blinking at bright lights, turning the head towards peripheral motion or a loud sound, for instance. Voluntary attention is an exertion of effort in activities selected by current plans and intentions, or strategies. Attention in cognitive activities is usually voluntary. It is possible that there may be aspects of involuntary attention involved during two-part dictation (a tendency to recognize a final tonic, for instance, or to realize that rhythms are on or off the beat). Intensive aspects of attention are related to arousal, with subtypes such as the orientation reaction (OR), directional fractionation or the P-pattern, and general arousal (Kahneman, 1973). These states are distinguished by directional differences in physiological measures (pupil dilation, heartbeat, brain waves, sweatiness of palms, skin conductivity, and breathing). Such measures were not used in the present study because the emphasis was on accuracy, not on intensity. Research on intensive aspects of attention indicates that certain stimulus properties ("collative" properties of novelty, complexity, and incongruity) make some stimuli more arousing than others. The more arousing stimuli are often the ones to which subjects respond first in situations of "response conflict" (Berlyne, 1960). The more arousing stimuli are then said to have "captured behaviour control". There may be response conflict situations with accompanying capture of behaviour control by one variable or another during two-part dictation.

Selective attention is used when the individual chooses the stimuli that will control behaviour. In signal detection theory (Divenyi and Hirsh, 1978; Eriksen and St. James, 1986; Kahneman, 1973; Pomerantz, 1981), selective attention to an object increases sensitivity to that object by increasing perceptual readiness, increasing response readiness, and lowering the criterion level of sensory magnitude necessary for a positive response to the object's presence. Learning to attend to something and learning to attach correct responses to it are two different stages of discrimination learning. Factors that can help in the process are discriminability of the object and prior learning. These ideas clearly connect Kulpe (1904) to music research which found that perception and memory correlated to prior learning of theory rules and musical styles (Deutsch, 1982; Dowling, 1973a, 1978; Dowling and Bartlett, 1981; Dowling and Fujitani, 1971; Duke, Geringer and Madsen, 1988; Halpern and Bower, 1982; Kuhn, 1987; Kuhn and Booth, 1988; Maslenkova, 1980; Ortmann, 1933; Oura, 1983, 1987; Oura and Hatano, 1988; Pollard-Gott, 1983; Sink, 1983; Sloboda and Parker, 1985; Smith and Cuddy, 1989; Taylor, 1976; Wang, 1984; Wang and Sogin, 1990). What Kulpe thought happened in his study was that selective attention actually improved perception ("perceptual tuning"). Kahneman (1973) suggested two other interpretations. A response hypothesis was that unattended material was less rehearsed and suffered more forgetting, making it less likely to be included in responses. An encoding hypothesis was that the attended attribute, encoded first, took primacy in recall.

> In summary, the study of Kulpe's effect did not provide compelling evidence that attention to a dimension alters perception. The intention to pay attention to a particular attribute appears to have its effects by increasing response readiness for a category of responses... and by controlling the quality and the sequence of encoding and the order of report. This interpretation does not violate naive introspection... Listen to a brief tune, while trying to pay special attention to the attribute of loudness. Now listen... and attend to pitch and melody. How did you interpret the instruction to attend to one or the other attribute? You may find that you acted as if you were preparing to recall [them] with special accuracy... If this was the case, did you adopt different strategies to store the two attributes? Could the different experiences of listening...arise from different modes of rehearsal?
>
> Kahneman, 1973, p. 105.

Kahneman (1973) also examined studies of divided attention. Such studies usually required attention to two simultaneous (and not necessarily related) sets of stimuli, such as dichotic listening tasks. Because these activities differ from listening to polyphonic music in which the multiple stimuli are related, one must apply the psychology literature with caution, but extremely interesting connections can nevertheless be made. For example, Kahneman (p. 141) wrote that in competing situations, visual stimuli dominated auditory stimuli, capturing both awareness and response. This implies that during two-part dictation students may believe that what they have written is correct because of the strength of the visual information on the page. They may then "hear" the exercise incorrectly on subsequent repetitions. Later, Kahneman explained that "mental manipulations of stored symbols are more demanding than routine perceptual analysis... particularly... when executed under pressure of time. ...This is especially true of any mental act that depends heavily on short term memory, since the rate of rehearsal must compensate for the rate of decay of stored information" (p. 191). This description perfectly fits the activity of two-part dictation.

It is clear from this quote that Kahneman linked attention, rehearsal and memory. This is true of other researchers of human memory. Posner (1978) considered results from many memory studies to show that retention depends upon active rehearsal. Rehearsal, and thus retention, is interfered with by any mental operation that takes attention elsewhere. Posner also stated that if presentation rates match encoding rates, one could predict as good a memory capacity among slow encoders as among fast encoders. Young or inexperienced subjects would be expected to be slower encoders because of their unfamiliarity with the elements of the given material. Posner emphasized the importance of what he called the "prior set", the process by which conscious attention or search is guided by prior hypotheses and knowledge. Prior set is similar to other terms such as expectancy (getting ready to perceive a stimulus) and preparatory set (getting ready to respond) which are found in attention and memory research by both psychologists and musicians (Gibson, 1941, cited in Carlsen, 1982).

Cofer (1976) also stressed the use of existing knowledge in memory tasks: "Meaningful input engages a portion of a person's knowledge and initiates activities of processes which (a) integrate that input... (b) fill in gaps... and (c) provide contexts in terms of which the information taken in can be remembered" (p. 194). Meyer and Schvaneveldt (1976) expanded upon this by stating that the particular way input engages knowledge is by means of the semantic structure of memory. Specifically, in word tasks, long term memory seems to be organized by the meaning of the words. This semantic structure of verbal memory seems to facilitate the initial encoding of words and the accessing of their meanings. Cofer, Chmielewski and Brockway (1976) cautioned, though, that the consequences of activation of long term memory depended strongly on what the subject thought the task to be. Subjects' prior knowledge could actually be a source of error if they took a task too far towards inference, association or prediction. This view of memory as a creative and constructive process is supported by observations of students' creative constructions in two-part dictation.

Memory studies have examined the way retention and recall are affected by encoding strategies and depth of processing. Encoding was defined by Gilmartin, Newell and Simon (1976) as the conversion of perceived stimuli to internal representations. The transition is effected by perception of the stimulus, search of short term or long term memory until a match for the stimulus is recognized, followed by rehearsal and transfer of the internal symbol to the appropriate memory store. Gilmartin et al. defined depth of processing as the degree of elaboration of the trace of the stimulus. A stimulus that does not get past the "sensory store" is lost, whereas if it reaches sensory "imagery" it receives shallow processing and the subject can give a rough physical description of it. Medium depth processing in short term memory permits subjects to give contextual descriptions based on initial encoding. Deep processing which accesses long term memory permits subjects to give descriptions based on the semantics of memory. A comparable process in music perception would require a "semantic" musical memory. This would be a body of knowledge built up through study and instruction in theory rules, stylistic features, and aural recognition of paradigms. Such knowledge would permit accurate recognition of the contextually dependent meaning of musical rules and features. Gilmartin et al. stressed that individual differences in encoding strategies, and changes of strategies over time, underlie behaviour and explain qualitative and quantitative differences of performance.

Tulving (1983) agreed that subjects have private strategies for encoding events and emphasized that the lifelong buildup and consequent habitual nature of these methods makes them resistant to experimental manipulation. The researcher can establish only partial control over habitual encoding strategies, yet significant effects have been observed.

This suggests that the longer a subjects' musical experience, the more likely that person is to have developed ingrained strategies for perception and retention of music. The subjects for this study were chosen from among second year students because it was thought their strategies for contrapuntal dictation may have been less rigidly fixed than those of more advanced students.

Attention research: Music studies have emphasized how temporal relations of variables affect expectancy, perception, attention and memory while interacting with prior knowledge. An early case in point is provided by Carlsen, Divenyi and Taylor (1970). Their study of perceptual expectancy in melodic configurations demonstrated that expectancies varied according to subjects' cultural background. In their analysis they distinguished between effects of expectancy for clearly separated variables at the event level in music, specifically, pitch, rhythm, tonal context, and timing of events within a phrase. Carlsen et al. called for further cross-cultural studies, predicting that cultural effects of foreknowledge would alter predictive abilities as well as expectancies in cross-cultural listening. Carlsen's continued work in this area supported the suggestion that a cultural "reservoir of predisposition" affects melodic expectancy (Carlsen, 1981). He also demonstrated that melodic expectancy correlates negatively with melodic error (Carlsen, 1982). This corroborates Mari Reiss Jones' (1976) concept that patterns which excessively foil expectancies cannot be comprehended.

Jones' work has stressed the perceptual importance of temporal relationships and the proportionality of nested rhythms. She detailed (1976) how a pattern's time scale determines the serial integrity of its pitch/loudness structure. Noting that humans are rhythmic by nature, she suggested that human inner time can be synchronized with time scales in "world events" if the two are proportional. Proportionality facilitates memory span as long as people are locked onto the rhythmic time scale of the world event. If a pattern in world events is not proportional in its time relationships, perception cannot fit it into a single time scale. The pattern will not make sense and will be difficult to learn. The perceiver must try to comprehend such a pattern by a multi-faceted approach (Jones, 1976, p. 328, Assumptions II.1 through II.5). Further, "attention to auditory patterns fits nicely within a rhythmic framework... rhythmic attention meets the criteria Kahneman [1973] has set forth." (Jones, 1976, p. 345). "Distinctions between expectancy, perception, and memory are subtle, for all are tied to the same psychological mechanism--namely, nested rhythms." (Jones, 1976, p.347).

In "Music as a stimulus for psychological motion" (parts I and II, 1981, 1982), Jones further developed her ideas in a manner more closely linked to music. She suggested that Ideal Prototypes based on very simple symmetries underlie what she terms "ordinary" melodies, and whole movements of musical works. This is akin to music theorists' reductions to underlying structures, or descriptions of paradigms (Aldwell and Schachter, 1989; Schenker, 1910). Jones stated that music implies the prototypes, much as rhythm implies (in Western music) a metric framework. It is against this implied underlying symmetry that one comprehends the particulars of the melody or music in question. Jones has explored many sides of auditory attention including structures in memory (Jones, Maser and Kidd, 1978), rhythmic attention (Jones, Kidd and Wetzel, 1981), controlled attending (Jones, Boltz and Kidd, 1982) and rule recursion in memory for melodies (Boltz and Jones, 1986).

Dowling incorporated elements of Jones' model of rhythmic attention in his more recent research, which he has also linked to psychology (Divenyi and Hirsh, 1978), and vision (Eriksen and St. James, 1986). Dowling, Lung and Herrbold (1987) described the ability of both musicians and non-musicians to synchronize their attention with rhythmic structures in familiar patterns. Dowling et al. likened this matching process to the setting up of a series of "expectancy windows" which could be "aimed" easily at beats and at expected events off the beat. The windows yielded relatively accurate rhythmic focus and relatively approximate pitch focus, but were flexible (Dowling, Lung and Herrbold, 1987, p. 656).

With unfamiliar material one might hypothesize that musicians would be somewhat superior to non-musicians in their ability to anticipate events. Although a relationship of narrow temporal focus (fairly accurate rhythmic perception) to broader pitch focus (rather less accurate pitch perception) might persist, musicians might be especially more accurate than non-musicians on pitch tasks. Musicians can name pitches accurately from a structured set such as a chord or the seven notes of a tonality. They improve with training if the instruction emphasizes the structural nature of the set, which does not hold true for non-musicians (Cuddy, 1982).

Cuddy (1982) raised the issue of how people process tonal answers. She discussed how a deeper research understanding of their ambiguity could contribute to musical cognition theory. Although Cuddy has not yet conducted research into perception of tonal answers, it is significant that her range of inquiry extends to materials that can only be found in contrapuntal contexts such as fugues. It is possible that in the not-so-distant future, many researchers will turn their attention to counterpoint as a proving ground for existing theories derived from studies of more basic materials such as pitch and rhythm.

There are conflicting beliefs among music attention researchers concerning the relationship of pitch and rhythm. One view is that they interact, i.e., that they can mutually reinforce one another or distract from each other. This view has implications for music instruction. For example, Mialaret's monograph of programmed instruction (1979) involved the integration of solfège into the acquisition of performance skills. In this context, Mialaret proposed that pitch and rhythm are best taught together.

Studies supporting this view have included Deutsch (1980), who found that melodic memory was better when pitch/rhythm organizations coincided and worse when they conflicted; and Jones, Boltz and Kidd (1982), who found that pitch changes were detected more readily at temporally stressed locations than at unstressed points.

Palmer and Krumhansl (1987), however, have taken the view that pitch and rhythm are not interactive, but perceptually independent and additive. They pointed out that perceptual interaction of two variables, according to Pomerantz (1981), should imply limited capacity for processing the two independently, or difficulty in attending selectively to the separate features. Palmer and Krumhansl (1987) found independence of pitch and rhythm structures' effects on judgements of the goodness of musical phrases. The two variables were not correlated, and an accurate predictive model for overall judgements could be made by addition of their separate effects. Other research suggesting independent perception of temporal order was conducted by Handel (1973) and Monahan and Carterette (1985). Indeed, Jones, Boltz and Kidd's discussion (1982) of effects of temporal organization on attention to particular pitches implied that selective attention to pitch alone is possible. This would seem to indicate at least a partial independence of the two variables. Jones, Boltz and Kidd did not, in fact, argue that pitch and rhythm are inseparable. They argued that attention is rhythmical. Accurate perception of tonal events, however, would appear to need more knowledge, skill and effort than accurate perception of rhythm. In working with single line melodies, Cuddy showed that tonal rules (and how easily they can be applied to sequences) are critical determinants of acoustic pattern recognition (Cuddy, Cohen and

Miller, 1979). Recognition of sequences, and ratings of their structural goodness, both deteriorated as tonal rules were relaxed (Cuddy and Lyons, 1981). Studies of melodic memory processing, especially how it is influenced by "tonal strength", have also been done by Williams (1975, 1980, 1982).

Feature Extraction versus Unilinear Listening

The task demanded of music students during contrapuntal dictation is complex. Students must pay attention to many features and aspects of the music at once. Responses also draw on many senses, skills, and types of knowledge simultaneously. Strict time constraints increase effort by causing a narrow beam of attention to skip around in a disorganized way. One purpose of this study was to find a way of enabling subjects to stabilize their attention. The choice was between a typical ear training class method such as unilinear listening, or, based on the importance of pitch and rhythm as separate features in the attention literature, feature extraction.

Feature extraction can be defined as selective attention focused on a single unitary variable or feature such as diagonal lines, light flicker, localization, timbre, loudness, pitch, or rhythm (Francès, 1958; Kahneman, 1973). Certain pedagogical techniques require students to focus their attention selectively. During dictation, for instance, focusing on one specific aspect of the music at a time may help students to construct an accurate notation of the exercise. A frequent question one encounters among students and teachers is whether to adopt a unilinear approach (by attempting to hear both pitch and rhythm simultaneously in one line and then another), or whether to adopt some other strategy such as listening to harmonic implications or perhaps using a feature extraction approach. Concerning contrapuntal dictation, students are often trained to listen first to one voice then the other, thus treating the lines as independent single melodic dictations (Warburton, 1971).

A common rationale for the popularity of a unilinear strategy in polyphonic dictation is the idea that it is impossible to pay attention to two simultaneous lines. As discussed previously, it is unclear that this is the case. Nevertheless, it seems evident that it is harder to attend to two lines at once than to attend to only one. Dichotic listening techniques, in which simultaneous unrelated messages are delivered by headphone to opposite ears, are based on this difficulty, and so is much of the interference research literature. There are, however, several problems with a unilinear strategy.

First, unilinear listening ignores the relationship between parts. If the only way to hear two lines at once is not to hear two lines at once, counterpoint should be impossible to perceive and should have died out long ago as a compositional device. Second, the non-attended line is a source of aural interference. If the student ignores it, the mental effort required to do so may also cause interference. In either case transcription accuracy may be degraded by distraction. Third, even heard one at a time, each voice contains many musical features.

The attentional literature and the music expectancy literature suggest (as alternatives or supplements to one-line listening) that students might profit from strategies which concentrate on single features such as rhythm or pitch and how they relate across voices. It is another common technique in ear training classes to sketch rhythm first. Rhythmic grouping has an effect on subjects' ability to group melodic materials in memory (Dowling, 1973b). Mastering rhythm before pitch is a pedagogical concept which numbers among its proponents Dalcroze and Hindemith, yet there has been little research to validate the practice. Pembrook's (1986) "progressive technique" described previously would seem to be the opposite of a rhythm-first technique. A main purpose of this study was to pit these two strategies against each other as possible methods for focusing subjects' attention during dictation of contrapuntal materials. As a control measure, subjects also did one dictation session by their usual methods (frequently unilinear), thus permitting an examination of the relative efficacy of all three strategies.

METHOD

The Three Attentional Strategies

In the dictation tasks, two strategies required specific attentional direction and one was a non-directed strategy. For directed strategies, subjects were asked to attend initially to rhythm or pitch but not to both at once.

The Rhythm strategy This method used rhythm symbols which omitted note heads except for white notes. Whole and half notes were pencilled lightly above the staff. Quarter notes and briefer durations were indicated by stems with appropriate flags, beams, dots, ties or rests, either above or directly on the staff according to subjects' preferences.

Subjects attended first to the rhythm and wrote rhythmic symbols without pitch indications. After half the repetitions of the dictation were finished (three of the six playings of the separate phrases), subjects then attended to pitches and added note heads on the staff.

The Pitch strategy Subjects attended first to pitch and wrote note heads without rhythmic indications. Whole notes and half notes were not differentiated from black head notes; all were shown by means of a dot on the (hopefully correct) staff line or space. After half the repetitions of the dictation, subjects then attended to rhythm and completed rhythmic aspects of the notation.

The Non-directed strategy Subjects notated pitch and rhythm in any order until the dictation was completed. Their only instructions from the investigator were to use whatever procedures they normally employed.

The Questionnaire

It was possible that some subjects' usual strategies would be identical or similar to one of the directed strategies employed in this study. It would be crucial to account for any such overlaps during statistical analysis. Also, it seemed likely that the students' dictation strategies would be consistent with their overall learning styles. There is a substantial body of research indicating that music instruction and learning can interact with learning styles (for a recent review, please see Zikmund and Nierman, 1992). It became obvious that the study must have a descriptive tool. A registration form and questionnaire was designed to gather information in five categories: (1) factual information such as age, sex, instruments, and years of study; (2) self-assessments of memory skills and keyboard skills; (3) self-assessments of learning styles, using the descriptors intuitive, analytical, visual, verbal, non-verbally aural, and tactile; (4) self-descriptions of methods, strengths and weaknesses in dictations other than two-part; and (5) self-descriptions of strategies, strengths and weaknesses in two-part dictation. Later the reader will be referred to appropriate appendices to see the development of the questionnaire from pilot study, through main study, to tabulation of descriptive results.

Pilot Study

A week-long pilot study took place before the main study. The goals of the pilot study were to practice all procedures, to refine instructions and questionnaires, and to test marker reliability.

Subjects Participants were eight McGill undergraduate music majors (five men, three women). Their ages ranged from 19 to 36 and averaged 22.9 years. Five subjects were enroled in second year ear training courses. The other three subjects were first year ear training students who had placed into second year ear training for dictation only. The group had an average of 2.6 years of theory study and 1 year of counterpoint classes.

Subjects' principal instruments (average 6.3 years study) included woodwinds, brass, voice and keyboard. There were no double majors, but 7 of the 8 subjects listed one or more secondary instruments which included plucked and bowed strings. Subjects rated their keyboard skills on a five-point scale: non-player, poor, fair, good, excellent. The average was 3.3, or between fair and good.

Preparation of Musical Materials Original music was created for experimental sessions because any example drawn from existing literature might be familiar to subjects. The examples had to meet several criteria: (1) the counterpoint had to be accurate; (2) the styles had to represent certain historical periods without falling into caricature; (3) besides embodying the paradigms stressed by the McGill second year ear training programme, the inventions had to be of a uniformly appropriate difficulty for this level; and (4) the musical features of the inventions had to be sufficiently controlled so as to be appropriate for research purposes. For example, if all examples were in one metre and one key, it would be difficult to generalize from results. A plan to balance the examples by feature was developed (see Appendix A). Also, it was decided to submit all music composed for this study to thorough evaluation by a panel of experts.

Construction of musical examples. In February, 1991, I composed twelve two-part inventions for the pilot study. Every invention was eight bars long and was divided into two four-bar phrases. Stylistically they were restricted to Common Practice idioms ranging from late Baroque through early Classical. The harmonic rhythm was kept steady and predictable, and modulations were made only to closely related keys, usually the dominant or the relative major or minor. An attempt was made to strike a balance between vocal and instrumental styles. Four inventions were free counterpoint and eight were imitative. Of the imitative examples, four used real imitation and four used tonal imitation. Over all twelve exercises, there was an equal representation of each of the following musical features: simple versus compound metre; duple versus triple time; major versus minor mode; sharp versus flat key signature (no examples in C major); bass versus soprano first entry; and tonic versus dominant first entry. Counterbalancing for the above musical considerations was distributed equally across free, imitative-real, and imitative-tonal exercises. All of the inventions were designed to be of suitable difficulty level for second year university music majors. Some gradation of difficulty level, however, was unavoidable. Judges evaluated difficulty so that the exercises could be presented to subjects in increasing order of challenge. A chart used to plan the inventions is in Appendix A.

Judge evaluations. The inventions were judged by three McGill Faculty of Music professors. The first was a theorist and counterpoint teacher, the second was a composer with much stylistic knowledge, and the third was co-ordinator of second year ear training. All three judges were active performers.

Judges received copies of the twelve inventions, an evaluation form, and a letter explaining how to proceed (see Appendix B). They graded each invention on a five-point scale (1 = very poor, 5 = very good), based on the following criteria: (1) suitability for second year McGill ear training classes; (2) contrapuntal accuracy; (3) vocal/instrumental neutrality of style; (4) stylistic consistency between exercises; and (5) overall musicality of each exercise. Space was left at the bottom of the page for additional commentary; some judges continued on additional pages. Judges returned the exercises ordered according to difficulty, the "easiest" one uppermost. For the pilot study only, they were also asked to suggest a suitable dictation tempo.

Judges' scores are reported in Appendix C, along with their written commentary. Confirmation of the suitability of the exercises came from the fairly high ratings overall (only 2 of 36 means fell below 3 out of 5), from personal verbal communications with the judges, and from their written reactions. Judge 2 wrote, "I find this a good collection which should serve its purpose very well... each exercise is consistent with itself." Judge correlations are in Table 1. Judge 3 gave consistently lower ratings than the other two judges, but in fact correlated better with Judge 2 than with Judge 1, who was more likely to rate an exercise differently from his colleagues.

Table 1

Pilot Study Inventions: Judge Evaluation Correlations

Judge 1 to Judge 2:	r = .25
Judge 1 to Judge 3:	r = .37
Judge 2 to Judge 3:	r = .52

Judges tended to rate an exercise consistently. If they thought it suitable ear training material they also found it acceptable counterpoint, and scored it high on all other questions. Similarly, if a judge considered an example unsuitable for ear training it was usually because of incorrect counterpoint or musical and stylistic weakness, and the exercise received low scores overall. Inventions for which scores diverged by more than two points, or which received detailed criticism from a judge, were revised. Details of the revisions are also in Appendix C.

Inter-judge evaluation of the order of difficulty was fairly consistent. Eleven of the 12 inventions were classed within an identical or an adjacent group of four exercises, each group being equivalent to an experimental session. One invention was placed in the easiest group of four exercises by one judge, but was placed among the most difficult four exercises by the other judges. This invention was revised to improve the counterpoint, and placed last in order. The revised inventions are shown in their final order in Appendix D.

Recording. Taping was done at the McGill Faculty of Music in a performance teaching studio which had a Steinway 7 foot grand piano. Two Sennheiser directional microphones were positioned to the left and right, 2 metres behind the performer's back, slightly above the level of the keyboard. They were connected to an AKAI-HX-A2 Stereo cassette deck. Recording was done on TDK SA60 chromium cassette tape (high bias). Each invention was announced by number. Tonality was established by a I--IV--V--I cadence, followed by the first pitch. Tempo was established by announcing the note value of the beat, and by counting one full bar before playing. Every invention consisted of two phrases. The dictation order was: the entire exercise (1 min); first phrase plus first downbeat of second phrase, 4 times (once every min); the entire exercise (1 min); second phrase 4 times (once every min); and the whole example one final time (1 min). Spacing the repetitions this way created pauses of 30 sec after presentation of the complete exercise and up to 45 sec after presentation of the first or second phrase. There was also a final pause of 1 min to allow subjects to check their work. Each exercise thus took a total of 12 min elapsed tape time for subjects to complete their work. A stopwatch was used to ensure precise timing.

Two exercises were recorded on side A, and two on side B, of each of three tapes. This produced a different master tape for each experimental session, and provided each session with a brief pause half-way through. The master tapes were dubbed onto copies for use with subjects.

<u>Procedure</u> Pilot subjects met in a group for three one-hour sessions on three consecutive days. They used a McGill Faculty of Music theory classroom equipped with an AKAI-HX-A2 stereo cassette playback deck, a Sony TA-1150 amplifier and KLH speakers, for free-field playback of the inventions.

On entering the classroom, subjects were asked to sit at widely spaced writing desks. Each person was given an identification number to guarantee anonymity. At the first session only, subjects filled out a one page registration form and a one page prototype of the questionnaire (see Appendix E). General instructions were then read aloud to all the subjects, and their questions were answered (see Appendix F). At every session subjects received prepared manuscript answer pages (see Appendix G) and written, strategy-specific instructions (see Appendix H). These were explained verbally and any subsequent questions were answered. The dictation tape was then played.

The order of strategies for the pilot group was: Non-directed strategy in the first session; Rhythm strategy in the second session; and Pitch strategy in the final session. After the second and third sessions, pilot subjects filled out a one page post-dictation questionnaire to state their reactions to the strategy they had just used (see Appendix I).

Dependent Measures and Marking The dependent measures were pitch accuracy and rhythm accuracy in subjects' finished written work. Every invention was to be graded twice, once for rhythm and once for pitch. The highest possible score for each was 100.

Marking procedures. Marking grids were devised in order to establish precise grades for the pitch and rhythm of each note. Each grid consisted of a copy of the complete invention with separate marks assigned for pitch and for rhythm. To arrive at a system of mark distribution, initially the total score of 100 for each variable was divided evenly over the eight bars (12.5 per bar). This was obviously too crude a division because some passages were more challenging than others. Higher marks were distributed to difficult spots, and lower marks to the less challenging passages, while maintaining an even division between phrases i.e., 50 points for pitch in the first phrase, 50 in the second phrase, and likewise for rhythm. The marks were entered above the staff. Rhythm was uppermost, originally in red; pitch was below the rhythm grades and just above the note heads, originally in green (see Appendix J).

Markers were told to write a value for every number on the grid, rhythm in red and pitch in green. Part marks were possible for transpositions, slight displacements of rhythmic figures, and so on. Markers were told to use their own discretion (see Appendix K). Marking was done by two independent markers and myself, without knowledge of subject names and strategies used. Marks were averaged for the three experimental sessions: overall means out of 200, and the component means for pitch (100) and rhythm (100).

Results Correlations between the markers were as follows.

Table 2

Pilot Study Marker Correlations

	Marker Pair		
	1/2	1/3	2/3
Score			
Overall:	.96	.94	.93
Pitch:	.96	.95	.96
Rhythm:	.94	.89	.87

No other statistics were calculated except group means under each condition. This was done partly out of curiosity, but the resultant means eventually provided an interesting comparison to those of the main study. The overall group average was highest under the non-directed condition, which was the first session (Table 3). This countered the prediction that directed attention of any kind should raise accuracy. Possibly subjects were tired or confused by a new strategy each day for three days. It is also possible that the other strategies were not effective.

Table 3

Pilot Study Group Averages

	Condition		
	Non-directed	Rhythm	Pitch
Score			
Overall (200):	132	121	120
Pitch (100):	59	42	51
Rhythm (100):	73	79	69

Accuracy differed for pitch and for rhythm, especially under the experimental strategies. Rhythm marks were consistently higher than those for pitch, and rose even higher under the Rhythm condition. Pitch marks went down from the Non-directed condition to the Pitch condition. This was unexpected because the prediction had been that directed attention toward a variable would raise accuracy for that variable.

An analysis for main effects was not appropriate because of the small number of subjects and the consequent use of a single order of strategies. Another prohibiting factor was the lack of time between sessions. In the main study, which lasted seven months, sessions were separated by at least 10 days to reduce the possibility of strategies influencing each other. Analysis of content reliability of the examples was also not considered necessary at this time because the main study was to use twelve different inventions.

An examination of the post-dictation questionnaires revealed that three subjects did not feel comfortable with either strategy, because they had to delay writing symbols for the non-attended variable until after half the repetitions were over. With only twelve minutes per dictation, subjects felt that time was too short to delay any of the writing. However, five subjects stated strong aversions or preferences for one strategy or the other. When this tendency was checked against questionnaire information, a trend appeared. The subject who favoured the rhythm strategy scored high for an analytical general learning style. Conversely, of the four subjects who favoured the pitch strategy or who found the rhythm strategy disruptive, three subjects scored high for intuitive and non-verbal learning general learning styles. The subjects who disliked both strategies showed no similar patterns. Also, visual and tactile learning styles seemed to be randomly high or low across all subjects.

Discussion The pilot study served several purposes. The judge evaluations for the suitability of musical examples could be repeated by experienced judges for twelve different inventions to be used in the main experiment. It is likely that the creating, judging, and recording of the main study inventions were more accurate than would have been the case without the practice of producing the pilot study. It was also important to have had the opportunity to practice running the experimental sessions. Compared to the pilot sessions, main study sessions were smooth and error-free, especially in terms of delivering instructions properly and answering questions completely and quickly. The high marker intercorrelations made it feasible to reduce from three to two the total number of markers for the main study.

Much of the paperwork had to be refined. Instructions were made clearer and shorter in order to prevent diversions from the written text. The subject answer sheets were redesigned to make phrase structure clearer and to give more writing space. Marking grids were enlarged and further standardized for the main study. Instructions to markers were unchanged.

The registration questionnaire changed the most from pilot to main study. The pilot subjects responded in great detail to the request to describe their usual ways of taking two-part dictation. Some people came back several days later to say that they had thought of more information. There was clearly a need to expand the descriptive aspect of the study, especially as there are no published surveys of student techniques used in contrapuntal dictation. It was at this stage that the registration questionnaire developed into the four-page probing tool described previously (see Appendix P).

The examination of the post-dictation questionnaire results suggested that there may have been some interaction between subjects' general learning profiles and their preferred strategies. It remained to the main study, with its far larger group of subjects, to examine the question of whether there really was a significant interaction between learning styles and effective strategies.

Main Study

Subjects Sixty volunteer subjects (25 male and 35 female McGill music students) completed all experimental sessions. Fifty-three were enroled in second year ear training. Seven were first year ear training students who had placed into second year dictation seven months earlier. Subjects had completed an average of 2.8 years of theory study and 1.0 year of counterpoint study. The major area of study was classical for 49 subjects. There were 7 subjects in Jazz, and 4 in Early Music. Subjects ranged in age from 18 to 41, with an average age of 23.2 years.

Subjects had studied their principal instruments for an average of 9 years. Although there were no double majors, 50 subjects (83.3%) listed one or more secondary instruments. Principal and secondary instruments encompassed the entire range of keyboards, woodwinds, strings, brass and percussion, as well as voice and guitar.

Self-ratings on keyboard skills were: 18.3% claimed excellent skill, 23.3% claimed good skill, 33.3% claimed fair skill, 20% claimed poor skill, and the remaining 5% (3 subjects) claimed to be non-players. Three-quarters of subjects said that they played keyboards with a fair degree of skill or better. The mean was 3.3, i.e., between fair and good.

Assignment to Groups Subjects were divided randomly into 6 groups for counterbalancing according to the grid in Table 4.

Table 4

Counterbalancing Grid for Main Study Groups

N = Non-directed R= Rhythm P = Pitch

Group	Order		
1	R	P	N
2	P	N	R
3	N	R	P
4	R	N	P
5	N	P	R
6	P	R	N

Materials In March 1991 I wrote twelve exercises for the main study. Every eight-bar long example was divided into two four-bar phrases. Stylistically they represented Common Practice idioms ranging from late Baroque through early Classical. The harmonic rhythm was kept steady and predictable. Modulations were made only to closely related keys such as the dominant or the relative major or minor. An attempt was made to strike a balance between instrumental and vocal styles. Four exercises were free counterpoint and eight were imitative. Of the imitative examples, four used real imitation and four used tonal imitation. Over all twelve exercises, there was an equal representation of each of the following musical features: simple versus compound metre; duple versus triple time; major versus minor mode; sharp versus flat key signature (no examples in C major); bass versus soprano first entry; tonic versus dominant first entry; and downbeat versus upbeat first entry. Counterbalancing for the above musical considerations was distributed equally across free, imitative-real, and imitative-tonal exercises. All of the examples were designed to be of suitable difficulty level for second year university music majors. Some gradation of difficulty level, however, was unavoidable. Judges evaluated difficulty so that the exercises could be presented to subjects in increasing order of challenge. A chart used to plan the inventions is in Appendix L.

There were several reasons why I did not re-use the exercises of the pilot study, but these reasons did not include the presence of pilot subjects in the main study--all subjects in the main study were new participants. First, I wanted the main study examples to be of even higher quality, if possible, than the pilot exercises--the idea of equalizing the number of examples of downbeat and anacrusis rhythmic openings had been raised, among other issues. Second, I wanted to avoid the possibility that main study subjects could have any sense of familiarity whatsoever with the musical examples (from having talked with pilot subjects, for instance, or from having overheard portions of the pilot sessions from outside the not-very-well-soundproofed door). Third, I wanted to create as large as possible a new reservoir of two-part exercises to be made available to the McGill ear training staff or whoever may find them musically useful.

The exercises were evaluated by the same panel of three judges who judged the pilot study music: a counterpoint teacher, a composer, and the co-ordinator of second year ear training. Judges received copies of the twelve inventions, an evaluation form, and a letter explaining how to proceed (see Appendix M). They graded each invention on a five-point scale (1 = very poor, 5 = very good), based on the following criteria: (1) suitability for second year university ear training classes; (2) contrapuntal accuracy; (3) vocal/instrumental neutrality of style; (4) stylistic consistency between exercises; and (5) overall musicality of each exercise. Space was left at the bottom of the page for additional commentary; some judges continued on additional pages. Judges returned the exercises ordered according to difficulty, the "easiest" one uppermost.

Judges' responses and written commentary are in Appendix N. Correlations of their evaluations are presented in Table 5.

The judges did not exhibit a high degree of agreement. The low correlations may in fact have been due to a ceiling effect; ratings for these twelve inventions were higher than they were for the pilot set, indicating that the higher quality sought was probably realized. The zero correlations occurred because Judge 2 marked response 5, "excellent", for every exercise on criteria a and c. The actual scores were high (see Appendix N). Every exercise received a majority rating of 4 or 5, with a few 3's. Exercises that received grades of 2 were revised. Others were revised in response to specific suggestions. Judge agreement on order of difficulty was comparable to the situation for the pilot study. Eleven exercises were placed in identical or adjacent groups of four. One invention was placed in the group of the four easiest examples by one judge, but at other difficulty levels by the other two judges. It was revised and placed at the start of the final (most difficult) group of exercises. The final order of exercises is stated in Appendix N. The inventions are presented in their final form in Appendix O.

Table 5

Main Study Inventions: Judge Correlations

Criteria:

a = suitability for ear training level 231

b = accuracy of counterpoint

c = stylistic balance, vocal and instrumental

d = internal stylistic cohesion

e = overall musicality

	Judge Pair		
	1/2	1/3	2/3
Criterion			
a	0	-.20	0
b	-.35	.41	-.24
c	0	.75	0
d	.15	.87	.13
e	-.09	.17	.17

Revisions were followed by recording. Taping was done at the McGill Faculty of Music in a performance studio with a Steinway 7 foot grand piano. Two Sennheiser directional microphones were positioned to the left and right, 2 metres behind the performer's back, slightly above the level of the keyboard. These were connected to an AKAI-HX-A2 Stereo cassette deck. Recording was done on TDK SA60 chromium cassette tape (high bias). Each invention was announced by number. Tonality was established by a I--IV--V--I cadence, followed by the first pitch. Tempo was established by announcing the note value of the beat, and by counting one full bar before playing. Every invention consisted of two phrases. The dictation order was: the entire exercise (1 min); first phrase plus first downbeat of second phrase, 4 times (once every min); the entire exercise (1 min); second phrase 4 times (once every min); and the whole example one final time (1 min). Spacing the repetitions this way created pauses of 30 sec after presentation of the complete exercise and up to 45 sec after presentation of the first or second phrase. There was also a final pause of 1 min to allow subjects to check their work. Each exercise thus took a total of 12 min elapsed tape time for subjects to complete their work. A stcpwatch was used to ensure precise timing. It should be noted at this point that no change was made from the 12 min timing of the pilot study exercises because pilot study subjects did not state that they felt short of time.

Two exercises were recorded on side A, and two on side B, of each of three tapes. This produced a different master tape for each experimental session, and provided each session with a brief pause half-way through. The master tapes were dubbed onto copies for use with subjects.

Procedure Subjects met in small groups for three one-hour sessions. A minimum of 10 to 14 days went by between any one session and the next. The experimental settings were McGill Faculty of Music theory classrooms equipped for free-field playback using the following equipment: AKAI-HX-A2 stereo cassette playback decks, Sony TA-1150 amplifiers and KLH speakers. Sessions ran from April to November 1991. There was a 33.3% dropout rate. Subjects who left were replaced by others. A total of 91 subjects took part over this time, of whom 60 completed all experimental tasks.

At the first session, subjects were greeted and given numbers. They were assigned to widely spaced writing desks so that no subject sat in close proximity to another.

All subjects filled out registration forms. Next they completed the expanded questionnaires about learning styles and two-part dictation methods (see Appendix P). Instructions common to all strategies, and about the experiment in general, were then read to all subjects (please see Appendix F).

Because of counterbalancing considerations, it frequently happened that subjects using different strategies listened to a given tape in the same session. Strategy-specific instructions were therefore distributed for all subjects to read silently (see Appendix H). Answers to subjects' questions were given in close physical proximity to the subject, and in a very quiet voice.

The tape was then played. Subjects took dictation on prepared manuscript answer pages (see Appendix G). Upon completion of each session subjects filled out a one page post-dictation questionnaire on which they stated their reactions to the strategy they had just used (see Appendix Q). Second and third sessions omitted registration, the pre-questionnaire and the reading of general instructions; they were otherwise identical to the first session.

RESULTS

Data analysis involved (1) correlations for marker reliability, (2) multivariate analyses on dictation marks, (3) a descriptive report of questionnaire results, (4) factor analysis on learning styles, (5) covariate analyses of selected questionnaire variables, and (6) split-half reliability tests on dictation marks.

Marker Correlations The dependent measures were marks for pitch accuracy and marks for rhythm accuracy on the written dictations. Each variable was marked out of a possible total of 100 points, and the two were added for a possible overall score of 200. Markers 1 and 2 (retained from the pilot study) graded the dictations using scoring grids which established precise values for each note and rhythm (see Appendix R). Marker 1 scored all 720 exercises. Marker 2 graded 25% of the total, or 180 exercises. Marker 2's exercises were distributed across the six groups and chosen at random within each group.

The correlations between Marker 1 and Marker 2 were $r = .99$ for overall scores, $r = .98$ for pitch marks and $r = .97$ for rhythm marks. The raw scores also matched closely (see Appendix S). Given the agreement between markers it seemed unnecessary to average scores for subjects who were graded twice, especially as this would affect only 25% of subjects. The full set of marks generated by Marker 1 seemed reliable enough to be used as data. For each subject, a pitch mean and a rhythm mean under each of the three conditions was used for analysis.

Dictation Results The overall mean (all groups, all conditions) was 47%. The component pitch mean was 34.7%, and the rhythm mean was 59.2%. Broken down by strategy, overall means were highest for the Rhythm condition and lowest for the Pitch condition, as can be seen in Table 6 below. When separated into means for the two dependent variables, pitch marks differed from rhythm marks. Pitch marks did not vary markedly under any strategy whereas rhythm marks changed noticeably according to the strategy used (again, please see Table 6).

Table 6

Percentage Accuracy by Condition

	Condition		
	Non-directed	Pitch-first	Rhythm-first
Score			
Overall	48.0	43.7	49.3
Pitch	37.3	36.4	30.5
Rhythm	58.6	50.9	68.1

Subjects were assigned to six groups to counterbalance the order of strategies. A two-way analysis of variance was done, pitch and rhythm by group, to see if there were order effects (see Table 7). No order effects were found, but because pitch scores and rhythm scores behaved so differently two separate one-way analyses of variance (ANOVAs) were also done on pitch by group and on rhythm by group (see Tables 8 and 9). There was no significant difference between groups for either pitch or rhythm. Further analyses thus treated all subjects as one group.

Table 7

Two-way Analysis of Variance for Order Effects,

Pitch and Rhythm by Group

Source	SS	df	ms	F	p
Total	41592.31	118	--	--	--
Pitch total	24079.72	59	408.13	--	--
Group	1203.56	5	240.71	.56	ns
Error	22876.16	54	423.63	--	--
Rhythm total	17512.59	59	296.82	--	--
Group	670.17	5	134.03	.43	ns
Error	168424.42	54	311.90	--	--

Table 8

One-way Analysis of Variance Pitch by Group

Source	SS	df	ms	F	p
Total	81667.48	179	--	--	--
Between groups	3608.87	5	721.77	1.61	.16
Linear term	77.25	1	77.25	.17	.68
Deviation	3531.62	4	882.90	1.97	.10
Within groups	78058.61	174	448.61	--	--

Table 9

One-way Analysis of Variance Rhythm by Group

Source	SS	df	ms	F	p
Total	84751.21	179	--	--	--
Between groups	2009.99	5	401.99	.85	.52
Linear term	549.22	1	549.22	1.16	.28
Deviation	1460.77	4	365.19	.77	.55
Within groups	82741.22	174	475.52	--	--

A multiple analysis of variance (MANOVA) with repeated measures was done on rhythm and pitch marks by three conditions (see Table 10). There was a main effect for condition ($F = 14.07$, $p < .0001$), linked with significant changes in rhythm marks ($F = 10.38$, $p < .0001$). The differences between pitch means did not attain significance ($p = .165$). A significant two-way interaction between pitch and rhythm means ($p < .0001$) occurred because pitch marks did not vary whereas rhythm marks rose and fell significantly under the different strategies.

Post hoc one-way ANOVAs were run on pitch and rhythm marks by condition. For pitch marks (see Table 11) this confirmed that there were no significant differences under any condition ($F = 1.82$, $p = .17$). For rhythm marks (see Table 12) the significant difference between conditions was confirmed ($F = 10.38$, $p < .0001$). To pinpoint where the precise differences lay, the Tukey-HSD test was used. The results indicated that rhythm marks under the Rhythm condition were significantly higher compared to rhythm marks under the Non-directed condition, $p < .05$, and compared to rhythm marks under the Pitch condition, $p < .0001$. (The difference between rhythm marks under the Pitch condition compared to the Non-directed condition was not significant even to the .0001 level.)

Table 10

Multiple Analysis of Variance, Pitch and Rhythm by Condition

Source	SS	df	ms	F	p
Total	311472.45	718	--	--	--
Between subjects	176962.07	362	--	--	--
Pitch	1643.50	2	821.75	1.82	.165
Rhythm	8899.89	2	4449.95	10.38	.0001
P x R	10543.39	4	2635.84	5.99	.0001
Error	155875.29	354	440.33	--	--
Within subjects	134510.38	356	--	--	--
Condition	9902.38	2	4951.19	14.07	.0001
Error	124608.00	354	352.00	--	--

Table 11

One-way Analysis of Variance, Pitch by Condition

Source	SS	df	ms	F	p
Total	81667.48	179	--	--	--
Between conditions	1643.50	2	821.75	1.82	.165
Linear term	1392.24	1	1392.24	3.08	.08
Deviation	251.27	1	251.27	.56	.46
Within conditions	80023.97	177	452.11	--	--

Table 12

One-way Analysis of Variance, Rhythm by Condition

Source	SS	df	ms	F	p
Total	84751.21	179	--	--	--
Between conditions	8899.89	2	4449.97	10.38	.0001
Linear term	2692.32	1	2692.32	6.28	.0131
Deviation	6207.57	1	6207.57	14.49	.0002
Within conditions	75851.32	177	428.54	--	--

Stratified analysis of dictation scores. To see if strategies had differential effects according to dictation accuracy, subjects were rank ordered and regrouped into High Accuracy, Medium Accuracy, and Low Accuracy groups, with 20 subjects in each. A MANOVA with repeated measures was done on stratified overall scores by groups by conditions, to determine whether there would be a significant interaction between accuracy groups and treatments. Results showed no such interaction (see Table 13). The effects of conditions did not vary according to subject accuracy. (A similar analysis, not on overall scores but on constituent pitch and rhythm scores, revealed a comparable lack of significance. It was not thought necessary to table these subsequent non-significant results.)

Analysis by instrumental ranges. A question that arises in the teaching of ear training is whether students hear differently according to the range of the instrument they play. It is possible that cellists and tuba players hear bass lines differently from how they hear soprano lines, or how violinists hear soprano lines. To investigate this possibility, subjects were regrouped according to the range of their instruments (voices in the case of singers). Four groups were established: high range players, middle range players, low range players, and pianists. Only pitch scores were analysed. As the use of pitch scores affected by experimental conditions would be confounded by possible treatment effects, only Non-directed condition scores were analysed. Means were calculated for soprano and bass accuracy for each group (see Table 14).

Table 13

Multiple Analysis of Variance, Accuracy by Group & Condition

Using Stratified Overall Scores

Source	SS	df	ms	F	p
Total	77817.98	171	--	--	--
Between subjects	67098.33	57	--	--	--
Group	40361.42	2	20180.71	84.43	.0001
Error	26736.91	55	486.13	--	--
Within subjects	10719.65	114	--	--	--
Condition	1044.73	2	522.36	5.56	.005
Gr X Cond	189.66	4	47.42	.50	.733
Error	9485.26	108	87.83	--	--

Table 14

Pitch Accuracy by Instrumental Range, Non-directed Condition

(Overall pitch accuracy under Non-directed condition= 37.3%)

Group	Soprano mean	Bass mean	Overall
Pianists (n=17)	49	42	45.5
High (n=19)	43	38	40.5
Middle (n=10)	31	35	33.0
Low (n=14)	24	30	27.0

The separated soprano and bass means were tested for significance of difference between independent samples (Ferguson, 1981, p. 178). The only two comparisons which reached significance were for soprano means. There was a significant difference between low range players and high range players, $t = 2.47$, $df = 31$, $p < .02$. There was a significant difference between low range players and pianists, $t = 3.33$, $df = 29$, $p < .01$.

The Questionnaire The questionnaire (see Appendix P) yielded demographic data as well as self-assessments of keyboard skills, memory abilities, general learning styles, and dictation habits. Most of the questions concerned students' experiences of two-part contrapuntal dictation.

Appendix U tables questionnaire results with the order rearranged from the original, so as to group questions about similar musical aspects into five main sections. These five sections are new, and do not exist in Appendix P. Each section groups responses from questions not necessarily in order on the questionnaire. The sections have been created only for presentation of results and analysis. Please see Appendix U to consult the tabulations section by section.

Section I (age, sex, principal instrument, years of study of the instrument, theory, and counterpoint) was summarized in the Method section under Main Study, Subjects.

Section II grouped responses about keyboard skills and memory. The mean response for keyboard skills was 3.3 (between fair and good) with a standard deviation of 1.7. A curious feature was that only 18.3% stated that their keyboard skills were excellent although piano majors formed 28.3% of the subject group.

Two questions on memory skills, one on instant recall and the other on long term memory (LTM), elicited dissimilar response patterns. Instant recall ratings were distributed normally; 75% of subjects said their immediate recall was fair or good. The mean was 3.3 with a standard deviation of 0.6. LTM was negatively skewed with a mean of 3.6 and a standard deviation of 1.3.

In Section III, self-assessments on learning styles, possible responses to descriptors ranged from 1 (never) to 5 (always). Mean responses are shown in Table 15. It can be seen that the higher the mean, the less variability was associated with the descriptor. Visual and intuitive received high ratings from a majority of subjects and low ratings from extremely few subjects; therefore, the standard deviation was small. Analytical and non-verbal received high ratings from quite a few subjects also, but there were more subjects who rated them extremely low. This lowered the means and spread their variability; thus the standard deviations are larger than for visual and intuitive. The same holds true for the descriptor tactile.

Table 15

Responses to Learning Style Descriptors

Descriptor	Mean	Standard deviation
Analytical	3.5	1.4
Intuitive	4.0	0.8
Visual	4.1	0.7
Verbal	3.4	2.4
Non-verbal	3.4	1.6
Tactile	3.1	1.5

Responses to the descriptor verbal had a bimodal distribution. Most subjects rated themselves very high or very low, and very few subjects rated themselves as moderately verbal. The mean therefore lies between the two rather distant peaks of the curve, at a rating which hardly any subjects actually chose. A large standard deviation is the inevitable result of this type of distribution.

Other learning methods were cited by 16.6% of subjects. These were repetition, demonstration, association, inner dialogue, mnemonic devices, and knowledge of theory.

Section IV asked subjects to report on their dictation weaknesses and strengths in textures other than two-part counterpoint. Responses were on a five-point scale identical to that used in Section III (1 = never to 5 = always).

For pitch, 43.3% of subjects claimed they never or rarely made errors. For rhythm error the mode was "rarcly" (38.3%) with a mean of 2.5. On isolated chords, 28.3% of subjects said they made errors half the time, 26.6% stated they had trouble often, and 18.3% always. The mean on isolated chord difficulty was 3.3. For harmonic progressions, subjects said they made few errors. The mode was "rarely" (38.3%) and the mean was 2.9.

Section V asked about two-part dictation. 21.6% of subjects typically used a feature extraction strategy. Twice as many subjects listened to the rhythm first compared to those who listened to pitches first. 63.3% of subjects gravitated to linear listening, nearly half of them soprano-first. 11.6% preferred harmonic or structural strategies involved with voice comparison. 3.3% of subjects used other strategies. One person heard purely melodic features such as sequences, and the other person seemed to write in a trance ("automatic writing response").

When questioned as to the efficacy of their natural tendencies, those who used feature extraction had a mean of 3.5 out of a possible high of 5. Linear listeners had an efficacy rating mean of 3.2, harmonic and structural listeners had a mean of 3.4, and those with other strategies had a mean of 1.2.

In describing their ear training class work, 38.3% of subjects said instructors suggested linear strategies, 20% received melodic strategies, 16.6% were directed to feature extraction, and 6.6% reported that harmonic work was suggested. Instruction frequently seemed to be an attempt to strengthen students' less developed ways of listening; 69% felt that they were asked to do the opposite of their natural tendency in class. Class work in which instructors suggested no specific strategies and let students discover their own methods was mentioned by 18.3% of subjects.

Compared to subjects' assessments of their normal strategies, efficacy ratings of the various methods generally rose with instruction. Melodic methods as used in class had a mean of 3.3, up from 1.2. Feature extraction methods, formerly rated 3.5, and harmonic hearing, formerly rated 3.4, both rose to means of 3.6. Linear listening received the lowest ratings; the mean was essentially unchanged, up from 3.23 to 3.25.

All subjects listened in a linear way some of the time. There was an inverse relationship between those who said they always listened to a single line (68.3%) and those who said they could never hear two lines at once (31.6%). Linear listening was not due totally to an incapacity for dual hearing, however. Many subjects (30%) who usually listened to single lines admitted that they were sometimes capable of hearing both lines at once. Also, 16.6% of subjects stated that they compared lines from the start.

Thirty percent of subjects claimed to be able to hear both lines at once. Half of them (15% of all subjects) used melodic methods such as hearing relative motion and analysing entry types. Additional methods listed included using perfect pitch, hearing harmonic relationships, visualising on piano, and "not worrying". Multiple responses were possible, and not all subjects answered the question.

The first entry was the most common voice for single-line listeners (42%) to start with, for obvious reasons. This even overrode a natural tendency to listen to the soprano first. The soprano and the first entry tied as "the easiest" voice to perceive. However, voice confusion was something of a problem for nearly 80% of subjects.

Questions about methods of hearing voice relations revealed that few students listened to harmony while hearing counterpoint. Only 8.3% of subjects said they could always hear the harmonic intervals and only 21.6% stated they could always hear the implied harmonic functions. Many subjects never listened for harmonic intervals (31.6%). Those who listened did so mainly at cadences (66%) or at the second entry (60%). A few listened for consonance and dissonance (38.3%). Similarly, many subjects could not hear harmonic functions (30%). Those who could do so listened mainly at cadences. Few attempted to hear harmony at modulations (10%).

Questions about the transcription process addressed two issues. The first was the prevalence of what Pembrook (1986) called "the progressive method", i.e., writing while listening to the example. The second was the prevalence of activities which could be disruptive in a classroom setting, but which may be permissible or even desirable during individualized instruction. These included reproducing the melodic material aloud by singing, humming, or whistling, and tactile encoding, or "playing along" on a kinetically imagined instrument.

The progressive method was not often used. Only 15% of subjects stated that they notated exclusively while the exercise was being played. Nearly all the others wrote during and after the exercise was being played. 3.3% said they always wrote exclusively afterwards.

Only 16.6% of subjects claimed they never reproduced the music. Of the remainder 28.3% admitted they sang, hummed or whistled out loud. All others claimed they sang "mentally only". Not all reproducers did so at all stages of a dictation. The most prevalent times were while notating their response (84% of the subgroup) and after writing to check the answer (86% of the subgroup).

Tactile encoding was more prevalent among pianists than among non-pianists (77% of pianists compared to 37% of non-pianists). Equally likely moments for playing along were between listening and writing, or afterward. Playing along while listening was done rarely (1.6%, and only sometimes).

Questions about other aspects of two-part dictation yielded the following results. The easiest aspect overall was identified as rhythm by 20% of subjects, then the soprano (15%), beginnings and endings (11.6%), cadences, and single lines (8.3%

each). No other variable was cited by more than 5% of subjects. Many students replied that there was no easy aspect to the task.

The hardest aspect was perceiving the vocal entries (18.3%) followed closely by harmony, especially modulations (16.6%). The bass, wide leaps, harmonic intervals, and the actual notation process afflicted 10% of subjects. Speed (8.3%), concentration, memory, and voice confusion (13.3% each) were also problematical. A variety of other troublesome aspects were cited such as chromaticism, certain keys, metres and modes, especially the minor mode. Though many subjects listed pitch-related difficulties, none stated that pitch itself was a main difficulty.

Few subjects used techniques not covered by the questionnaire. Listening for structures (8.3%), keeping the tonic (6.6%), and trying to work as fast as possible (3.3%) were the main ones. All other suggestions were offered by only 1 subject each, except for 7 variations on the theme of "guess-compose-pray".

<u>Learning Styles</u> Responses from Section III of the questionnaire tabulations (see Appendix U) were submitted to factor analysis, which revealed three distinct learning styles (see Table 16). These were labelled as Fluid (intuitive and non-verbal/aural), Sensory (tactile and visual), and Structural (analytical and verbal). Some subjects fit none of the labels. They were grouped under a fourth style, Hybrid.

A subject's style was determined by the highest average of two descriptors, weighted by the highest rating given. For example, a subject who marked a 5 for Analytic, a 3 for Verbal, a 4 for each of Intuitive and Non-verbal, and lower ratings

Table 16: Factor Analysis of Learning Styles

Means (SD):						
	Intuitive	4.03 (1.0)	Tactile	3.12 (1.2)	Analytical	3.48 (1.2)
	Nonverbal	3.37 (1.1)	Visual	4.05 (1.1)	Verbal	3.38 (1.1)

Correlation Matrix (Communalities):

	An	In	Vi	Ve	No	Ta
An	.597					
In	-.202	.491				
Vi	-.014	-.285	.676			
Ve	.361	.247	-.286	.542		
No	-.355	.449	-.368	.080	.514	
Ta	-.062	.314	.327	.190	.098	.788

Factor Matrix:	Fluid	Sensory	Structural
Intuitive	.68913	.14326	.07644
Non-verbal	.67801	.02919	-.23176
Tactile	.25772	.73523	.42539
Visual	-.55120	.60794	.05177
Analytical	-.29492	-.34308	.62675
Verbal	.33810	-.21606	.61743

for other descriptors, would have an average of 4 on both Structural and Fluid. The highest rating, given to Analytic, would determine the assignment to Structural. A tie would have occurred if all four of the highest variables had been rated identically. Absolute ties and mixed cases were assigned to Hybrid. Overall, 18.3% of subjects were Fluid, 26.6% were Sensory, 36.6% were Structural, and 20% were Hybrid.

Covariate Analyses Covariates of three types were chosen. The first type consisted of aspects of undergraduate musical instruction (theory, counterpoint, and keyboard skills). The second type included aspects of a student's musicianship that might be useful to ear training instructors (instrument and its linear capacity). Linear capacity was defined as single or multiple according to whether the instrument usually plays one note at a time or is capable of playing multiple notes such as keyboard instruments and guitar. The last group of covariates included aspects of subjects' cognitive approach (general learning styles, and private strategies for two-part dictation).

The original MANOVA was reprogrammed in SPSS-X using the "with" routine for covariate analysis. Each covariate was submitted in turn. No significant relationships emerged (see Table 17).

Reliability Split-half reliability using the Spearman-Brown procedure yielded an R of .71. In addition, the correlation between pitch scores and rhythm scores was .55.

Table 17: Results of Covariate Analyses

Covariate related to	Pitch scores		Rhythm scores	
	t	p	t	p
Years of theory	.54	.59	.13	.89
Years of counterpoint	-.43	.67	-1.13	.26
Keyboard skills	1.77	.08	.75	.46
Major instrument	.69	.50	-1.50	.14
Linear capacity	1.19	.24	.94	.35
Learning style	-.11	.91	1.12	.27
Private strategy	.23	.78	.27	.87

Summary The results of this study were:

1. When subjects attended first to rhythm, their rhythm scores rose to an average of 68.1%. This was significantly higher compared to using their normal strategies ($p < .05$) and to attending first to pitch ($p < .0001$).

2. The difference between conditions ($p < .0001$) was due entirely to the shift in rhythm scores. There were no significant differences between pitch scores ($p = .165$).

3. There were no statistically significant differences between groups. indicating that there was no order effect of treatments.

4. Stratification of scores did not change the above results. High, medium or low accuracy did not interact with experimental strategies.

5. When examined by range (soprano or bass), pitch accuracy differed according to subjects' major instruments. Soprano line scores of middle and low range players were significantly lower than those of high range players ($p < .02$) and those of pianists ($p < .01$).

6. Methods used by subjects included feature extraction, melodic and harmonic strategies, and linear listening (the most widespread but not apparently the most effective strategy). With instruction, efficacy ratings rose the most for melodic and harmonic methods.

7. Factor analysis on learning styles revealed three groups, Fluid (intuitive and non-verbal/aural), Sensory (visual and tactile), and Structural (analytic and verbal). A

fourth category, Hybrid, was created for all other combinations. 18.3% of subjects were Fluid, 26.6% were Sensory, 36.6% were Structural, and 20% were Hybrid.

8. There was no significant relationship between effects of experimental strategies and learning styles, nor any of the several other covariates.

9. Reliability of responses was analysed by the Spearman-Brown split-half procedure and yielded an R of .71.

DISCUSSION

The most striking result of this experiment is that directed attention had differential effects depending on the variable to which subjects initially attended. Based on attention research (signal detection theory) the expectation had been that higher scores for the attended variable would be attained under both directed strategies compared to the non-directed strategy. Instead, while rhythm scores rose significantly under the Rhythm condition, pitch scores were not significantly higher under the Pitch condition or "progressive technique" (Pembrook, 1986). (The same pattern was seen in the pilot study pitch and rhythm means under directed conditions.) The main study results were not affected by high or low subject accuracy, as evidenced by the stratified analysis. The covariate analyses additionally showed that results were unrelated to a variety of aspects of musical training or individual learning styles.

Differences in pitch and rhythm accuracy were less surprising in light of the differences between these features noted by music perception research. However, it is one thing to know that two variables are different; quite another to understand why. At this level music perception research still struggles for clarification.

One explanation is that rhythm might be easier to perceive than pitch. (This still begs the question of why.) Ear training teachers seem to assume this when, as is frequently the case, they allot proportionally fewer marks for rhythm accuracy than for pitch accuracy in a single line melodic dictation. Certainly rhythm seemed easier to perceive than pitch within the style constraints of the music used in this study. It would be interesting to see if these results could be replicated in future studies using examples of complex rhythms combined with simple pitches, then the reverse, and finally complex pitches and complex rhythms together. This sort of research might include examples of non-Common Practice styles of counterpoint including atonal examples.

The rhythms of the study were planned be no less complex than the pitches. The diatonic style (chosen for its familiarity to subjects) restricted pitches to the seven notes of a tonality, with a few chromaticisms at decorative or modulatory points. The exercises did not include unusual leaps, nor did they exploit extreme ranges. Rhythm included durations which varied from those lasting two or more beats, to a single beat. Shorter durations included the beat's subdivision and second subdivisions, further complicated by anacruses, dots, ties, and resultant syncopations. There were rests of as many varieties as note values. In addition the study involved a rotation between simple and compound time, duple and triple metre. Why then were pitch marks so consistently low, and why was only rhythmic accuracy amenable to improvement?

One possibility is that the rules for rhythmic recognition may be fewer and easier in a metric context than the rules for pitch recognition. Subjects might have organized rhythms in reference to downbeats and regular bar groupings. The variety of rhythmic events described above might have been categorized easily in relation to these frameworks. In changing metres or non-metric music, rhythm may not be easy to perceive and notate. Without the regularly recurring predictability of the downbeat, expectancies would be difficult to form, much less fulfil. It would be interesting to attempt a comparable dictation task in non-metric two-part inventions.

· Another possiblity is that the pitch material exceeded subjects' harmonic studies in ear training classes, whereas the rhythm patterns fell well within the bounds of what they had drilled. Especially at chromatic alterations and modulations, subjects seemed unable to discern secondary dominants which in principle they had drilled in class. It is possible that they had not worked long enough with this sort of harmonic vocabulary to be able to recognize secondary dominants when they were implied by only two parts. The rhythms, by contrast, were extremely similar to the type of pure rhythmic drills students had been doing since early in their first year of ear training.

While material differences cannot be ruled out completely as the source of pitch being more difficult than rhythm, neither can the possibility that pitch and rhythm are perceived and processed differently. Research in fact has suggested that pitch and rhythm are perceptually distinct attributes (Dowling, Lung and Herold, 1987; Jones, Boltz and Kidd, 1982; Jones, Kidd and Wetzel, 1981; Palmer and Krumhansl, 1987; Zikmund and Nierman, 1992). Palmer and Krumhansl wrote that "Temporal and pitch information may engage independent mental processes due to internal constraints on the way we produce and perceive information across temporal frames." (Palmer and Krumhansl, 1987, p. 125.) This suggests that inherent productive aspects of human information processing necessitate perception of pitch and rhythm by separate, different, and concurrent mental operations. Palmer and Krumhansl stated that this should be particularly so when temporal information and pitch information occur together in a natural combination, and are perceived simultaneously by subjects. The combinations of pitches and rhythms in the present study fulfilled that condition. The difference in pitch and rhythm accuracy is consistent with Palmer and Krumhansl's suggestion of independent processing.

Jones, Kidd and Wetzel (1981) argued that attention is rhythmic. The evidence from this study suggests that the reverse is possibly also true: rhythm may be attentional. Perception of rhythm might be accomplished by paying attention to it alone. This is known as "filtering input" (Broadbent, 1958), a process which permits rapid perceptual analysis (recognition, interpretation, and response selection) done with little conscious analysis or effort.

Simply being told to attend solely to pitch was insufficient to improve the accuracy of pitch perception in this study. Other researchers have emphasized the importance of knowledge of music theory rules in melodic cognition (Cuddy, Cohen and Miller, 1979; Oura, 1983, 1987; Oura and Hatano, 1988; Smith and Cuddy, 1989) and melodic expectancy (Carlsen, 1981, 1982; Dowling, Lung and Herrbold, 1987; Jones, 1976, 1981, 1982). It would seem reasonable to suppose that in counterpoint, accurate pitch perception depends on knowledge of music theory rules. Pitches in counterpoint are pitches in relation to a constantly changing context determined and described by precisely such rules. Each note, by its interconnections, contains much information. Sometimes this information becomes ambiguous or paradoxical, such as in modulations or implied chromatic harmonies. The more layers of musico-structural meaning of a passage, the more a musician's knowledge of music theory and structural rules would seem to be crucial for the understanding of pitch content, and the more serious a decrement in accuracy would be predicted by lack of theoretical knowledge. It was not surprising that the problem areas subjects encountered in this study were frequently at modulations, chromaticisms, and leaps, especially in combination. These are areas where notes may have several meanings at once, or do not demonstrate good continuation, or diverge from the main tonality in unexpected decorative ways. Again, this was an area in which it became aobvious that pitch content of a harmonic nature exceeded the theoretical training of the subjects.

Selective attention, a necessary first step for accurate contrapuntal pitch perception, seems to be followed not by rapid perceptual analysis as for rhythm, but by a more time-consuming cognitive analysis accompanied by decision-making (Kahneman, 1973). We are certainly far from understanding all the processes, perceptual, neural, cognitive and strategic, that might underlie such an analysis.

The progressive technique has been shown to yield high scores in one-line melodic dictation (Pembrook, 1986), but it is unknown to what extent it constitutes, or activates, a set of rule-based cognitive strategies for counterpoint dictation. Further investigation of the progressive method in contrapuntal contexts might be a useful course for future research. Its efficacy can not be ruled out on the basis of the present study, given the time constraints of these experimental dictations. The taped exercises were fast (three complete playings and four repetitions of two phrases in twelve minutes). Subjects complained that the tempo was too quick for memorization and that the time between phrases was insufficient for notation. Some subjects expressed an affective preference for the pitch-first strategy, but again complained about the quick pace. Replication with more repetitions, more slowly delivered would be important for exploration of the usefulness of the progressive technique.

The results of this study suggest that the classroom teacher of ear training would be well advised to have students make a rhythmic sketch first when taking dictation of counterpoint in Common Practice style. Rhythmic accuracy will most likely be improved. There is no guarantee that pitch accuracy will be improved. If, though, the sketch is done in as few hearings as possible, the rest of students' time could be spent on pitch perception. This time spent exclusively on pitches may help students achieve higher pitch accuracy. In other styles, the reverse order might be preferable, depending on the relative difficulty of pitches and rhythms.

There are a number of secondary issues which warrant discussion. The first such issue is why the marks, especially for pitches, were so low. The quick pace of the tapes combined with the difficulty of the musical exercises probably lowered marks. The situation could have been avoided in a couple of ways, but both would have introduced serious drawbacks.

There could have been more playings per phrase and more time between hearings, but this would have stretched experimental sessions to well beyond an hour. Finding, keeping, and scheduling subjects would have been impossible unless the number of exercises was reduced, which would have adversely affected the design of the study. The decision rested on whether it was more important to avoid a ceiling effect with the strongest subjects or a floor effect with the weakest. I chose the former option because only by making it tough for the most accurate subjects would I have any indication of experimental effects on their work. In the classroom, the utility of extra repetition is suggested by other dictation research (Pembrook, 1986, 1987).

Another way to avoid low scores would have been to make the exercises simpler, but this would have reduced the extent to which results could be generalised. It was important to use material that could be compared to standard repertoire from the Common Practice period. The judges may have overestimated the capabilities of the second year students. Many subjects stated that they had found the final ear training examination very easy compared to the experimental tapes. This may have been purely affective, or it is possible that subjects' attentional capacity expanded due to coping earlier with the demands of the more difficult experimental conditions. This is a phenomenon reported in Kahneman (1973).

Turning to the various analyses of instrumental effects, the range effect was most thought provoking. Under the Non-directed condition, low range players heard the bass line more accurately than the soprano part, but they heard both lines less accurately than high range players. Pianists heard both voices more accurately than did other players. Covariate analysis by instrumental family irrespective of range showed no association to experimental effects. Neither did the linear capacity of subjects' major instruments. Familiarity with the extended keyboard range rather than with the timbre or medium of the instrument seemed to enhance accuracy of counterpoint dictation. This finding suggests that non-pianists might benefit from serious and prolonged piano studies. Keyboard familiarity does not seem to be an issue that can be addressed by more ear training alone.

Another possibility is that pianists were indeed aided by the familiar instrumental timbre of the experimental tapes. One ear training teacher, concerned about the poor pitch perception of wind players compared to pianists, presented exercises to his class in wind timbres. His impression was that the wind players then had superior pitch accuracy compared to pianists (Pennycook, 1993, personal communication).

Still another possibility is that pianists were more familiar with the style of the exercises. This sort of two-part invention abounds in graded repertoire books available to piano students from an early age. Non-pianists typically start their instrumental studies at a later age, and when they progress to ensemble and duo playing they meet a wider range of styles, thus developing less solid familiarity with any one style.

The questionnaires yielded much information about students' unsupervised work methods during dictation of all sorts. A word of caution is necessary here, however. Self-assessment is always a slightly unreliable procedure. It may be more so when subjects are asked to disclose weaknesses they would prefer to hide even from themselves. Fully 43.3% of subjects claimed they never or rarely made pitch errors. The mean of 3.0, which indicated that subjects had trouble with pitches about half the time, seemed restrained in light of a pitch accuracy of 30--37% during the experiment. Subjects' assessments of their rhythmic accuracy seemed more realistic. Subsequent experimental scores confirmed that they did not normally find rhythm very difficult. Self-assessment of difficulty with isolated chords seemed fairly trustworthy, but it made strange contrast to assessments of difficulty with harmonic progressions. Here, the peak was at the descriptor "rarely". This seemed surprising given subjects' stated difficulty with chords, and also given their lack of harmonic perception in counterpoint. It is possible that subjects were so weak in this area that they were truly unaware of how much there was to perceive.

The questionnaire revealed that during two-part dictation the practice of linear listening was widespread. The unilinear method, though, was not rated the most effective way of perceiving and remembering dictation exercises. Other methods less commonly used were rated higher, specifically feature extraction and harmonic structural hearing. When methods were rated the second time as a function of instruction, clear indications emerged as to which teaching methods students felt were most beneficial: hearing harmonic progressions and intervals, motivic entries and imitations, relative motion between parts, and other structural principles. Much future research is needed to determine precisely how such methods work, which ones are the most effective, and in which order or combination they yield the most accurate dictation results.

Questionnaire results also indicated that singing or playing along during or after a dictation exercise was common. Perhaps instructional methods can take advantage of these behaviours by emphasizing individual instruction, and different response activities either prior to, or in lieu of, dictation. Research with these non-dictation and pre-dictation response activities, which were not addressed at all by the present study, would thus seem to be warranted. Singing back an exercise before writing it may not be useful (Pembrook, 1986), although the addition of solfège or sol-fa syllables may increase accuracy. Also, the effect on dictation accuracy of playing back an exercise on the piano before writing has yet to be investigated.

It was surprising that there was no relationship between experimental effects and the learning styles revealed by factor analysis. The expectation had been that subjects in the Fluid category might profit from the Pitch strategy, based on the observation of pilot study subjects. Part of the difficulty seemed to be, again, that the dictations went too fast for subjects to organize pitch material in memory. Also, the descriptors may not have meant the same thing to each subject. They were not specifically defined. If the questionnaire was not sufficiently sensitive or accurate, results may have differed had one of the existing learning styles inventories been used.

Future Research

As is clear from previous suggestions, many types of studies are possible based on this research. Future investigations might address attentional or mnemonic matters, psychology of auditory perception in general, or the perception and memory of musical counterpoint. In this last category, work might concentrate on pitch relationships, attempting to develop theoretical, structural, and mnemonic strategies for perception and memory of pitch in contrapuntal textures of two, three or more voices.

This was not a treatment study in that it involved no practice or learning over time. Other non-treatment studies might vary the difficulty levels of rhythm and pitch in a more systematic fashion as discussed above, or investigate what happens when attention is selectively directed to variables other than rhythm and pitch. A parallel line of treatment research could explore classroom instruction, where students acquiring dictation skills are given much class drill and practice. Here, the following procedures might be considered: 1) present many playings per phrase; 2) allocate long intervals between phrases for memory and writing; 3) introduce notation of the non-attended variable at a relatively early stage. This could lead to different results from those in the present study because there would be less loss of information such as subjects suffered in this study. Under such conditions the Pitch condition may lead to much higher accuracy than in the present study. The Rhythm condition may not depress pitch scores (a small lowering of accuracy, though not statistically significant, was observed in the present results). Having extra time for pitches early on in the Rhythm condition may even improve pitch memory and scores.

Because the melodic and harmonic elements of Western music are inextricably mixed (Schmuckler, 1989), especially in counterpoint, future experiments might explore melodic and harmonic strategies for counterpoint perception. For instance, a study might investigate different preparations for two-part dictation. Harmonic interval drill (split-second vertical relations or "first-species" approach) could be compared to harmonic progression drill (horizontal flow approach) and to motivic comparison (diagonal scanning and pattern-matching approach). All of these would have to be tested in tonal contexts, where scale degree is an added clue, and in non-tonal contexts.

Research might also be done with reproduction modes other than dictation. After hearing a contrapuntal example, subjects might sing it line by line with solfège labels; play it back on their instrument, line by line; or play back both lines simultaneously on piano. This last option might benefit students' keyboard skills. Accuracy on a two-part dictation examination or accuracy on playing or singing back contrapuntal examples by memory might be suitable dependent variables.

Another approach would be to have students create their own contrapuntal materials by practising score reading, improvisation, and composition. It is possible that such processes help to engrain the theory constructs that inform pitch perception. Subjects in such an experiment might attempt one or more of the following activities: (1) read from score, (2) copy from score and sing at concert pitch with solfège syllables as they write, (3) play back by memory, (4) improvise, (5) study species and free counterpoint writing techniques, (6) compose and notate their own two-part contrapuntal inventions, and (7) have examples played to them for perception, memory and reproduction by performance or notation.

Finally, it might be useful to start from broad general analysis and then work gradually toward more specific issues. This would entail listening first to overall form, phrases and phrase endings, cadences, and harmonic content. This would build a large organic sense of the general shape of the work. Next, attention would be directed to motivic pitch and detailed rhythmic content, then to motivic relationships between voices and phrases such as non-imitative, imitative, real and tonal entries. Last would come awareness of the details of the tonal context, specific scale degrees and chromaticism used at modulations. Finally, tests could be administered using such paradigms as recognition and comparison tasks, error detection, performance, or notation. All of these would seem to be suitable measures of the accuracy of students' perception and memory for counterpoint.

Appendix A

Pilot Study Inventions: Planning Chart

Non-consecutive numbers yielded sessions of mixed types.

Type and Number	Key	Metre	First voice	Imitation
Free				
1	D+	duple compound	Soprano	
5	Bb+	triple simple	Soprano	
9	e-	triple compound	Bass	
12	g-	duple simple	Bass	
Imitative, Real				Imitation
2	A+	triple compound	Soprano	Tonic/Dominant
6	Eb+	duple simple	Bass	Dominant/Tonic
7	b-	duple compound	Bass	Tonic/Dominant
10	d-	triple simple	Soprano	Dominant/Tonic
Imitative, Tonal				
3	G+	duple compound	Soprano	Dominant/Tonic
4	Ab+	triple simple	Bass	Tonic/Dominant
8	f#-	triple compound	Bass	Dominant/Tonic
11	c-	duple simple	Soprano	Tonic/Dominant

Note that the choice of keys yielded equal representation of sharp and flat key signatures within each contrapuntal type.

Appendix B

Pilot Study Inventions: Letter to Judges and Evaluation Form

Date: Monday, February 25, 1991 Re: PhD Pilot Study

Dear Colleague,

Thank you for agreeing to evaluate the music for my doctoral pilot work. This package includes twelve inventions and evaluation forms.

There are five criteria. Below each statement is a line marked with numbers 1 to 5; these values represent possible answers ranging from 1 (very poor) to 5 (very good). Please respond by marking each line with a slash at the number that closest matches your response.

Please answer all questions. If some do not fall completely within your expertise, answer them as best you can.

Order of difficulty: Please return the examples ordered from simplest to most difficult, the easiest uppermost.

Tempo: Please write a suggested dictation tempo on each score.

Additional commentary: If there is insufficient room at the bottom of the form, please continue overleaf or on additional paper. Also, please feel free to write directly on the scores.

Thank you very much for your time and expertise.

Appendix B continued

Pilot Study Inventions: Evaluation Form

Please write a suggested dictation tempo here: _____

Photocopy of the invention inserted here

PLEASE RANK THE EXERCISE ON THE FOLLOWING CRITERIA:
(REMINDER: 1 = VERY POOR 5 = VERY GOOD)

1. Suitability for McGill 212-231 ear training classes

1	2	3	4	5

2. Correctness of the counterpoint

1	2	3	4	5

3. Neutrality of balance between instrumental and vocal style

1	2	3	4	5

4. Stylistic cohesion with the other exercises

1	2	3	4	5

5. Overall musicality

1	2	3	4	5

6. Additional comments:

THANK YOU VERY MUCH

Appendix C

Pilot Study Inventions: Judge Evaluation Means and Commentary

Exercises ranked suitable for McGill second year ear training, and considered correct contrapuntally, tended to be ranked high overall. Those ranked unsuitable in either area usually received low points overall. Revisions were made for divergences of more than 2 points and for specific criticisms.

	Judge			Action
No:	1	2	3	
1	4	4.5	3	re-ordered to number 8
2	5	4.5	3	revised bar 6 for continuity and re-ordered to number 9
3	3	4	3	re-ordered to number 2
4	2	4.5	3.5	strengthened bars 3, 4 and re-ordered to number 1
5	3.5	5	3.5	revised bar 4, re-ordered to 3
6	4.5	5	4	re-ordered to number 10
7	4	4	3	re-ordered to number 4
8	4	4.5	3.5	re-ordered to number 11
9	4	4	3	chromatic errors removed and re-ordered to number 5
10	5	4.5	3.5	re-ordered to number 6
11	3.5	3	3.5	phrase endings improved and re-ordered to number 7
12	1	4.5	3	revised bar 8 and retained as number 12

Pilot Study Inventions: Judge Commentary

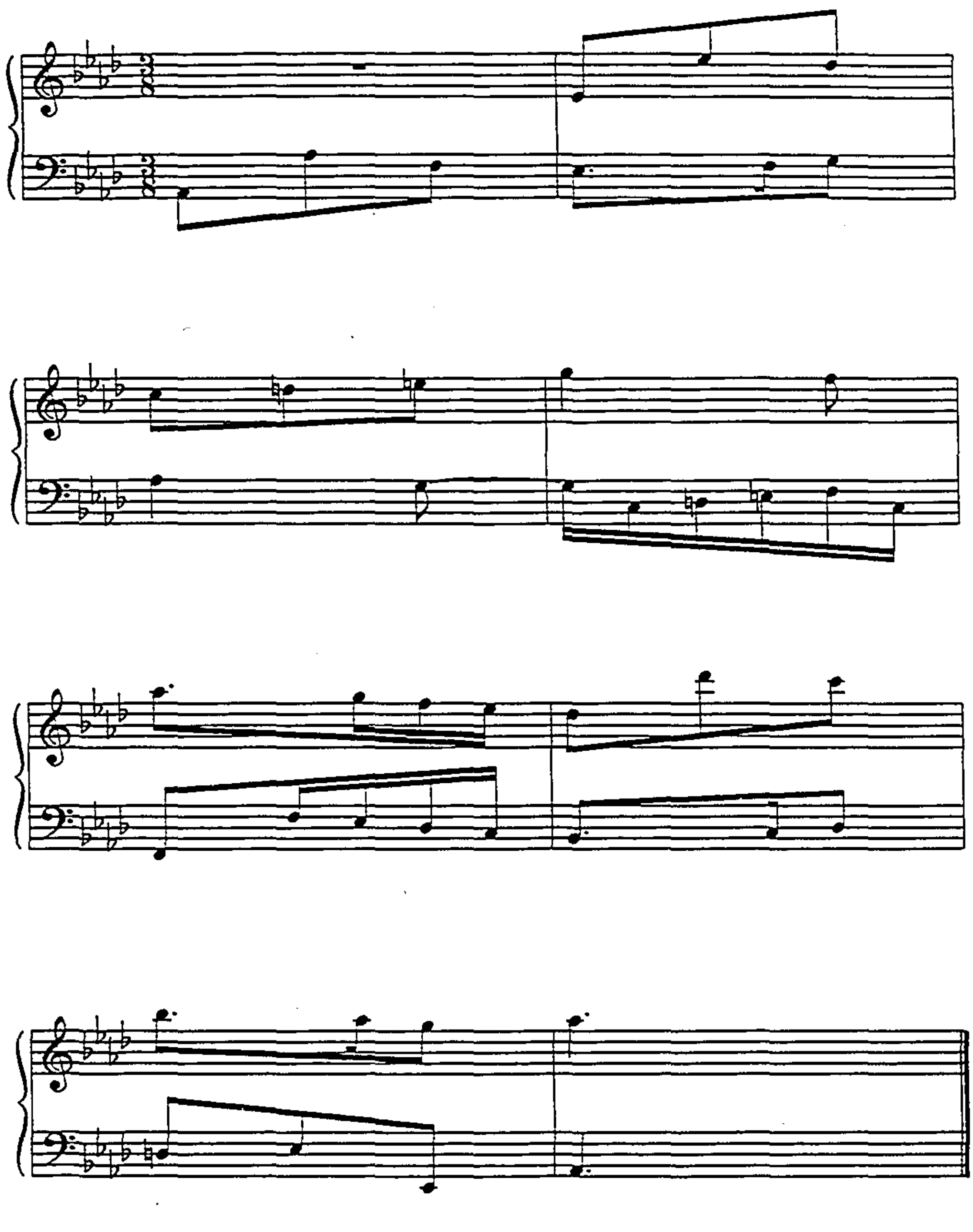
Judge 1's remarks were mostly about ear training level. Original exercises 3, 4, and 9 were marked appropriate to first semester of second year, and all other exercises appropriate for second semester of second year. Other remarks were "tonally weak" (numbers 1, 4, and 8); "omit bracketed notes" (number 5); and "rhythmically weak" (number 6). Revisions were made accordingly. Judge 1 disliked exercise number 12 because of its "rhythmic complexity, [lack of] clear-cut phrase structure, double semitone motion", and "inconsistency with style" of other exercises. However, because the other two judges rated number 12 higher, it was revised and retained.

Judge 2 remarked that for exercise number 9: "Counterpoint fine except: Since motion in two upper registers is not emphasized, the doublings of d# and e in the R.H. last two measures imply octave parallel rather than registral reinforcement. Implied 2-voice motion d# to e, and f# to e, would be better." And for exercise 12: "Tie in m. 8 emphasizes suppression of the 4-3# resolution. Within the style frame an explicit f# probably would be more convincing." Judge 2 also appended the following:

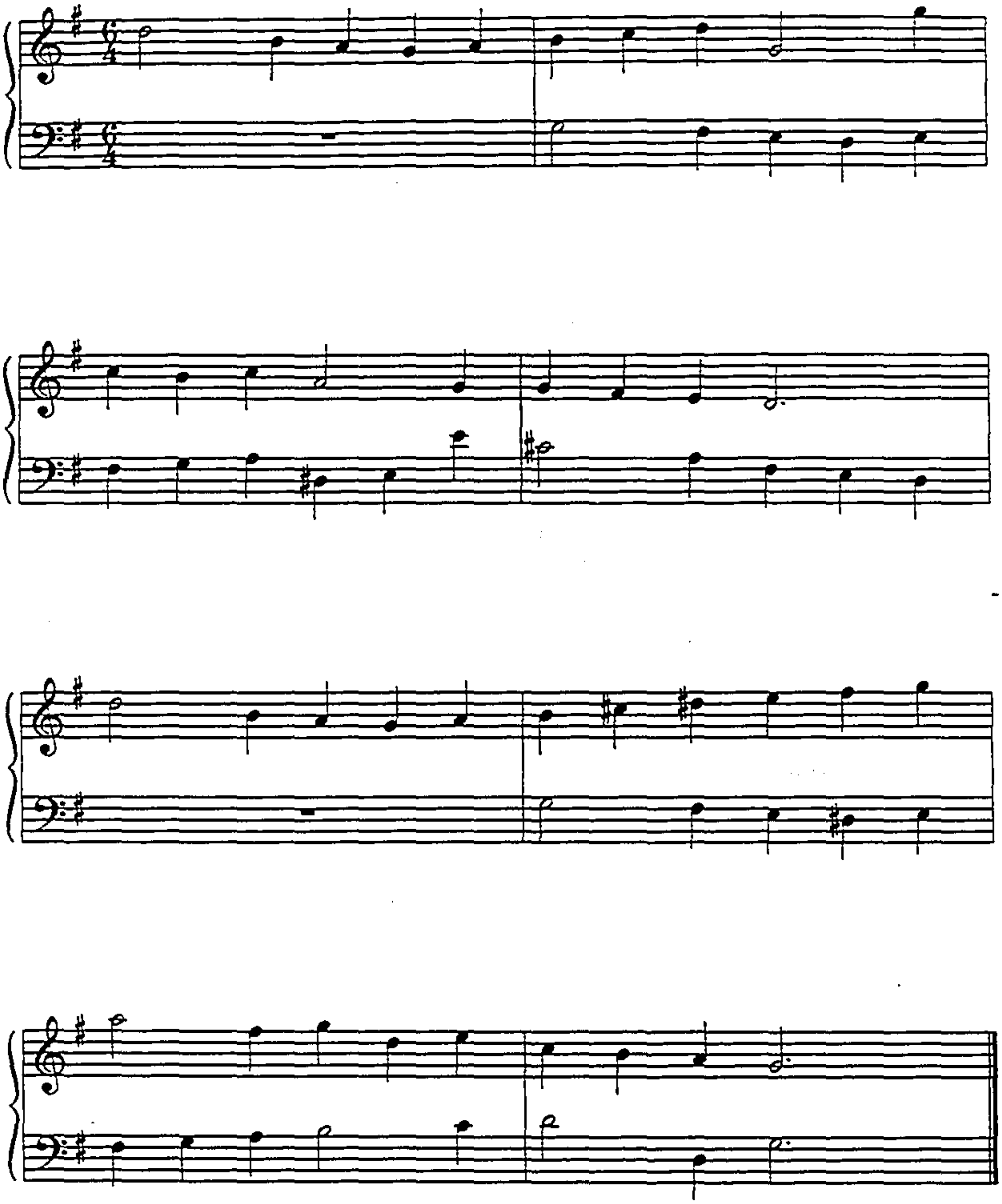
> "I find this a good collection which should serve its purpose very well. Question #1 I have answered as best I can. Under Question #2, my evaluations go below 5 if there are elements of relatively free dissonance treatment; this, of course, is not to say they are incorrect in their style frame--early classical counterpoint abounds in unprepared chordal sevenths and suspensions. Under Question #3 I have gone below 5 only when I find the lines slightly more vocal than instrumental. As for Question #4, style, if a few exercises differ in style, then no single one agrees with the other eleven. I find the collection vacillating between early classicism and late baroque, but I see no problem with this as long as each exercise is consistent with itself. This I think they are. Judging #5 is subject to personal idiosyncrasies (mine is tiring of weak-beat cadences). Tempo suggestions <u>very</u> subjective! Don't hesitate to ask for clarifications."

Judge 3, like Judge 1, made restrained commentary; "awkward" (number 9), "OK for keyboard, awkward to sing" (number 1), "indirect parallels" (number 2) and "unusual to open a full measure with V7 in this style". Every comment resulted in revision.

Appendix D: Pilot Study Inventions: Number 1



Appendix D: Pilot Study Inventions: Number 2



Appendix D: Pilot Study Inventions: Number 3

Appendix D: Pilot Study Inventions: Number 4

Appendix D: Pilot Study Inventions: Number 5

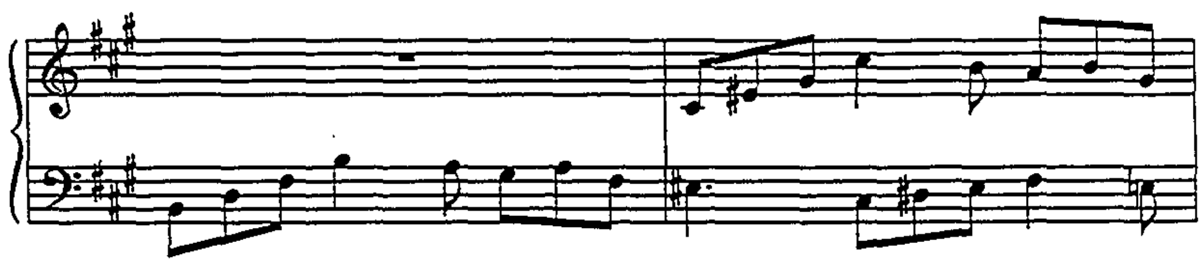
Appendix D: Pilot Study Inventions: Number 6

Appendix D: Pilot Study Inventions: Number 8

Appendix D: Pilot Study Inventions: Number 9

Appendix D: Pilot Study Inventions: Number 10

Appendix D: Pilot Study Inventions: Number 11



Appendix E

Pilot Study Registration and Questionnaire

<u>Student Registration Form</u>

Subject number _____ Age: _____ Sex: M F Tel. _____

Main instrument: _________________ Years studied: __________

Other instruments played: _________________________________

Years of theory study: ______ Current ear training course: _____

Have you studied counterpoint? ______ How many years? _____

Keyboard skill: (Circle one)

Excellent Good Fair Poor Non-player

Thank you. Please fill out the questionnaire by circling one number per question.

Questionnaire

1 = NEVER 2 = RARELY 3 = HALF & HALF 4 = MOSTLY 5 = ALWAYS

<u>My general learning style is:</u>

analytical	1	2	3	4	5
intuitive	1	2	3	4	5
visual	1	2	3	4	5
verbal	1	2	3	4	5
aural (non-verbal)	1	2	3	4	5
tactile	1	2	3	4	5
other (____________)	1	2	3	4	5
My instant recall is good	1	2	3	4	5
My long term memory is good	1	2	3	4	5

<u>When doing dictation other than two-part:</u>

I make many pitch errors.	1	2	3	4	5
I make many rhythm errors.	1	2	3	4	5
Isolated chords are hard.	1	2	3	4	5
Progressions are hard.	1	2	3	4	5

Please describe your usual way of taking two-part dictation:

Thank you very much.

Appendix F

General Instructions to All Subjects

Thank you for participating in my doctoral research.

The purpose of the study is to examine 1) your existing strategies for contrapuntal dictation; and 2) whether pitch and rhythm strategies affect your accuracy.

Your participation is voluntary (you can leave at will, but please stay); confidential (results are reported anonymously; also, please don't discuss the study while it is still running, as this might spoil it for future subjects); and standardized (the exercises are taped, for instance, so that everybody hears the same thing).

Here is a registration form and a questionnaire. Please read carefully and ask any questions; then fill them out now and return them to me immediately. Thank you.

These answer sheets show you key and time signatures, barlines, and the starting pitch, which could have a variety of time values. Each exercise has two phrases, a and b. Phrase a always ends on bar 5 downbeat, the first note of b.
For every exercise you will hear: exercise number, tonality (I--IV--V--I, once only), starting note, note value of the beat, and a bar of tempo.

Once an exercise starts, I won't stop the tape. There are four exercises in each session, with pauses between each. Please save questions until the pauses.

As you finish each exercise, please turn the answer sheet face down and don't go back.

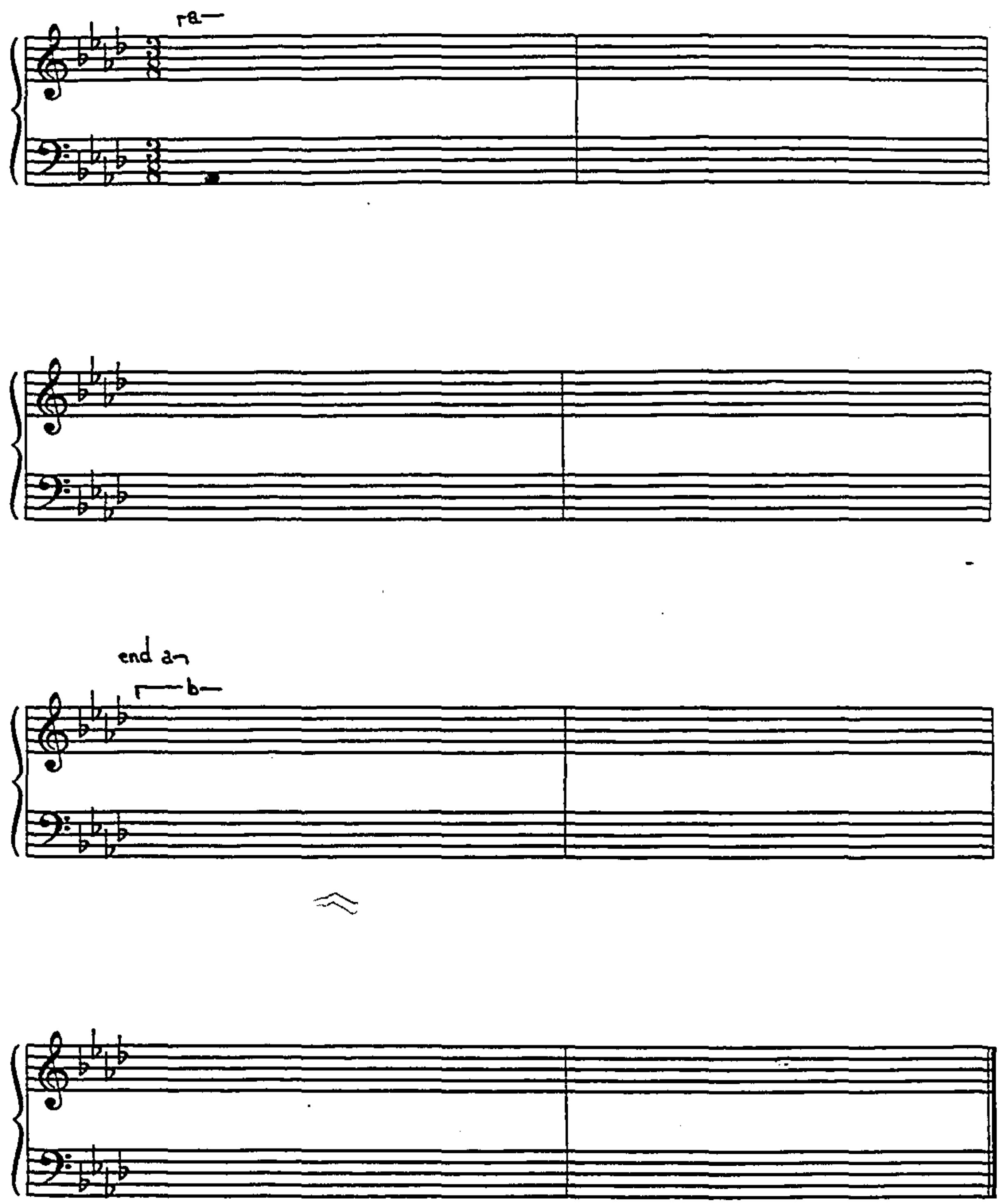
Each session will use a different strategy. Here are today's instructions to read. (In Main Experiment add: Don't glance at a neighbour's--they may be different! If you have questions, please raise a hand. I respond to any queries quietly, moving around the room from subject to subject.)

ARE THERE ANY FURTHER QUESTIONS AT THIS POINT? [respond]

Now here is the tape.

Appendix G

A Sample Answer Page



Appendix H

Strategy-specific Instructions

Non-directed Strategy

You will hear the whole exercise, followed by the first phrase 4 times; the whole exercise again, then the second phrase 4 times; and a final hearing of the whole exercise. Use whatever method you choose--whatever you normally do.

Rhythm Strategy

What you will hear:	What you will do:
Whole exercise	rhythm symbols only
1st phrase, 2 times	rhythm symbols only
1st phrase, 3rd and 4th times	add pitches
Whole exercise	anything for 1st phrase rhythm for 2nd phrase
2nd phrase, 2 times	rhythm symbols only
2nd phrase, 3rd and 4th times	add pitches
Whole exercise	check everything

Pitch Strategy

What you will hear:	What you will do:
Whole exercise	note heads only
1st phrase, 2 times	note heads only
1st phrase, 3rd and 4th times	add rhythm
Whole exercise	anything for 1st phrase note heads for 2nd phrase
2nd phrase, 2 times	note heads only
2nd phrase, 3rd and 4th times	add rhythm
Whole exercise	check everything

Appendix I

Pilot Study Post-dictation Questionnaire

Subject #: Date: Time: Room:

1. What was today's strategy? (Please circle one)

rhythm pitch

2. Did today's strategy help to:

hear	_____
memorize	_____
write	_____
detect errors	_____
correct errors	_____

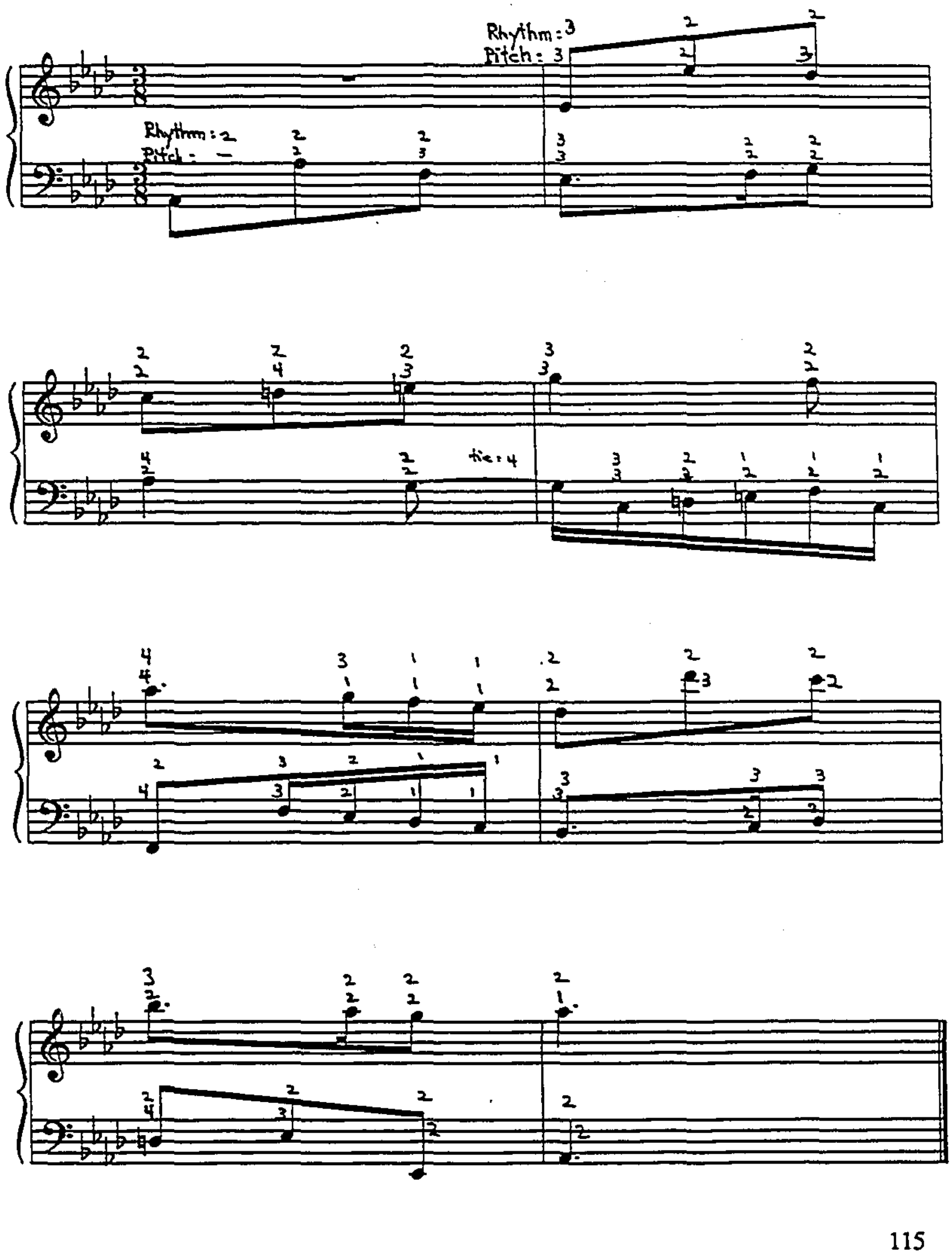
3. Would today's strategy become useful to you with practice?

4. Are there any specific improvements you would suggest for the strategy?

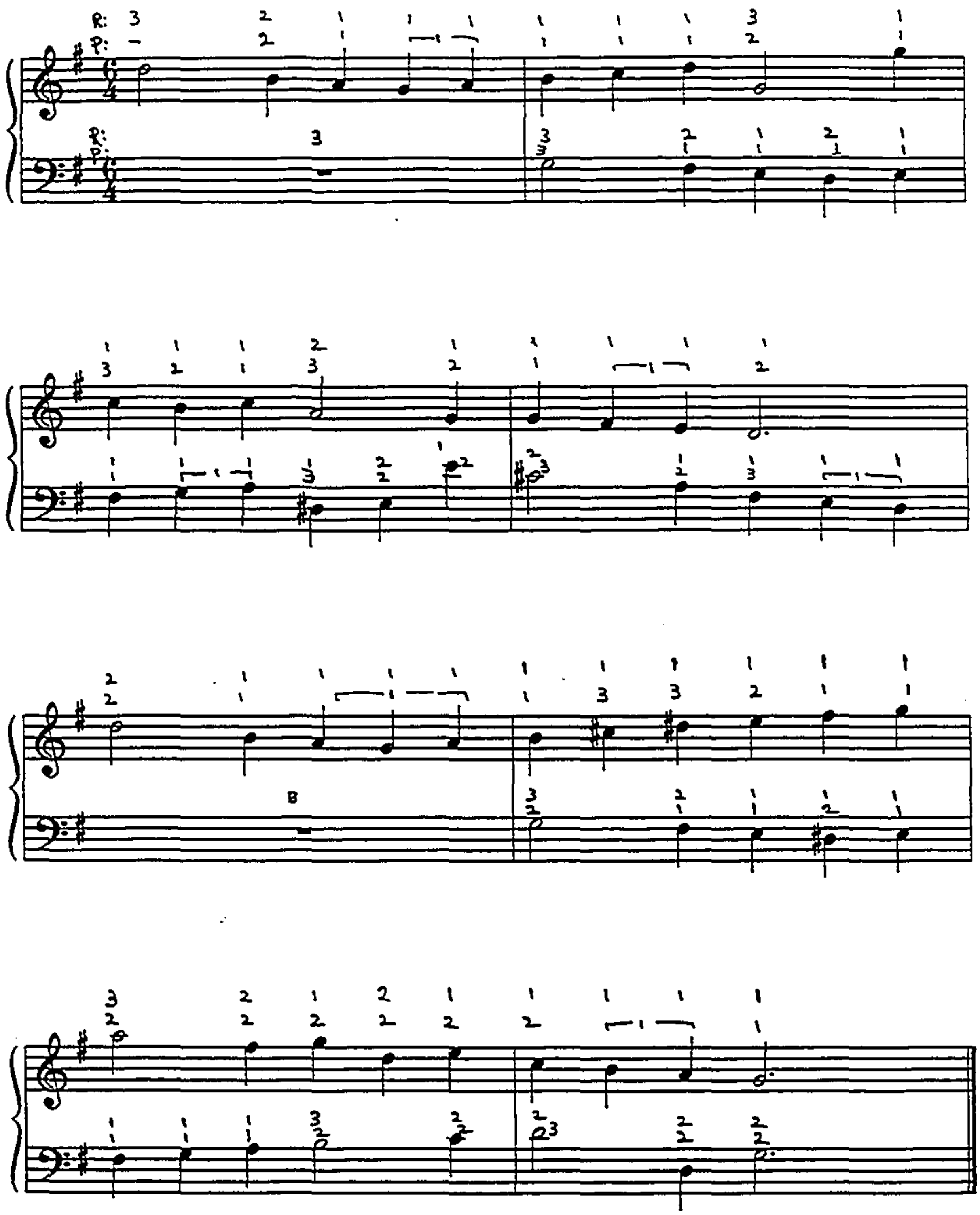
5. Apart from the main strategy, describe how you did today's dictation. When did you listen to which voice? Did you listen for harmonic functions? Did you play along? Did you sing, hum or whistle? Were you using analysis or intuition? etc. Please describe any and all little "tricks" that you used.

Thank you very much.

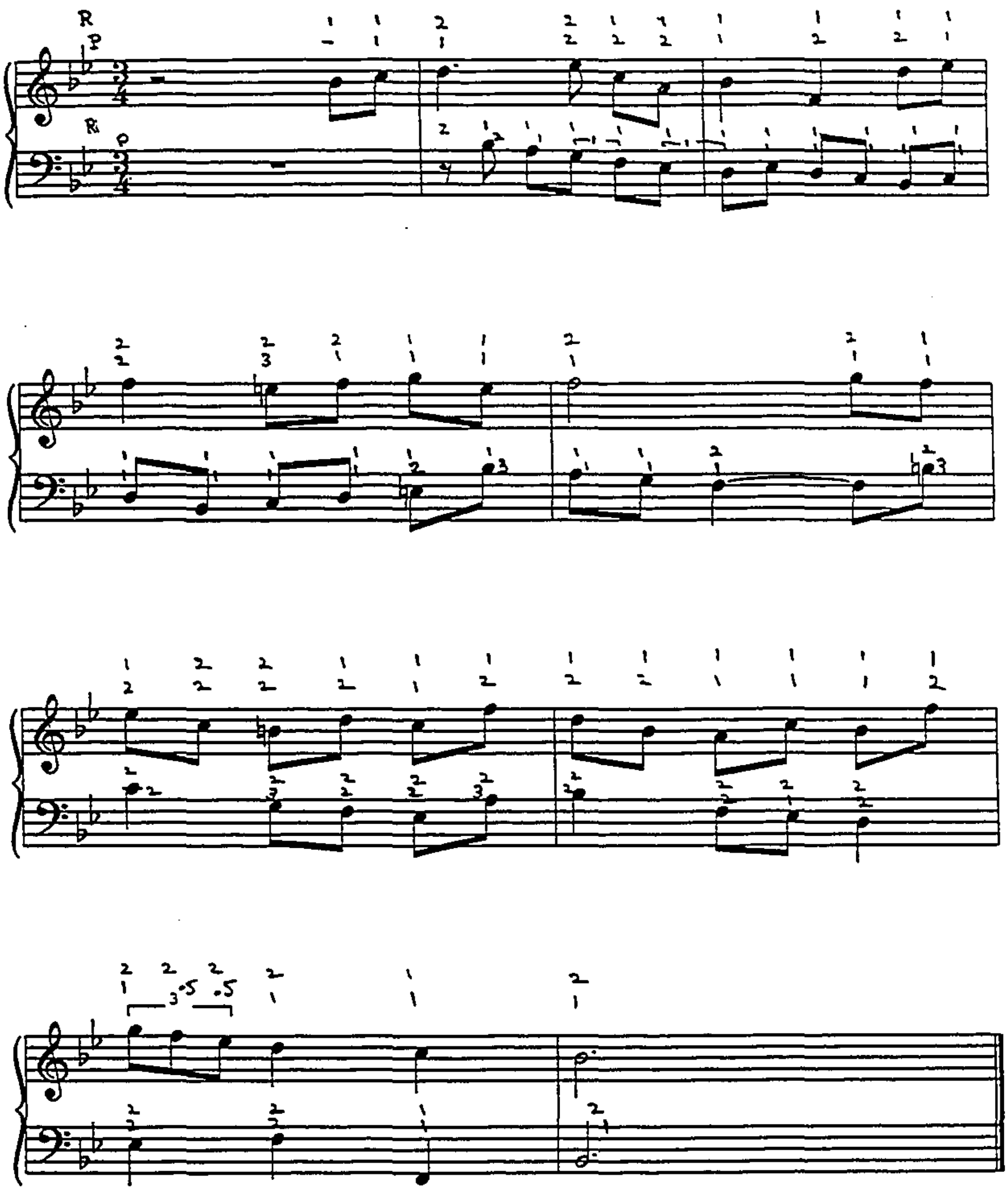
Appendix J: Pilot Study Marking Grids: Number 1



Appendix J: Pilot Study Marking Grids: Number 2



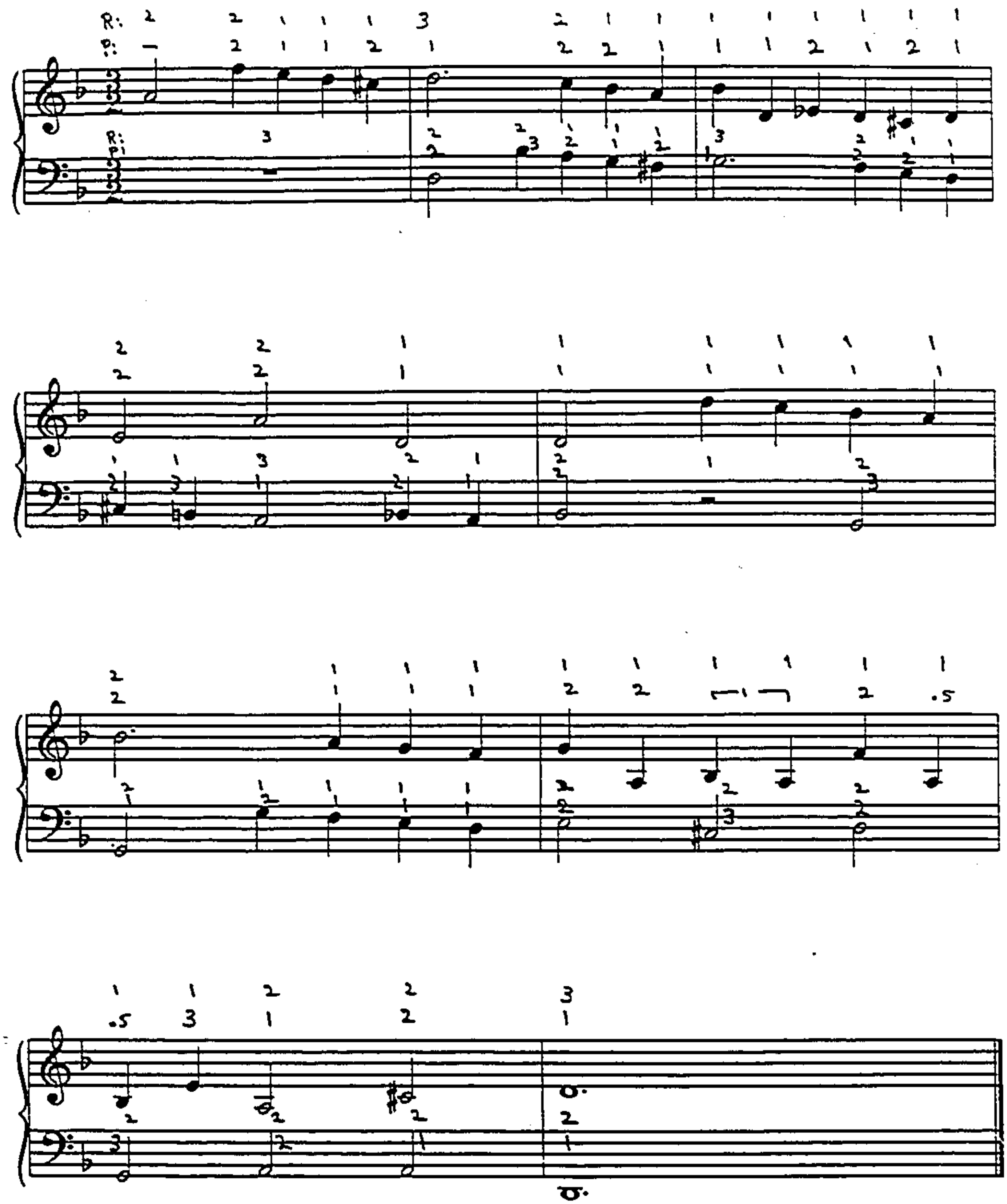
Appendix J: Pilot Study Marking Grids: Number 3

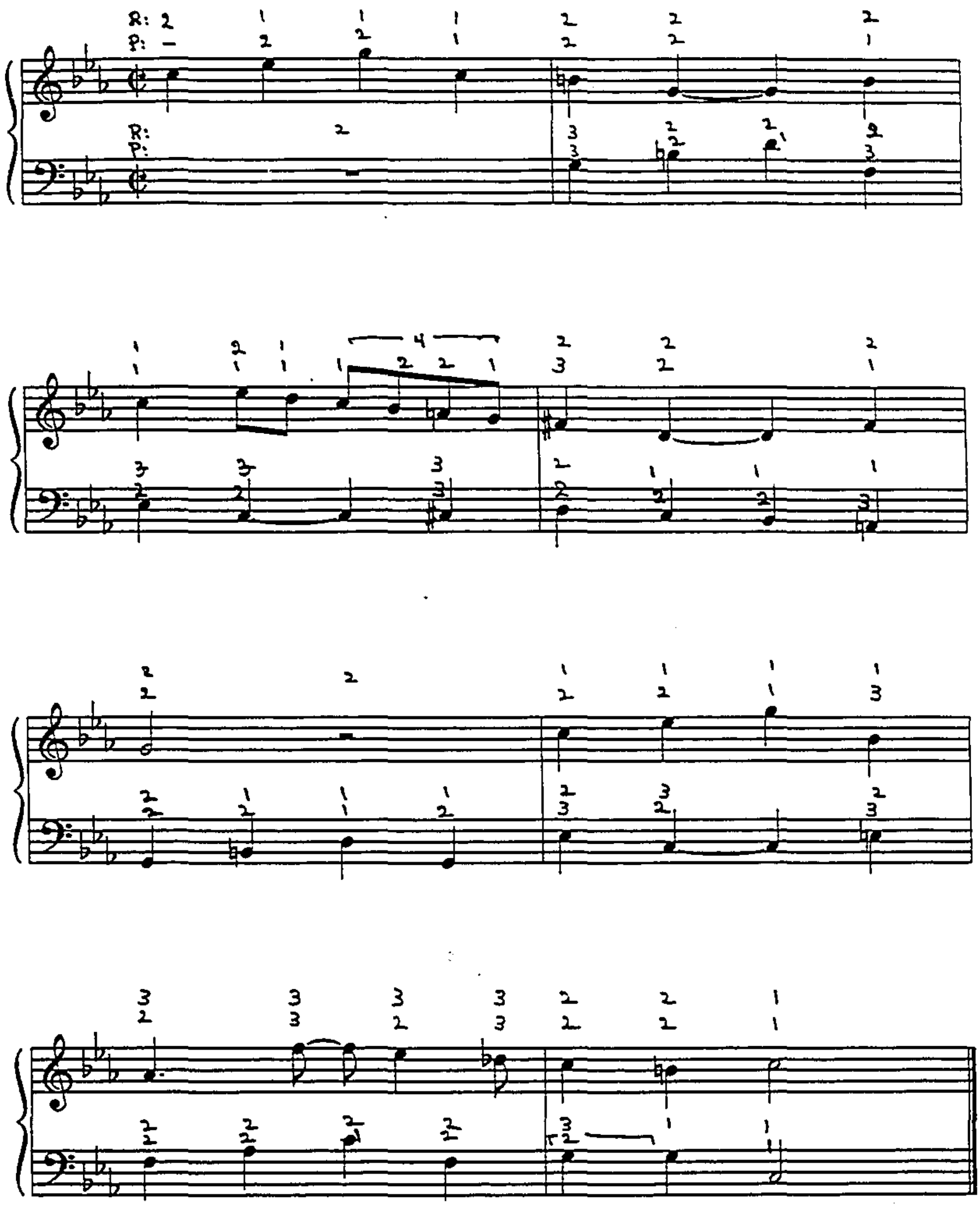


Appendix J: Pilot Study Marking Grids: Number 4

Appendix J: Pilot Study Marking Grids: Number 5

Appendix J: Pilot Study Marking Grids: Number 6

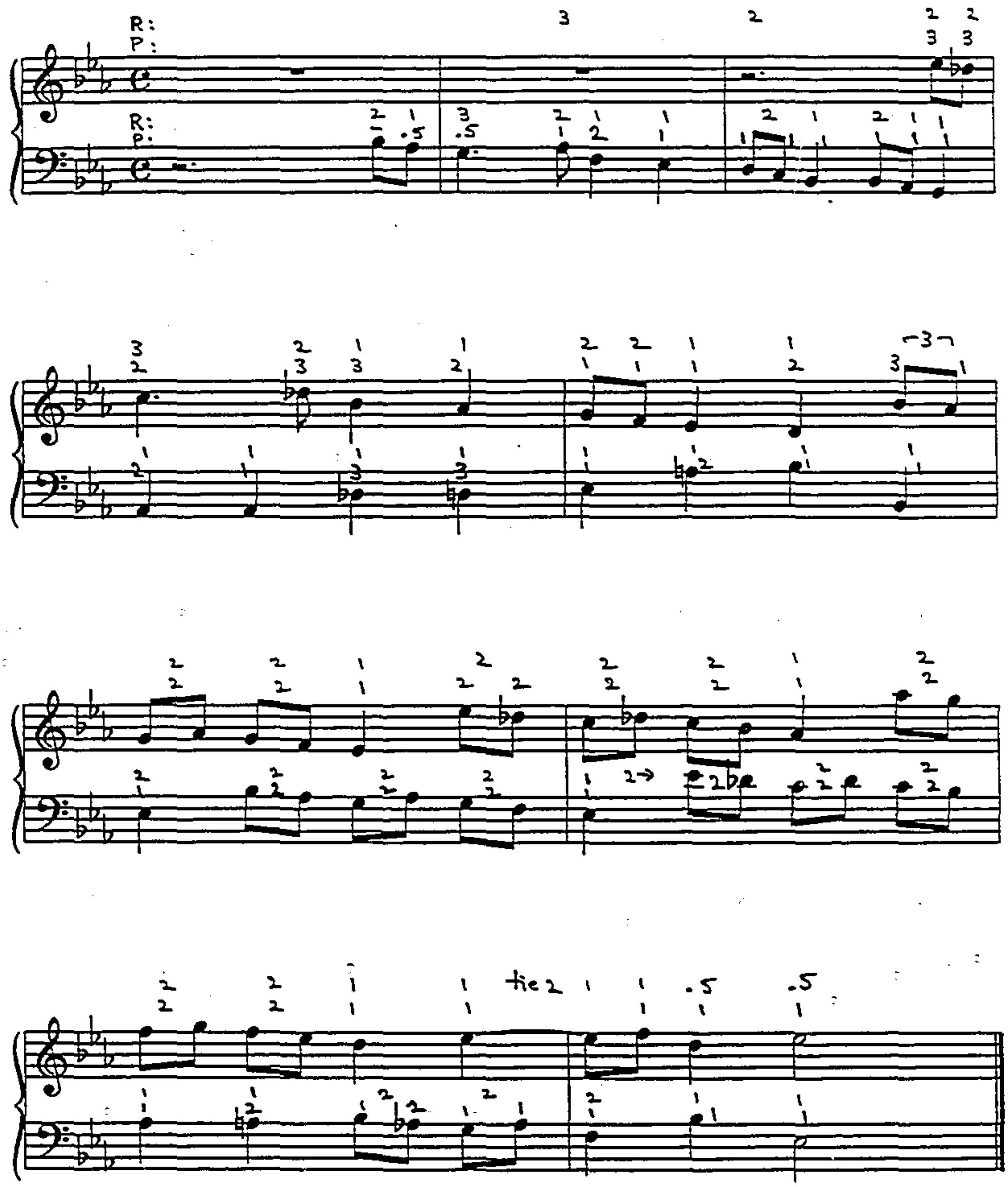


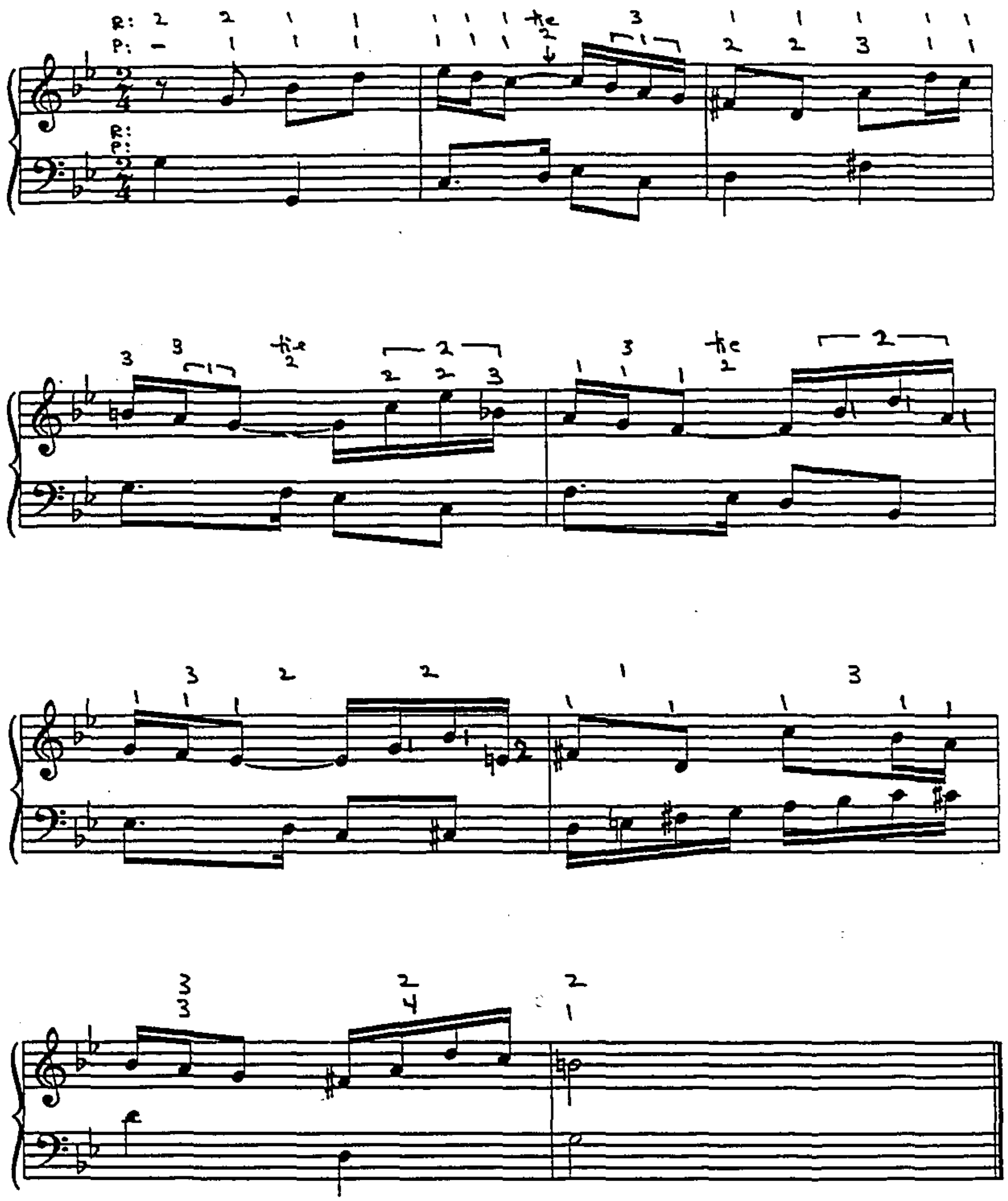



R:
P:
R:
P:
tie

Appendix J: Pilot Study Marking Grids: Number 9

Appendix J: Pilot Study Marking Grids: Number 10




R:
P:
tie
R:
P:
tie
tie

Appendix K

Guide for Markers

1. Pitch. Please mark in green.
First note has no value (given pitch).
Write above each note, or its location.
Show a value for every number on grid.
Mark only pitch:

Example: the 5th note is A in the 2nd bar.
Student's 5th note is A, but it turns up in bar 1 or 3 or on the wrong beat.
Give full marks for pitch.
Deduct full marks for rhythm.

Where the student has "composed", especially adding notes, use your own discretion. Try to find the right notes among the foliage, give them whatever marks seem appropriate, or deduct according to how wild the extra material seems to be.

Part marks possible: for transposition where harmony not badly destroyed, half marks.
For transposition which totally distorts harmony, quarter marks.
For evidence of having heard it correctly (pre-erasure) fractional marks.
Etc., your own choice.

2. Rhythm. Mark in red above each note, tie, etc.
Show a value for each figure of the grid.
Mark only rhythm. Ignore pitch heads.

Stem direction is totally irrelevant--no marks off!!
Beams, however, should be correct according to metre.
Rests may not always be shown. Deduct no marks if the duration of the note before covers the rests. Rests at the beginning of entries, however, do receive marks and must be indicated in some way by the student.

Accept variations in durations elsewhere (this may cause rests not seen on grid, such as two quarters and a half note being transcribed as three quarters and a quarter rest).

Part marks possible: Slight slips and distortions--half marks. Examples, a dot missing in a sicilienne pattern, or quarter and two sixteenths for a sicilienne (long note is in right place, and correct number of attacks).
Moving an otherwise correct pattern off by a beat or a half bar, quarter marks.
Many other examples, use your own judgement.

Appendix L

Main Study Inventions: Planning Chart

Numbers left consecutive, permitting judge evaluations to create session assignments.

Type & Number	Key	Metre	Opening & Imitation	
Free				
1	G+	triple compound	Soprano downbeat	
2	Ab+	duple simple	Soprano pickup	
3	b-	duple compound	Bass pickup	
4	f-	triple simple	Bass pickup	
Imitative, Real				
5	E+	duple compound	Soprano pickup	dom/tonic
6	Bb+	triple simple	Bass downbeat	tonic/dom
7	f#-	triple compound	Bass pickup	dom/tonic
8	d-	duple simple	Soprano downbeat	tonic/dom
Imitative, Tonal				
9	G+	triple compound	Bass downbeat	tonic/dom
10	F+	duple simple	Soprano downbeat	dom/tonic
11	e-	duple compound	Soprano downbeat	tonic/dom
12	g-	triple simple	Bass pickup	dom/tonic

Appendix M

Main Study Inventions: Letter to Judges

Date: Monday, March 18, 1991 Re: PhD Main

Dear Colleague,

Thank you for your helpful evaluations of the music for my doctoral pilot work. Here is the second set of twelve inventions for the main study. I append the same set of questions which accompanied the first dozen exercises. Please respond by marking each line at the appropriate number (1 = very poor, 5 = very good). Additional commentary is welcome; feel free to write directly on the score.

<u>Please</u> <u>answer</u> <u>all</u> <u>questions</u>.

Order of difficulty: Please return the examples ordered from simplest to most difficult, as for the pilot set.

There is no need to decide on a tempo. The time allotted for recording automatically determines a tempo "molto moderato dictatissimo" for the exercises!

This is a busy time of year, but could I ask you to try to do this as soon as possible, please.

Thank you so very much, again, for your time and expertise.

(The evaluation form in Appendix B was used with the request for a suggested tempo deleted.)

Appendix N

Main Study Inventions: Judge Evaluations and Commentary

The criteria were: (a) appropriateness for ear training of subjects, (b) accuracy of counterpoint, (c) balance between vocal and instrumental styles, (d) internal stylistic cohesion, and (e) overall musicality.

Examples were revised (rev) if evaluations diverged more than two points, or for specific criticisms.

	Criteria					
	a	b	c	d	e	
Judge	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	
Exercise:						
1	3 5 5	5 5 5	5 5 5	5 4 5	5 5 4	
2	4 5 4	3 5 4	3 5 3	4 5 4	5 5 4	rev
3	5 5 5	5 2 5	5 5 5	5 4 5	5 5 5	rev
4	3 5 5	4 5 5	3 5 5	4 5 5	5 5 5	rev
5	3 5 4	3 4 2	3 5 3	2 4 3	5 3 4	rev
6	4 5 4	4 5 4	3 5 2	4 4 4	5 5 4	rev
7	4 5 4	4 5 4	3 5 3	4 4 4	5 5 4	
8	2 5 5	2 4 5	2 5 2	5 5 5	2 5 4	rev
9	3 5 5	3 5 4	4 5 4	4 4 5	5 5 4	rev
10	4 5 5	4 5 4	5 5 4	5 5 5	5 5 4	
11	3 5 5	5 3 5	4 5 4	5 4 5	5 5 4	rev
12	3 5 4	3 5 4	4 5 4	4 5 4	5 5 5	

The final order was: 10, 1, 8, 9, 3, 4, 2, 12, 6, 11, 7, 5.

Appendix N continued

Main Study Inventions: Judge Evaluations and Commentary

Judge 1 made brief comments such as "too easy" (number 10), "instrumental" (numbers 1, 2, 3, 4, 9), "weak opening" (number 6), "too hard" (number 7), and "difficult notationally" (number 5). Revisions were made when other judges made similar critical commentary.

Judge 2 appended four pages of annotated manuscript suggestions for improving counterpoint and stylistic unity. Almost all of these suggestions were incorporated into the revisions. Judge 2 wrote:

> "...Your exercises are admirable and succeed very well in embedding the particular tasks students need to focus on, in musically and stylistically pleasant packaging."

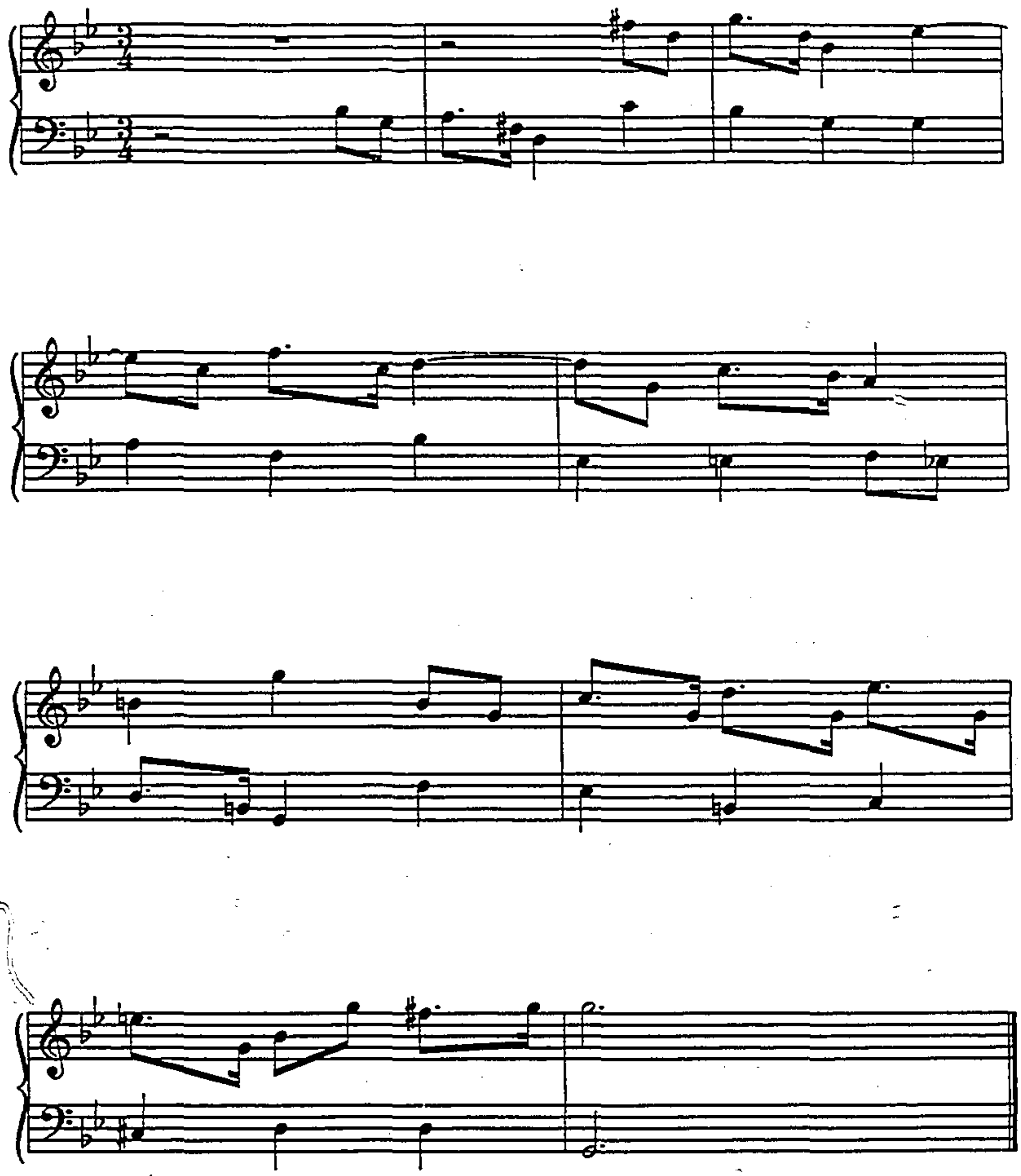
Judge 3 assessed the main study inventions higher overall than he did the pilot inventions. He found number 10 "much easier than the rest of the set". Other comments were: "second phrase more difficult than first" (number 1), "needs more stepwise motion" (number 2), "some unlikely voice-leading!" (number 3), "good closure" (number 6), "ending a problem" (number 11), and "return a bit sudden" (number 5). Revisions were made in response to most of the remarks.

Appendix O: Main Study Inventions: Number 3

Appendix O: Main Study Inventions: Number 5

Appendix O: Main Study Inventions: Number 6

Appendix O: Main Study Inventions: Number 7



Appendix O: Main Study Inventions: Number 9

Appendix O: Main Study Inventions: Number 11

Appendix O: Main Study Inventions: Number 12

Appendix P

Main Study Questionnaire

(The registration form was identical to the pilot study).

Questionnaire

1= NEVER 2= RARELY 3= HALF AND HALF 4= MOSTLY 5= ALWAYS

My general learning style is:

analytical	1	2	3	4	5
intuitive	1	2	3	4	5
visual	1	2	3	4	5
verbal	1	2	3	4	5
non-verbally aural	1	2	3	4	5
tactile	1	2	3	4	5
other (____________)	1	2	3	4	5

Memory skills:

My instant recall is good	1	2	3	4	5
My long term memory is good	1	2	3	4	5

When doing dictation other than two-part:

I make many pitch errors.	1	2	3	4	5
I make many rhythm errors.	1	2	3	4	5
Isolated chords are hard.	1	2	3	4	5
Progressions are hard.	1	2	3	4	5

When doing two-part dictation:

I most naturally listen first to (please specify):

This helps me to: Hear more	1	2	3	4	5
Memorize more	1	2	3	4	5
Write more	1	2	3	4	5
Detect errors	1	2	3	4	5
Correct errors	1	2	3	4	5

During class work we listen first to:

This helps me to: Hear more	1	2	3	4	5
Memorize more	1	2	3	4	5
Write more	1	2	3	4	5
Detect errors	1	2	3	4	5
Correct errors	1	2	3	4	5

I hear one voice at a time	1	2	3	4	5

Describe which voice you start with:

I compare voices aurally:

immediately	1	2	3	4	5
after 1 hearing	1	2	3	4	5
after 2 hearings	1	2	3	4	5
after 3 or more hearings	1	2	3	4	5
when 1st voice complete	1	2	3	4	5
when 1st voice partly done	1	2	3	4	5
when I'm sure of cadence	1	2	3	4	5
other (specify)	1	2	3	4	5

I compare voices visually in my written response:

immediately	1	2	3	4	5
after 1 hearing	1	2	3	4	5
after 2 hearings	1	2	3	4	5
after 3 or more hearings	1	2	3	4	5
when 1st voice complete	1	2	3	4	5
when 1st voice partly done	1	2	3	4	5
when I'm sure of cadence	1	2	3	4	5

I hear both voices at once	1	2	3	4	5

(If you circled 5 or 4, state briefly <u>how</u> you do this):

It is easier for me to hear: (circle one or more)

bass   soprano   first voice   tonic entry

other (specify)

I listen to harmonic <u>intervals</u> between parts:

always	1	2	3	4	5
downbeats	1	2	3	4	5
cadences	1	2	3	4	5
2nd entry	1	2	3	4	5
for consonance or dissonance	1	2	3	4	5
other (specify)	1	2	3	4	5

I listen for implied <u>harmonic</u> <u>functions</u>:

always	1	2	3	4	5
at cadences	1	2	3	4	5
elsewhere (specify)	1	2	3	4	5
I confuse voices	1	2	3	4	5
I notate: during hearings	1	2	3	4	5
during and after	1	2	3	4	5
after only	1	2	3	4	5

I sing, hum, or whistle aloud (please circle all that apply)

during hearings	1	2	3	4	5
between hearing and writing	1	2	3	4	5
while writing	1	2	3	4	5
after writing, to check	1	2	3	4	5

I "play along" physically. (specify instrument)

during hearings	1	2	3	4	5
between hearing and writing	1	2	3	4	5
after writing	1	2	3	4	5

The <u>easiest</u> aspect of 2-part for me is:

The <u>hardest</u> aspect of 2-pt for me is:

Certain keys, metres, modes are hard for me. (Specify).

My other techniques not covered by the above questions are:

Appendix Q

Main Study Post-dictation Questionnaire

Subject #: Date: Time: Room:

1. What was today's strategy? (Please circle one)

normal rhythm pitch

Exercise numbers ____ to ____

Ex. 1-4: If you circled "normal", do not answer other questions.

Ex. 5-12: If you circled "normal", answer #5 only if you did something differently.

2. Did today's strategy help to:

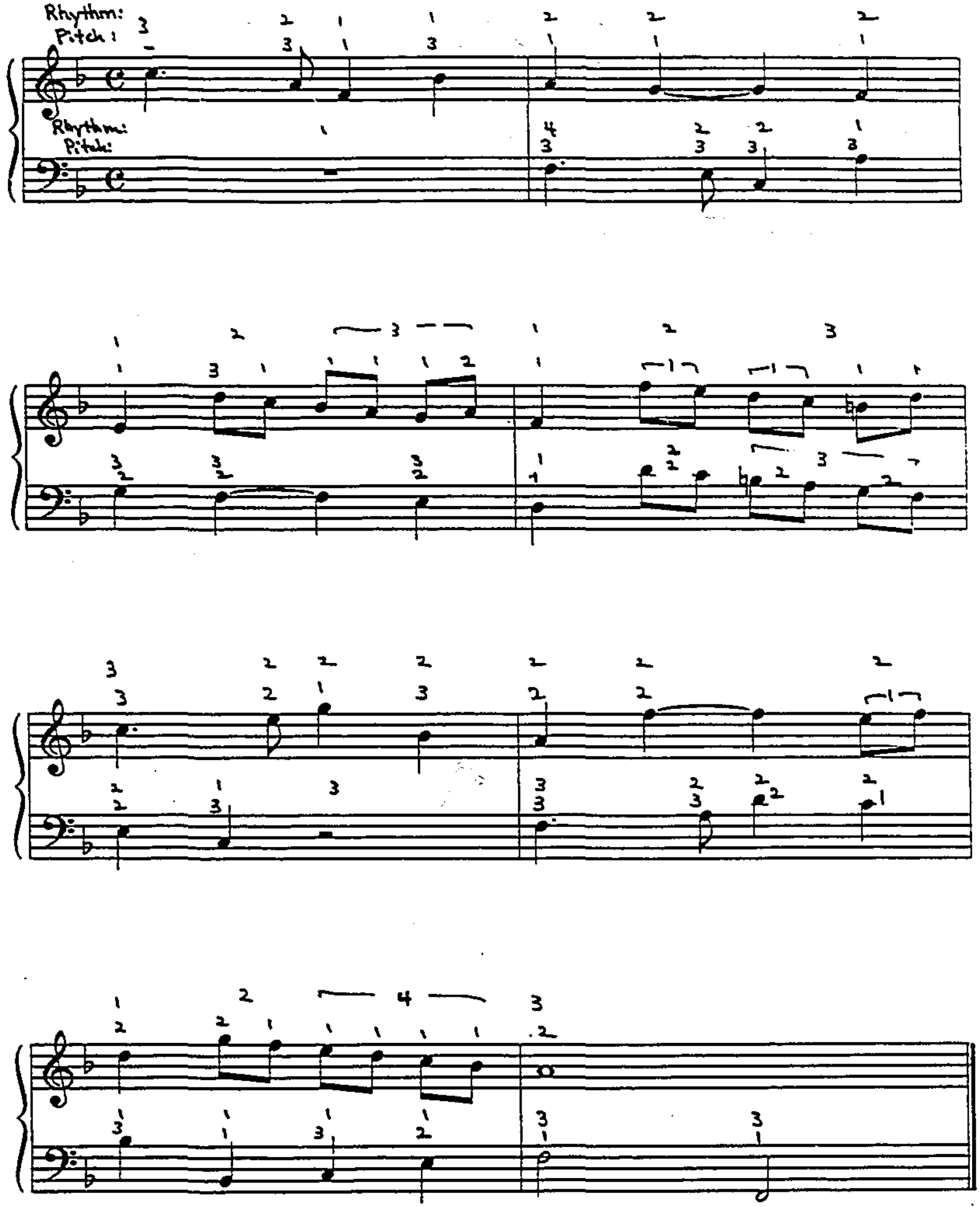
	hear	_____
√ = yes	memorize	_____
X = no	write	_____
	detect errors	_____
	correct errors	_____

3. Would today's strategy become useful to you with practice?

4. Are there any specific improvements you would suggest for the strategy?

5. Please describe any extra tricks you used. When did you listen to which voice? Did you listen for harmonic functions? Did you play along? Did you sing, hum or whistle? Were you using analysis, intuition? etc.

Thank you very much.


Rhythm:
Pitch:
Rhythm:
Pitch:

Appendix R: Main Study Marking Grids: Number 2

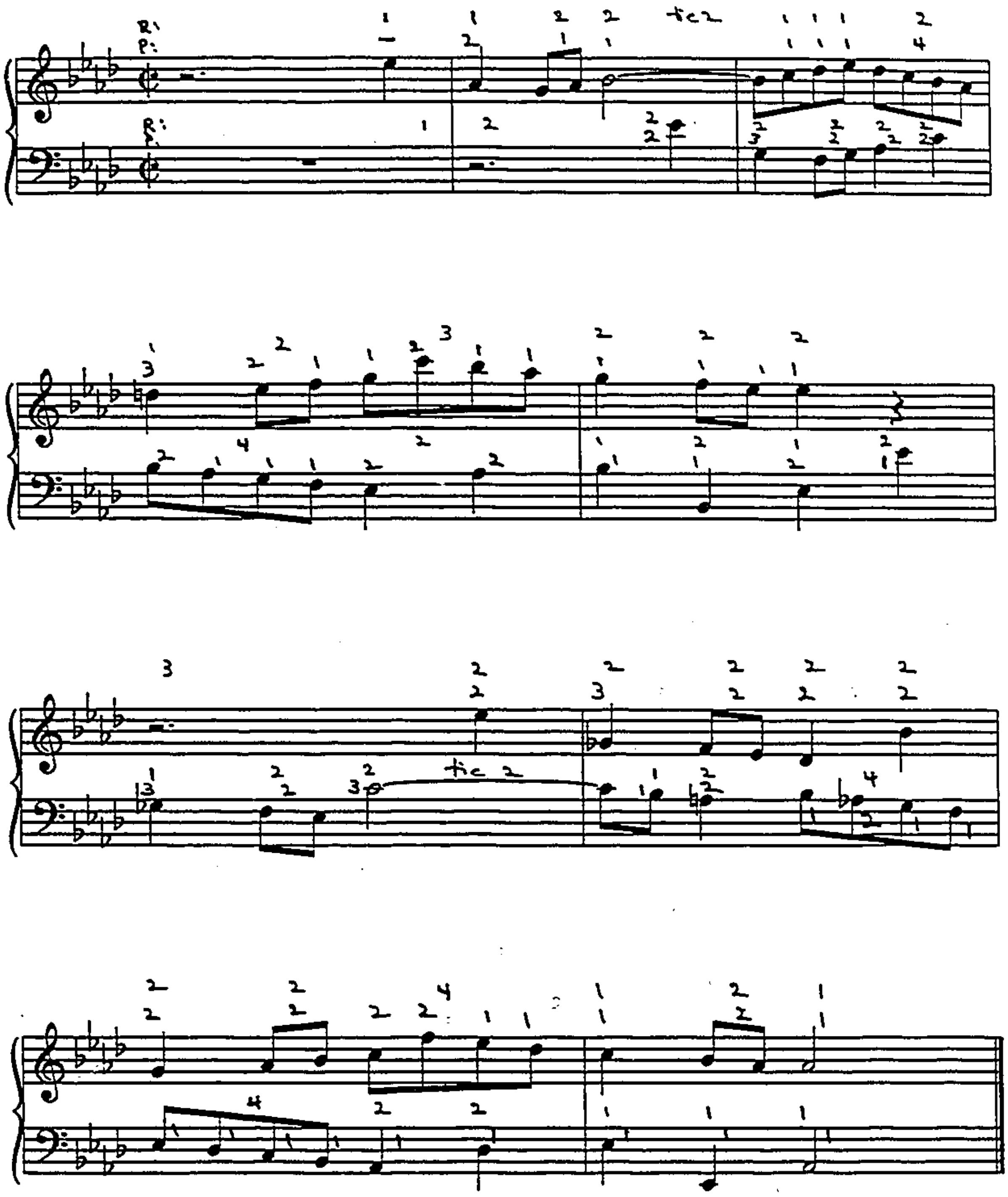

R:
P:
tie 2
R:
P:
tie 2

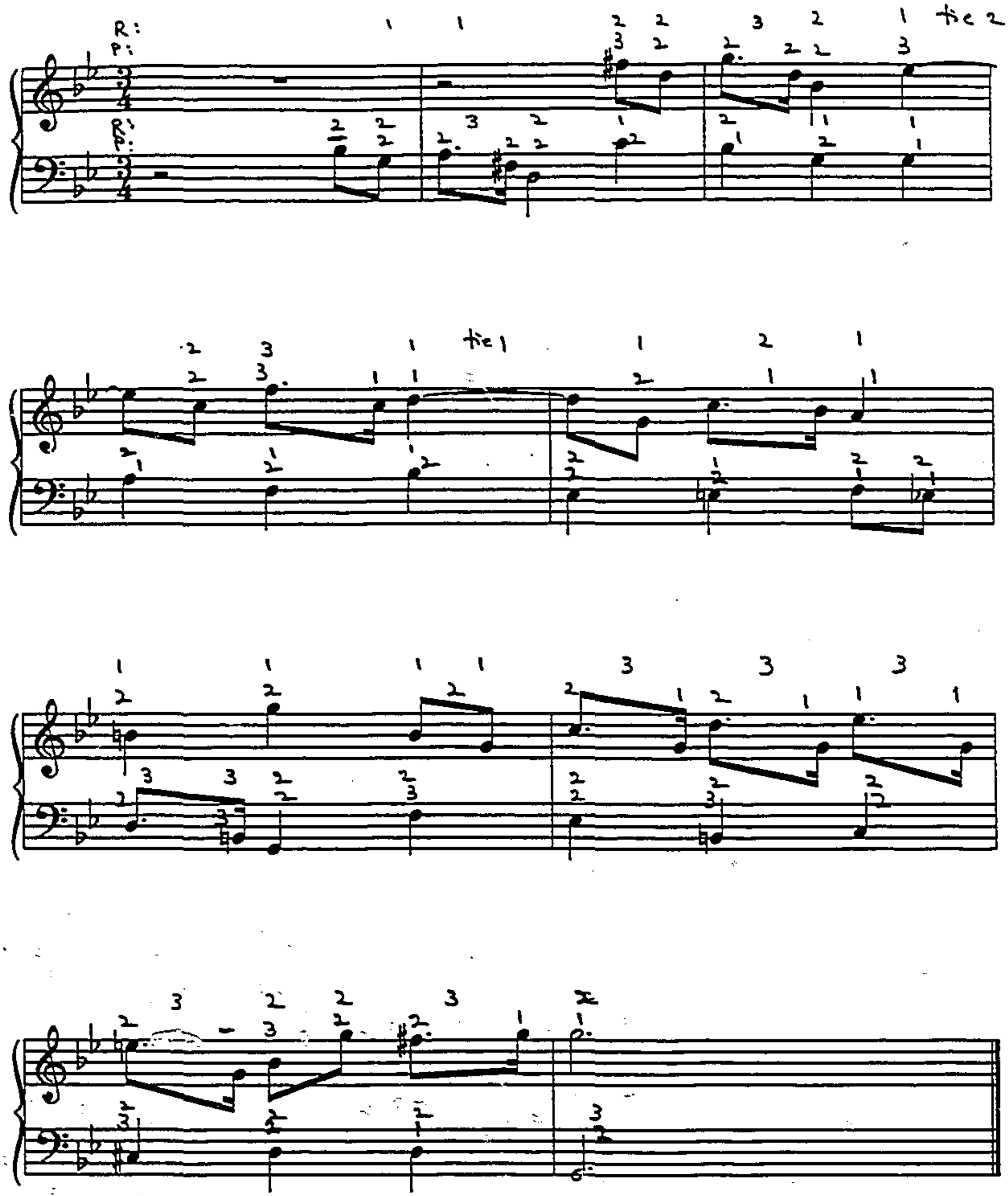

R:
P:
R:
P:

Appendix R: Main Study Marking Grids: Number 5


R:
P:
R:
P:

Appendix R: Main Study Marking Grids: Number 7

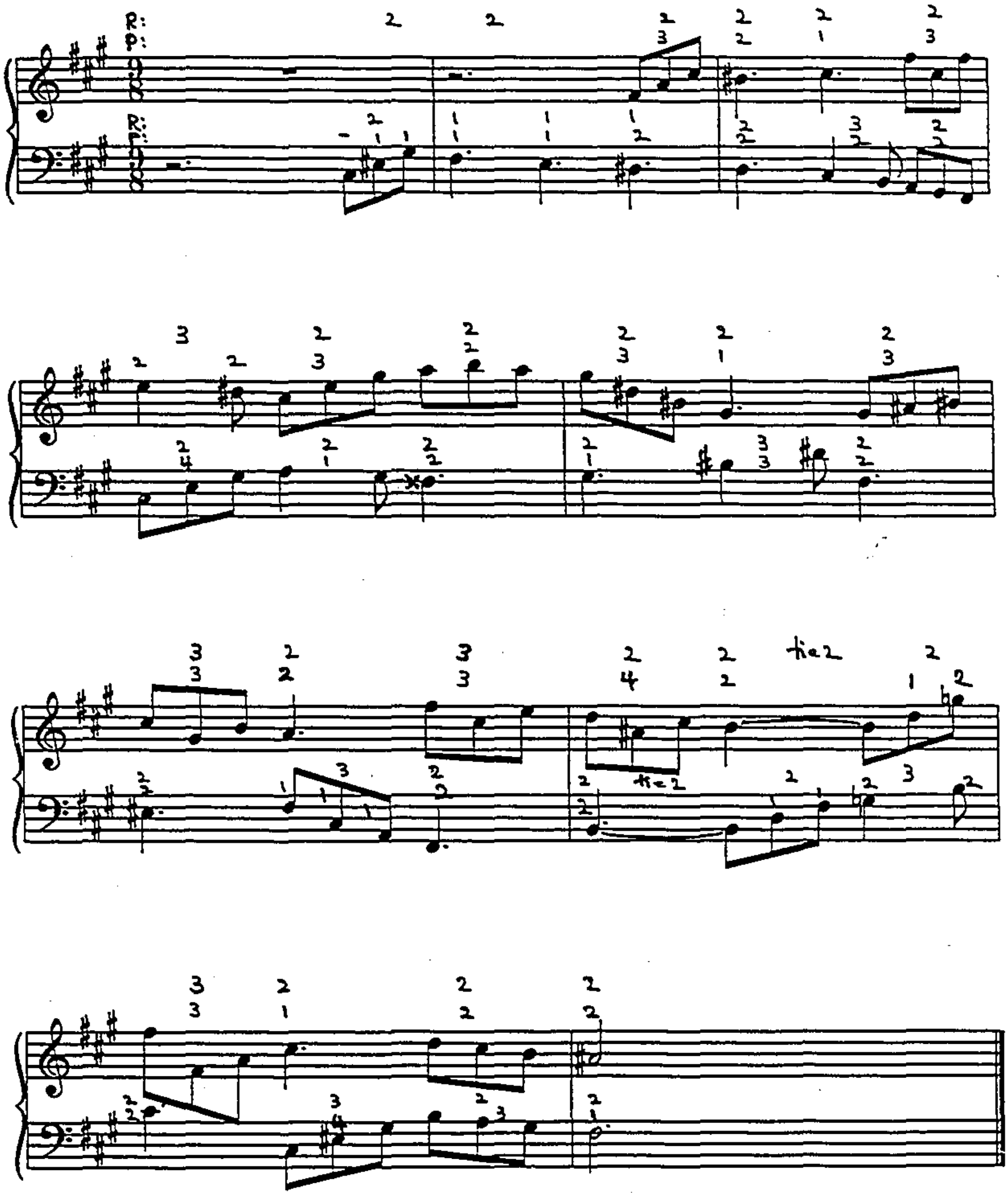



R:
P:
tie 2
R:
P:
tie 1


R:
P:
R:
P

Appendix R: Main Study Marking Grids: Number 10

Appendix R: Main Study Marking Grids: Number 11




R:
P:
R:
P:

Appendix S: Main Study Marker Correlation: Raw Scores

Group/Subject	Ex. #	Marker 1 Pitch 100	Marker 1 Rhythm 100	Marker 1 Total 200	Marker 2 Pitch 100	Marker 2 Rhythm 100	Marker 2 Total 200
1/3	1	21	51	72	12	48	60
	2	12	47	59	13	68	81
	3	12	24	36	6	19	25
	4	9	60	69	10	53	63
	5	22	86	108	20	82	102
	6	16	26	42	19	29	48
	7	15	18	33	13	23	36
	8	5	33	38	12	31	43
	9	11	30	41	13	29	42
	10	23	52	75	23	50	73
	11	11	59	70	11	54	65
	12	27	81	108	22	79	101
1/5	1	58	94	152	52	90	142
	2	70	94	164	59	91	150
	3	65	57	122	58	73	131
	4	54	95	149	53	92	145
	5	3	37	40	11	41	52
	6	46	55	101	46	60	106
	7	47	48	95	46	48	94
	8	48	50	98	51	47	98
	9	64	42	106	61	45	106
	10	58	61	119	54	55	109
	11	32	54	86	32	53	85
	12	31	44	75	32	44	76
1/8	1	14	51	65	15	49	64
	2	16	87	103	13	84	97
	3	7	52	59	6	46	52
	4	16	60	76	17	53	70
	5	16	26	42	22	32	54
	6	12	12	24	16	12	28
	7	7	0	7	13	3	16
	8	26	19	45	26	28	54
	9	19	52	71	34	27	61
	10	3	52	55	19	66	85
	11	18	79	97	19	73	92
	12	16	62	78	25	64	89

Appendix S cont'd: Main Study Marker Correlation; Raw Scores

		Marker 1			Marker 2		
		Pitch	Rhythm	Total	Pitch	Rhythm	Total
		100	100	200	100	100	200
Group/Subject							
2/2	Ex. # 1	69	73	142	68	68	136
	2	32	68	110	63	50	113
	3	45	45	90	46	35	81
	4	34	42	76	36	39	75
	5	85	80	165	83	77	160
	6	37	40	77	37	45	82
	7	30	33	63	38	27	65
	8	39	55	94	42	53	95
	9	28	34	62	28	34	62
	10	34	46	70	34	42	66
	11	36	41	77	37	31	68
	12	47	62	109	45	54	99
2/7	1	100	100	200	100	100	200
	2	99	99	198	100	100	200
	3	98	100	198	99	96	195
	4	94	99	193	92	95	187
	5	99	98	197	99	99	198
	6	94	100	194	91	100	191
	7	99	98	197	99	97	196
	8	100	100	200	100	100	200
	9	62	63	125	64	69	133
	10	100	100	200	99	99	198
	11	46	32	78	46	36	82
	12	57	79	136	55	74	129
3/4	1	93	99	192	90	98	188
	2	76	77	153	80	62	142
	3	40	64	104	49	60	109
	4	64	49	113	65	52	117
	5	93	97	190	93	95	188
	6	43	63	106	49	63	112
	7	52	80	132	52	81	133
	8	20	75	95	17	74	91
	9	85	80	165	86	82	168
	10	80	86	166	80	80	160
	11	51	44	95	55	41	96
	12	45	83	128	51	84	136

Appendix S cont'd: Main Study Marker Correlation; Raw Scores

Group/Subject		Marker 1 Pitch 100	Marker 1 Rhythm 100	Marker 1 Total 200	Marker 2 Pitch 100	Marker 2 Rhythm 100	Marker 2 Total 200
3/6 Ex. #	1	29	52	81	32	50	82
	2	47	72	119	55	65	120
	3	8	64	72	18	54	72
	4	23	64	87	19	67	86
	5	29	78	107	33	76	109
	6	24	28	52	24	28	52
	7	1	11	12	12	9	21
	8	19	42	61	17	47	64
	9	24	22	46	20	32	52
	10	32	10	42	36	14	50
	11	8	16	24	10	18	28
	12	9	26	35	11	32	43
3/12	1	74	94	168	65	99	164
	2	64	80	144	74	65	139
	3	31	100	131	42	95	137
	4	72	92	164	71	90	161
	5	80	95	175	77	96	173
	6	27	81	108	21	78	99
	7	33	70	103	42	74	116
	8	18	92	110	21	87	108
	9	24	50	74	32	53	85
	10	57	75	132	56	74	130
	11	37	72	109	42	69	111
	12	24	79	103	25	63	88
4/4	1	20	69	89	21	76	97
	2	28	88	116	25	83	108
	3	9	88	97	12	81	93
	4	14	60	74	12	50	62
	5	28	72	100	28	71	99
	6	24	32	56	18	31	49
	7	11	11	22	11	14	25
	8	6	12	18	12	13	25
	9	20	30	50	20	26	46
	10	19	35	54	25	36	61
	11	16	42	58	20	41	61
	12	23	41	64	22	46	68

Appendix S cont'd: Main Study Marker Correlation; Raw Scores

		Marker 1 Pitch 100	Marker 1 Rhythm 100	Marker 1 Total 200	Marker 2 Pitch 100	Marker 2 Rhythm 100	Marker 2 Total 200
Group/Subject							
4/7 Ex. #	1	19	87	106	16	94	110
	2	27	100	127	25	96	121
	3	0	56	56	6	57	63
	4	11	59	70	11	61	72
	5	32	80	112	30	78	108
	6	16	60	76	13	62	75
	7	11	37	48	15	43	58
	8	32	69	101	31	61	92
	9	31	53	84	31	52	83
	10	27	43	70	31	36	67
	12	17	26	43	18	27	45
	12	20	39	59	18	43	61
5/2	1	37	79	116	41	78	119
	2	43	76	119	54	73	127
	3	33	51	84	30	51	81
	4	35	47	82	34	47	81
	5	34	55	89	34	62	96
	6	27	39	66	23	50	73
	7	5	11	16	14	6	20
	8	21	51	72	22	54	76
	9	13	44	57	14	51	65
	10	29	59	88	32	70	102
	11	44	73	117	42	77	119
	12	26	82	108	22	79	101
5/8	1	73	77	150	69	65	134
	2	48	88	136	51	91	142
	3	41	32	73	34	34	68
	4	49	57	106	51	60	111
	5	36	57	93	33	56	89
	6	23	28	51	18	31	49
	7	36	9	45	33	13	46
	8	43	60	103	42	59	101
	9	16	33	49	22	31	53
	10	37	43	80	40	43	83
	11	12	59	71	12	54	66
	12	15	65	80	18	59	77

Appendix S cont'd: Main Study Marker Correlation: Raw Scores

Group/Subject		Ex. #	Marker 1 Pitch 100	Marker 1 Rhythm 100	Marker 1 Total 200	Marker 2 Pitch 100	Marker 2 Rhythm 100	Marker 2 Total 200
6/1	Ex. #	1	56	100	156	59	100	159
		2	79	82	161	77	78	155
		3	42	87	129	54	84	138
		4	34	55	89	31	55	86
		5	69	92	161	69	94	163
		6	37	66	103	37	73	110
		7	33	92	125	42	88	130
		8	39	96	135	38	91	129
		9	61	56	117	59	58	117
		10	77	94	171	73	92	165
		11	20	87	107	27	83	110
		12	27	84	111	33	78	111
6/2		1	43	83	126	49	80	129
		2	79	97	176	76	95	171
		3	53	97	150	45	95	140
		4	67	87	154	65	77	142
		5	49	89	138	45	96	141
		6	26	87	113	27	83	110
		7	32	80	112	29	83	112
		8	40	95	135	41	92	133
		9	75	78	153	79	79	158
		10	83	86	169	80	81	161
		11	41	35	76	45	34	79
		12	16	45	61	10	44	54
6/8		1	31	74	105	31	74	105
		2	43	93	136	45	97	142
		3	20	69	89	20	73	93
		4	19	70	89	18	72	90
		5	35	95	130	33	97	130
		6	18	86	104	19	88	107
		7	27	98	125	29	97	126
		8	24	100	124	32	100	132
		9	21	54	75	22	52	74
		10	38	73	111	40	77	117
		11	27	88	115	26	89	115
		12	9	91	100	14	90	104

Final Correlations:	Overall	.99
	Pitch	.98
	Rhythm	.97

Appendix T

Subjects' Mean Scores out of 100

Condition

Score:	Non-directed P	Non-directed R	Pitch-first P	Pitch-first R	Rhythm-first P	Rhythm-first R
Subject:						
1	32.25	35.50	26.00	26.00	45.50	70.50
2	18.00	55.50	14.50	40.75	13.50	45.50
3	46.25	50.25	36.00	47.50	61.75	85.00
4	75.50	64.75	86.25	66.50	72.25	71.25
5	33.50	56.50	43.00	37.50	41.75	76.75
6	14.00	61.25	15.25	14.25	13.25	62.50
7	16.50	56.25	26.25	64.50	20.00	75.50
8	49.50	65.00	42.50	62.25	47.50	78.00
9	34.75	92.75	37.00	74.00	35.00	97.75
10	39.50	51.75	50.00	60.25	44.50	90.25
11	19.75	25.25	24.75	25.25	4.00	25.50
12	47.75	52.00	45.00	57.00	36.25	45.75
13	16.50	67.25	27.25	49.50	3.75	61.50
14	28.25	29.75	35.50	53.50	28.25	41.25
15	26.25	23.25	31.00	58.75	18.00	61.25
16	98.00	99.00	97.75	99.50	66.25	68.50
17	23.00	56.25	33.50	65.25	14.50	59.25
18	57.50	59.50	79.00	88.25	37.50	67.75
19	39.75	64.50	44.50	62.00	28.50	76.25
20	9.00	13.75	7.00	21.25	6.25	15.75
21	39.75	62.75	25.25	57.50	23.75	94.00
22	30.50	42.75	26.75	39.50	23.25	72.75
23	35.25	58.50	23.00	44.75	10.25	82.75
24	68.25	72.25	65.25	73.25	52.00	78.75
25	26.75	63.00	18.25	18.50	18.25	39.75
26	45.50	86.25	39.00	47.50	34.25	49.00
27	38.75	44.25	32.50	39.25	19.50	55.50
28	23.25	32.75	14.75	5.75	24.75	77.00
29	60.25	91.50	35.50	69.00	39.50	84.50
30	15.00	44.25	10.00	22.00	23.00	49.25
31	35.25	80.75	35.50	71.25	36.00	83.50

Appendix T continued

Subjects' Mean Scores out of 100

Condition

Score:	Non-directed P	Non-directed R	Pitch-first P	Pitch-first R	Rhythm-first P	Rhythm-first R
Subject:						
32	5.50	15.25	5.25	12.50	12.25	67.75
33	17.00	23.75	20.25	27.50	14.00	67.25
34	17.25	31.75	19.50	37.00	17.75	76.25
35	37.25	55.75	16.50	42.75	23.50	68.75
36	28.75	96.25	33.00	54.25	41.50	89.25
37	22.75	61.50	23.75	40.25	14.25	75.50
38	26.00	44.00	20.75	27.00	22.50	58.25
39	51.50	86.50	48.50	47.25	53.50	99.25
40	93.00	90.00	82.50	71.75	86.25	88.25
41	20.00	64.00	30.50	44.50	10.25	18.25
42	37.00	63.25	21.75	39.00	28.00	54.40
43	94.75	99.75	77.25	77.75	88.75	94.75
44	99.99	99.99	98.50	99.99	92.50	98.25
45	28.50	44.00	27.00	42.25	24.25	60.50
46	30.25	63.00	18.75	57.50	9.75	47.25
47	52.75	63.50	34.50	38.50	20.00	50.00
48	50.25	68.25	56.50	53.00	35.00	51.50
49	29.50	46.75	15.25	48.25	14.25	69.75
50	71.25	81.50	41.75	52.00	31.50	80.50
51	46.25	80.25	52.75	81.00	44.50	86.50
52	53.75	61.00	60.50	91.00	36.75	87.75
53	16.25	44.50	35.00	50.75	15.25	64.00
54	20.50	46.50	13.75	41.75	17.25	29.75
55	13.25	25.25	30.50	40.75	15.75	70.25
56	27.00	56.00	45.75	27.25	27.25	72.75
57	22.00	62.00	37.75	79.25	16.50	77.00
58	23.75	76.50	28.25	76.50	26.00	94.75
59	17.25	61.00	26.00	43.00	28.00	75.00
60	41.25	46.25	34.75	47.50	20.00	69.50

N.B. Subject 44 was the only participant who possessed Absolute Pitch.

Appendix U

Descriptive Information from Questionnaires

Code: Each variable is followed by a range, % of subjects, a mean for the sub-group, and if applicable an overall Mean (N = 60).

Section I: Personal and factual profile of subject group.

1. Age:

16--20	21--25	26--30	31--35	36--40	41--45 yrs.	
32%	47%	13%	1.6%	3.3%	3.3%	
19.66	22.47	27.00	31.00	37.50	41.00	23

2. Sex:

	Female	Male
	58%	42%

3. Ear training level:

	2nd year	1st (2nd, dict)
	88%	12%

4. Principal instrument:

Woodwind	Brass	String	Voice	Piano	Guitar
8.3%	15%	16.6%	23.3%	28.3%	8.3%

5. Years of study of principal instrument:

1--3	4--6	7--9	10--12	>12	
15%	13.3%	16.6%	38.3%	15%	
2.6	5.9	7.8	10.6	16.6	9

6. Principal instrument's usual clef:

Treble	Bass	Alto	Grand Staff
45%	23.3%	3.3%	28.3%

7. Instrument's linear capacity:

Single	Multiple
63.3%	36.6%

8. Theory:

1 yr or less	2	3	4	>4	
13.3%	33.3%	23.3%	8.3%	21.6%	
1	2	3	4	6.8	2.8

9. Counterpoint:

0	1 yr or less	2	3	4+	
10%	66.6%	11.6%	5%	6.6%	
0	.75	2	3	4.25	1

Appendix U continued

Descriptive Information from Questionnaires

Section II: Self-assessments, keyboard skills and memory.

1. Keyboard skills:

1 non-player	2 (poor)	3 (fair)	4 (good)	5 excellent	
5%	20%	33.3%	23.3%	18.3%	3.3

2. Instant recall:

1 (very poor)	2 (poor)	3 (fair)	4 (good)	5 (excellent)	
6.6%	10%	36.6%	38.3%	8.3%	3.3

3. Long term memory:

1 (very poor)	2 (poor)	3 (fair)	4 (good)	5 (excellent)	
6.6%	16.6%	20%	28.3%	28.3%	3.6

Section III: Learning styles: (please see Table 21 also)

Analytical:	1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
	8.3%	13.3%	23.3%	31.6%	23.3%	3.5
Intuitive:	1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
	3.3%	6.6%	13.3%	36.6%	40%	4.0
Visual:	1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
	1.6%	10%	11.6%	31.6%	45%	4.1
Verbal:	1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
	13.3%	10%	28.3%	31.6%	16.6%	3.4
Non-verbally	1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
Aural:	10%	11.6%	31.6%	35%	10%	3.4
Tactile:	1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
	11.6%	21.6%	35%	11.6%	20%	3.1

Additional learning methods stated by subjects:
Repetition (3 subjects, mean 4.3); demonstration (2 subjects, mean 4.5); association, inner dialogue, mnemonic devices, and knowledge of music theory, all ranked at 5 by 1 subject each.

Appendix U continued

Descriptive Information from Questionnaires

Section IV: Dictations other than counterpoint, e.g., single-line melody, rhythm, chords, and progressions.

1. Subject makes pitch errors:

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
13.3%	30%	21.6%	13.3%	21.6%	<u>3.0</u>

2. Subject makes rhythm errors:

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
18.3%	38.3%	26.6%	16.6%	1.6%	<u>2.5</u>

3. Subject has difficulty identifying isolated chords:

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
5%	21.6%	28.3%	26.6%	18.3%	<u>3.3</u>

4. Subject has trouble transcribing harmonic progressions:

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)	
10%	38.3%	21.6%	21.6%	10%	<u>2.9</u>

Appendix U continued

Descriptive Information from Questionnaires

Section V: Strategies for two-part contrapuntal dictation.

NATURAL TENDENCIES: Subjects listened first for many musical features. Like replies were grouped e.g., "top line", "treble", etc. listed as "soprano". The long list (pitch, rhythm; soprano, bass; openings, cadences, or both; first entry; sequences; harmonic intervals; harmony, modulations; "structure"; the "easier" part) was further reduced by establishing the following categories:

1 = Feature variables (rhythm, pitch);
2 = Linear variables (sop, bass, 1st entry, openings only, and the "easier" part);
3 = Harmonic structural variables (cadences, chords, modulations); and
4 = Melodic variables such as sequences.

Subjects listens first for:

1 (feature)	2 (linear)	3 (harmonic)	4 (other)
21.6%	63.3%	11.6%	3.3%

Ratings on a five-point scale, 1 = very poor, 5 = very good:

Group 1: Feature extraction:		pitch-first	rhythm-first	
Helps them:	hear	4.0	3.9	
	memorize	3.3	3.4	
	write	3.8	4.0	
	find error	3.3	2.9	
	correct	3.3	2.7	
	overall	3.54	3.38	3.46

Group 2: Linear hearing:		18 Sop	8 Bass	10 1st	2 other	
Helps them:	hear	3.9	3.4	3.4	3.5	
	memorize	3.5	2.5	4.0	3.5	
	write	3.6	3.4	4.3	4.0	
	find errors	3.0	3.1	2.8	2.5	
	correct errors	2.9	3.1	2.5	2.5	
	overall	3.2	3.1	3.4	3.2	3.23

Group 3: Harmonic structures: (no sub-groups)

Hear	Memorize	Write	Find Errors	Correct	
3.4	3.7	3.6	3.0	3.1	3.36

Group 4: Other tendencies:

Hear	Memorize	Write	Find Errors	Correct	
1.0	1.0	2.0	1.0	1.0	1.20

Appendix U continued

Descriptive Information from Questionnaires

CLASS WORK: Instruction stressed melodic components: motives; entry comparison (imitative or not, and interval relationships); scale degrees; the first note in each bar. Harmonic emphases included focusing on tonality, progressions or cadences. One new rhythmic suggestion was counting the number of bars, grouped under 1 (feature). Eleven subjects reported class work that was undirected, gave no ratings and were grouped under 5 (NA). Of subjects who received instructional directives, 69% were asked to do the opposite of their natural tendency in class, and 31% had their normal inclinations reinforced by class instruction.

Subjects' classwork trained them to listen first for:

1 (feature)	2 (linear)	3 (harmonic)	4 (melodic)	5 (NA)
16.6%	38.3%	6.6%	20%	18.3%

Ratings on a five-point scale, 1 = very poor, 5 = very good:

Group 1: Feature extraction:		pitch-first	rhythm-first			
Helps them:	hear	4.0	3.3			
	memorize	3.0	3.6			
	write	4.5	3.5			
	find errors	3.5	3.4			
	correct errors	3.5	3.5			
	overall	3.7	3.5			3.58

Group 2: Linear hearing:		18 Sop	8 Bass	10 1st	2 other	
Helps them:	hear	3.2	3.1	3.9	3.5	
	memorize	3.7	2.8	3.6	3.5	
	write	3.3	3.0	3.9	4.0	
	find errors	3.0	3.5	2.4	3.5	
	correct errors	2.8	3.4	2.0	3.5	
	overall	3.2	3.2	3.2	3.6	3.25

Group 3: Harmonic structures: (no subgroups)

Hear	Memorize	Write	Find Errors	Correct	
4.3	2.8	3.3	4.0	3.5	3.58

Group 4: Melodic or other structures: (no subgroups)

Hear	Memorize	Write	Find Errors	Correct	
3.8	3.6	3.2	3.0	2.9	3.30

Ratings therefore rose with instruction: feature, 3.46 to 3.58; linear, 3.23 to 3.25; harmonic, 3.36 to 3.58; melodic, 1.2 to 3.3

Descriptive Information from Questionnaires

QUESTIONS ABOUT LINEAR LISTENING:

1. Subject listens to one voice at a time:

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)
0	6.6%	6.6%	18.3%	68.3%

2. Subject can hear 2 voices at once: (see also 8 below)

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)
31.6%	38.3%	10%	16.6%	3.3%

3. Subject confuses voices:

1 (never)	2 (rarely)	3 (half)	4 (often)	5 (always)
21.6%	41.6%	13.3%	11.6%	11.6%

4. Which voice subject starts with:

First entry	Soprano	Bass	No answer
41.6%	35%	18.3%	5%

5. What is easy to hear (multiple responses):

First entry	Soprano	Bass	Tonic entry	Motive
36.6%	36.6%	26.6%	5%	1.6%

6. When are voices compared aurally? (multiple responses):

Immediately	1 hearing	2 hearings	3 hearings	Cadences
16.6%	13.3%	16.6%	46.6%	25%

7. When are written voices compared visually? (multiple responses):

Immediately	1 hearing	2 hearings	3 hearings	Cadences
13.3%	10%	13.3%	48.3%	30%

8. Methods of hearing 2 parts at once, by the 18 subjects responding 3, 4, or 5, included: relative melodic motion (7 subjects); harmonic relationships (4 subjects); perfect pitch, visualising on piano, analysis of entry types, and "not worrying", 1 subject each; and "can't say", or no answer, 3 subjects.

Descriptive Information from Questionnaires

QUESTIONS ABOUT HARMONIC RELATIONSHIP OF VOICES:

Multiple responses were possible. Percentages may add to more than 100%.

1. Subject listens for harmonic intervals:

Always	Downbeat	Cadences	2nd entry	Cons/Diss	Other
8.3%	11.6%	68.3%	60%	38.3%	7%

2. Subject listens for chord functions:

Always	Cadences	Modulations
21.6%	70%	10%

QUESTIONS ABOUT THE TRANSCRIPTION PROCESS:

1. When does the subject notate? (no multiple responses)

During hearings only	During and after	After hearings
15%	81.6%	3.3%

2. When does the subject sing (hum, whistle, etc.)?
(N.B.: Only 10 subjects claimed they never sing, but of the 50 singers, only 17 admitted they sing out loud.) Subjects sang at these times in dictation:

	During hearing	Before writing	While writing	After
Aloud:	13.3%	23.3%	28.3%	28.3%
In mind:	11.6%	36.6%	41.6%	43.3%

3. Does the subject "play along" physically, on piano or another instrument? Only 4 of the 17 pianists said they did not play along. Among other instrumentalists, 22 said they did not play along. Among the 16 non-pianists who played along, 3 subjects did so on keyboard rather than their majors, and 1 subject alternated between piano and violin. Not all subjects played along at all stages of a dictation.

	During hearing	Before writing	While writing	After
Pianists=16	63%	81%	0	75%
Others=13	62%	92%	0	85%

Descriptive Information from Questionnaires

FINAL GENERAL QUESTIONS ABOUT CONTRAPUNTAL DICTATION:

Subjects wrote replies (no multiple choice), often several per question. There was some overlap with responses given before. Attributes are followed by # of subjects.

1. What is the easiest aspect of two-part dictation?

Rhythm, 12; Pitch, 3; Soprano, 9; Bass, 1; A single line, 5; Beginnings, 3; Beginnings and endings, 7; Cadences, 5; Entries, 2; Sequences, 1; Voice comparison, 2; Harmony, 3; Major keys, 1; The notation process, 1.

2. What is the hardest aspect?

Rhythm, 4; Bass, 6; Wide melodic intervals, 3; Entries, 11; Mid-sections, especially with many notes, 3; Harmonic intervals, 5; Note against note, "first species effect", 1; Second phrase, 4; Voice comparison or confusion, 8; Sequences, 1; Chromaticism, 1; Harmony, especially modulations, 10; Minor keys, 1; Concentration and memory, 8; Speed, 5; Insufficient hearings, 1; The notation process, 3.

N.B.: Pitch; Although many subjects cited pitch-related difficulties, not one stated "pitch" generically as a main difficulty.

3. Any additional difficulties?

Minor keys, 14; Flat keys, 1 (a guitarist); Unfamiliar keys i.e., more than 5 # or b, or subject has not played repertoire in the particular key), 5; Modes, 3; Compound metres, 10; Triple metre, 5; Duple metre, 2; Cut time, 2.

4. Any additional techniques not covered by the above questions? (Please note the small numbers of subjects who made suggestions.)

Listen for structure, 5 (i.e., listen for scales, chords, chromaticism, 1; use both melodic and harmonic intervals relative to tonality, 1; harmonic logic, bass first, 1; general contour and hear phrase direction, 2); Keep the tonic, 4; Memorize as soon as possible, 1; Write as fast as possible, 1; Work fragments, 1; Visualize piano, 1; "Compose", 2; "Guess", 4; and "PRAY!", 1.

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