Shifting Ear Differences in Melody Recognition through Strategy Inducement

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In a previous study, the pattern of ear superiority displayed by nonmusicians in a task where dichotically presented target melodies have to be recognized among four probes was found to be correlated with subjects’ descriptions of their operating modes: those who reported focusing on critical local differences in pitch tended to show right ear advantage (REA) and the others LEA. The purpose of the present study was to examine if laterality patterns can be affected by treatments designed to induce particular strategies. Treatments supposed to orient toward analytic processing, advising attention to critical notes, with (Experiment 2) or without (Experiment 1) the additional task of reporting their location, produced the expected shift toward REA. To the contrary, treatments supposed to orient toward holistic processing, advising attention to overall contour or requesting aesthetic judgments (Experiment 1), failed to produce the expected shift toward LEA. The result can be attributed either to a basic difference in susceptibility to strategic control between the different operating modes or, more simply, to ineffectiveness of the present holistically oriented treatments.

GENERAL INTRODUCTION

Most things we perceive can be analysed into parts and some of the central and most enduring problems in the study of perception concern the relation between indentification of parts and of the patterns resulting from their combination (Pomerantz, 1981; Treisman, 1985). One of these problems is that some materials can be dealt with either through identification of some local aspects only or through identification of more global properties. The perceiver then has the choice between several

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procedures. There is evidence that individuals differ in relative skill at using the different procedures (Cooper, 1980). More recently, the possibility has been raised that differential resort to analytic or holistic operating modes might be one aspect of the division of function between the cerebral hemispheres (see Bradshaw & Nettleton, 1981; Morais, 1982, for reviews). Several authors have cautioned against the tendency to use the distinction indiscriminately across the whole range of cognitive operations (e.g., Marshall, 1981; Bryden and Allard, 1981; Bertelson, 1982) but there are some domains where it has generated successful predictions regarding lateralization.

One such domain is the recognition of melodies. A melody can be described in terms of attributes at several levels ranging from pitch of individual notes to overall contour formed by successive changes in pitch directions (Dowling, 1982). Dowling has proposed that listeners can either attend to the contour or focus on local pitches or intervals. That different ways of processing melodies might have different hemispheric bases was first suggested in a seminal study by Bever and Chiarello (1974). These authors found that whereas nonmusicians recognized melodies better when they were presented monaurally in the left ear, musicians recognized them better in the right ear. On the other hand, only musicians performed above chance on recognition of a two-note sample from the target melody, and this was taken by the authors as evidence that the musicians’ operating mode, which the ear effect suggested was one typical of the left hemisphere, could be characterized as analytic.

The dependence of right ear advantage (REA) on musical expertise has not however been universally supported. Gates and Bradshaw (1977) have obtained REA in nonmusicians for melodies. The present authors (Peretz & Morais, 1980) have found evidence in nonmusicians for different operating modes with differential hemispheric involvement. The subjects were presented dichotically with two melodies, six to eight notes long, and had to recognize them among four subsequently presented probes. The melodies presented on one trial differed on only two positions. At the end of the session, the subjects were asked to describe the method they had been using. Some of them reported that they had tried to locate the positions at which the target melodies differed, and had focused on these positions when listening to the probe melodies. These subjects showed a tendency toward REA, while the other subjects who had reported no such analytic strategy displayed a marked left ear advantage (LEA). The difference in ear advantage between the groups was significant.

In that experiment, where the subjects were free to use any procedure, identification of the operating modes was thus based on a posteriori introspections. In the present study, an attempt was made to induce the recourse to particular operating modes experimentally, either through exhortation or through the imposition of a secondary task. The objective
was to find out if manipulations designed to encourage the resort to either analytic strategies or to holistic ones would shift the pattern of lateral differences toward respectively REA or LEA.

EXPERIMENT 1

The purpose of this experiment was to examine if ear differences in the recognition of melodies can be influenced through treatments designed to induce in the subjects either an analytic or a holistic approach. The strategy statements made by the subjects of our previous experiment (Peretz & Morais, 1980) implied that the key to the adoption of an analytic strategy was first to notice on which particular notes the target melodies differed. Hence one possible way of inducing such a strategy was to disclose the particular construction rules of the material and to advise the subject to focus on the critical notes when carrying out the recognition task. Regarding the possibility of inducing a nonanalytic strategy, our attempts had to be more exploratory, given that no clear indication as to what such a strategy might consist of was provided by subjects’ introspections. Two sets of instructions were used with separate groups of subjects. One set advised to focus on the contour of up-and-down pitch changes in the target melodies. The other consisted of requesting aesthetic judgments about the target melodies. This condition, it will be noted, is, unlike the other ones, based on the imposition of a subsidiary task. The production of aesthetic judgments, it was reasoned, implied a holistic apprehension of each melody.

The subjects were run for a first session without specific instructions, which were conveyed only at the beginning of the second session. To obtain a baseline against which to measure the effects of the different instructions, a control group of subjects did the recognition task throughout without receiving any information concerning the construction rules nor any particular advice about how to do the task. The effects of instructions could thus be examined on a within-subjects basis.

Method

Procedure. All subjects were tested twice with the same material, on two different sessions. The first session started with eight practice trials, where one target melody had to be recognized among four probes, both the target melody and the probes being presented binaurally. In the two experiments of the present study, the practice trials served also as screening tests: subjects who made two errors or more were eliminated. The overall elimination rate was 26.1%.

The remainder of the first session and the whole second one were devoted to experimental trials. On each such trial, two melodies were presented dichotically and the subjects had to recognize them among four probe melodies presented subsequently in succession and binaurally (Fig. 1a). They responded by tracing crosses on a response sheet. The earphones were reversed every nine trials. Half the subjects in each group started each session with track 1 in the left ear, and the other half had the opposite ear-track order.

The first session was identical for all subjects, and involved no specific instructions
Fig. 1. (a) Example of trial; melodies differ by two pitches in constant positions (indicated by "++"). (b) Each schema represents the melody presented at the end of the multiple choice; the schema above served for the cueing instruction, the one below for the contour instruction.

beyond those concerning the recognition task. Twelve subjects, forming the control group, were treated the same way on the second session. The other subjects were divided into three groups of 12, each of which received at the beginning of the second session one particular set of instructions.

The subjects in the cueing group were shown the type of schema illustrated in Figure 1B, on which two sets of points represent two target melodies. They were told that the melodies always differed on two positions only and advised to focus on these local differences while listening to the targets and then to the probes.

The subjects in the contour group were shown the type of schema illustrated in Fig. 1b
on which melodies are represented by broken lines. They were told that the two melodies differed by their respective patterns of up-and-down changes in pitch and advised to listen to the specific contours of the target melodies in order to recognize them among the probes.

The subjects in the aesthetic group were requested to evaluate which one in each pair of target melodies was most pleasant. Choices were expressed by indicating on the response sheet the side of presentation of the preferred melody.

Subjects. Forty-eight paid subjects, 24 females and 24 males, aged 17–27, were tested. None had received any musical training. All were strongly right-handed as assessed by a French adaptation of Oldfield’s (1969) questionnaire.

Material. The material was the “tonal pattern tape” used in an earlier study (Peretz and Morais, 1980). The stimuli were monodic melodies, six to eight notes long, played on guitar and lasting 3 to 5 s. They conformed to baroque tonalities and obeyed the following construction rules. From each of eight fundamental melodies, which varied in both rhythmic and tonal pattern, three different tonal variations were generated. These variation melodies differed from the fundamental one on only two notes, so forming together a “matched series.” The differing notes occurred in the same two positions for the four melodies of a matched series (see Fig. 1a), but these positions varied across the different series. Since only one matched series was used on any trial, there were no other differences between the four melodies among which the subjects had to make their choice than the pitches at the two critical positions.

A set of 36 experimental trials, and 8 practice trials, was constructed with these stimuli. Each experimental trial consisted of the dichotic presentation of two target melodies from one matched series, followed by the binaural presentation of all four melodies of the same series (probe melodies). Target melodies and probe melodies were preceded by a warning signal consisting of three taps. The timing of each trial was: warning signal, 1-s interval, target melodies, 1-s interval, warning signal, 1-s interval, probe melodies separated by 2-s intervals. The melodies were all recorded by one guitar player. The two melodies of each dichotic pair were recorded in succession, the player listening to the first melody recorded on track A while playing the second one for recording on track B and trying to synchronize the two melodies as well as possible. It will be realized that this procedure allowed only approximate synchronization, one consequence being that fusion never occurred within a dichotic pair, as it does with precisely synchronized inputs. Otherwise, spatial isolation of the critical notes would have been promoted and, as shown previously (Peretz and Morais, 1983), might have affected ear asymmetries.

The two positive probe melodies, identical to the target melodies, occupied varying ranks among the four probes, all combination of two ranks being used with equal frequencies. Each initial pair was recorded twice so that each member of the pair appeared on track 1 on one trial and on track 2 on another trial. The eight practice trials were recorded on both tracks. The stimuli were delivered over Beyer dynamic DT 480 headphones from a Sony TC 270 stereophonic tape recorder.

Results

The f’laterality score of Marshall, Caplan, & Holmes (1975) was computed for each subject and each session, according to the formulae \([((L_c - R_c)/(L_c + R_c)) \times 100]\) when percentages of correct responses, averaged over the two ears, was smaller than 50% above chance level (i.e., 75% in the present situation) and \([((L_c - R_c)/(L_c + R_c)) \times 100]\) when it was greater (\(L\) meaning the left ear, \(R\) the right one, \(c\) correct responses and \(e\) errors). The average values for each group are presented in Table 1. A positive score means LEA, a negative score REA.
TABLE 1

EXPERIMENT 1: MEAN PERCENTAGE OF CORRECT RESPONSES PER EAR AND MEAN $f$ SCORE FOR EACH SESSION IN EACH GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>Session 1</th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>Left</td>
<td>Right</td>
<td>Mean</td>
<td>$f$</td>
<td>Left</td>
<td>Right</td>
</tr>
<tr>
<td>Control</td>
<td>12</td>
<td>69.4</td>
<td>68.3</td>
<td>68.9</td>
<td>+0.6</td>
<td>71.8</td>
<td>67.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6)</td>
<td>(5)</td>
<td></td>
<td></td>
<td>(8)</td>
<td>(2)</td>
</tr>
<tr>
<td>Cueing</td>
<td>12</td>
<td>67.1</td>
<td>67.6</td>
<td>67.4</td>
<td>+3.0</td>
<td>62.5</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5)</td>
<td>(6)</td>
<td></td>
<td></td>
<td>(3)</td>
<td>(8)</td>
</tr>
<tr>
<td>Contour</td>
<td>12</td>
<td>67.6</td>
<td>68.5</td>
<td>68.1</td>
<td>−3.9</td>
<td>72.7</td>
<td>73.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6)</td>
<td>(5)</td>
<td></td>
<td></td>
<td>(5)</td>
<td>(7)</td>
</tr>
<tr>
<td>Aesthetic</td>
<td>12</td>
<td>66.7</td>
<td>66.9</td>
<td>66.8</td>
<td>+3.0</td>
<td>69.9</td>
<td>66.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5)</td>
<td>(6)</td>
<td></td>
<td></td>
<td>(8)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

Note. Numbers of subjects scoring higher on that particular ear, are shown in parentheses.

The mean $f$ scores obtained on the first session are similar for the different groups and close to zero ($t$-test values were 0.04, 0.22, 0.97, and 0.52 for the control, cueing, contour, and aesthetic groups, respectively). There are thus no ear differences. By contrast, on the second session the control group and the aesthetic group display LEA and the cueing group REA, the contour group still showing no lateral difference. Analysis of variance was performed on the individual scores, with Sex and Group as between-subjects factors, and Session as within-subjects factor. It did not reveal any main effect. There was a significant Session × Group interaction ($F(3, 40) = 2.9; p < .05$). Separate analyses each involving the control group and one of the experimental groups showed that the Session × Group interaction was entirely due to the difference between the cueing group and the control group ($F(1, 20) = 7.0; p < .02$). The control subjects switched from no ear difference on the first session to LEA on the second session ($F(1, 10) = 5.1; p < .05$). Conversely, the subjects of the cueing group tended to favor the right ear on the second session. This evolution toward REA was mainly due to male subjects for whom the evolution was significant ($F(1, 7) = 5.6; p < .05$). The Sex × Session interaction was significant ($F(1, 10) = 6.3; p < .05$).

The mean overall percentages of correct responses for each session in each group are also presented in Table 1. The performance levels are similar in the different groups on the first session and increased slightly on the second session, except in the cueing group which showed a decrement. An analysis of variance, with Sex and Group as between-subjects factors and Session as within-subjects factor, yielded a Session × Group interaction ($F(3, 40) = 2.9; p < .05$). The effect of Session is
TABLE 2

EXPERIMENT 1: MEAN PERCENTAGES OF CORRECT RESPONSES PER EAR ACROSS GROUPS, AS FUNCTIONS OF RANK ORDER OF PRESENTATION OF TARGET IN THE FOUR PROBES

<table>
<thead>
<tr>
<th>Rank</th>
<th>Left</th>
<th>Right</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70.</td>
<td>66.2</td>
<td>68.1</td>
</tr>
<tr>
<td>2</td>
<td>70.8</td>
<td>67.2</td>
<td>69.</td>
</tr>
<tr>
<td>3</td>
<td>66.7</td>
<td>66.7</td>
<td>66.7</td>
</tr>
<tr>
<td>4</td>
<td>62.8</td>
<td>69.5</td>
<td>66.1</td>
</tr>
</tbody>
</table>

significant in the cueing group \(F(1, 10) = 7.1; p < .02\) and also in the contour group \(F(1, 10) = 5.4; p < .05\), but in the opposite direction. In the other two groups, the effect fell short of significance \((F < 1)\).

Finally, ear differences were examined on the first session as a function of the rank order of presentation of the target among the probes (see Table 2). LEA is observed for early presentation ranks and gives way to REA for later ones. An analysis of variance, with Sex as between-subjects factor, and Rank order and Ear of presentation as within-subjects factors was performed on the correct responses.\(^1\) It did not yield any main effect but an Ear \(\times\) Rank order interaction \(F(3, 138) = 2.7; p < .05\). Linear regression was applied and it accounted for 82.9\% of the variance of ear differences \((F(1, 47) = 7.2; p < .02)\). The residual components were not significant \((F(2, 47) = 0.4)\).

The same analyses were performed on the ear asymmetries displayed by each group of subjects on the second session. The results differed according to the group considered. More specifically, LEA emerged for both early and late presentation ranks in the control group, while REA did in the cueing group. Within each group, no significant effect of rank order on ear asymmetry was observed. This may be linked to the small number of observations on each rank and the generally high variability of ear differences. Very large samples seem to be necessary to statistically support the observed trends; such as opportunity was provided by the first session of the present experiment where a large number of subjects were run under identical conditions.

**Discussion**

To the main question, can ear differences be influenced through manipulations of strategies, the answer depends on which kind of strategy it was attempted to induce. The treatment applied to the cueing group,

\(^1\) The \(f\) scores could not be computed since several subjects performed below chance level for a particular ear and rank order.
disclosing the fact that two particular positions were critical on each trial for discriminating between target and non-target melodies and advising to focus on the notes occupying those positions, was effective in shifting the pattern of ear difference toward REA relative to the control group. On the contrary, the treatment applied to the contour group and to the aesthetic group failed to produce the predicted shift toward LEA.

The success of the cuing instruction is consistent with the notion of left hemisphere superiority for processing in terms of local aspects. One could, however, still argue that, since there is no independent evidence that the subjects actually changed their operating mode, one cannot eliminate the possibility of the shift in ear advantage being due to some other effect of the instruction. Experiment 2 was designed to check on that possibility.

The failure of the holistic treatments admits of several explanations. One would be that, contrary to the working hypothesis, there is no superiority of the right hemisphere for holistic processing, only a superiority of the left hemisphere for analytic processing. In that view, all shifts in laterality, whether toward or away from REA, would be the result of increases or decreases in the degree of resort to analytic processing. This hypothesis is not tenable, for it is inconsistent with the occurrence of LEA for melodies, which has been clearly observed in the subjects of the control group on the second session, as well as in the nonanalytic subjects of Peretz and Morais (1980) and in numerous previous experiments.

One less radical explanation would be that holistic processing, unlike analytic processing, which can be provoked on external request, is obligatory. One could thus not increase resort to holistic processing through instructions or other means, and, exactly as in the preceding hypothesis, shifts in laterality could only result from increased or decreased analytic processing. The notion would account for the asymmetry between the effects of the different treatments in the present experiment, and, unlike the other hypothesis, is consistent with the occurrence of LEA.

Before accepting that explanation, one must however consider the possibility that the present treatments were simply inadequate to induce holistic operating modes. Several observations are consistent with that sort of view. Regarding the contour instructions, most subjects in the corresponding group reported that it is difficult to follow two similar contours simultaneously. For the aesthetic group, it appears that the aesthetic judgments have no consistency. As we have seen, each pair of target melodies was presented twice, and exactly 50% of the choices remained the same. It thus seems that the subjects could not carry out the double aesthetic judgment task which was expected to make holistic processing mandatory. There is thus a distinct possibility that the subjects could not, under the conditions of the present experiment, carry out the operations that the treatments were supposed to induce. One remaining
question, of course, is what the operating mode they actually adopted consists of.

An interesting incidental finding is the effect on ear differences of the rank of presentation of the target melody in the series of four probes. As long as subjects’ attention is not oriented toward any particular property of the melodies, one observes a shift from LEA for early presentations to REA for late ones. Since the probes were presented binaurally, the effect can only result from the original dichotic presentation of the target melodies. Presumably, the representations formed in the two hemispheres have different time constants, so that the one in the right hemisphere is better immediately after presentation but with time becomes less reliable than the one in the left hemisphere. The finding thus suggests a new difference between the two hemispheric representations of a melody. The suggestion is consistent with a result reported by Dowling and Bartlett (1981). Subjects heard on each trial four successive melodies and had to perform two comparisons: first judging whether the second and third melodies were identical and producing that judgment immediately after hearing the third melody, then comparing the fourth melody with the first one. The experiment involved thus an immediate and a delayed comparison. Melodies were such that responses could be obtained either on the basis of contour plus interval sizes or required consideration of interval sizes only. Immediate comparisons based on contour were predominant relative to those based on intervals, while for delayed comparison the order of predominance was reversed. The study suggests thus that representations of contour have a shorter time course than those of interval sizes. The suggestion would combine rather nicely with one derived from the present finding: information on global contour, better represented in the right hemisphere, would decay faster than information on local intervals, better represented in the left hemisphere.

In the control group, which carried out the melody identification task on the two sessions without any particular instructions, a clear shift toward LEA was observed on the second session. That observation is consistent with previous data showing that familiarization promotes LEA in melody recognition (Henninger, 1981; Peretz & Morais, 1983). We have, at present, no explanation for this apparently reliable effect. It should on the other hand be remarked that familiarization has been found to produce, no less reliably, shifts in the opposite direction in other domains, such as face and nonsense shape recognition (Sergent, 1983).

Finally, it was found that the cueing instruction caused a deterioration in performance level. A similar phenomenon has been reported by Francés (1972, p. 175) who suggested that nonmusicians, while being able to detect a discrepant pitch, are disturbed by the task because it interferes with a spontaneous orientation toward more global aspects of the melody. That hypothesis is difficult to reconcile with our own finding (Peretz and
Morais, 1980) that some nonmusicians reported using an analytic approach spontaneously, and were more accurate in the recognition task than the other ones. One possible explanation for the detrimental effect of an analytic instruction would be that it creates difficulties for those subjects who would not adopt it spontaneously.

EXPERIMENT 2

In Experiment 1, a shift toward REA occurred in the subjects of the cueing group, who were advised to use local critical differences between the two target melodies for choosing among the probes. The adoption of this analytic processing mode could be responsible for the observed change in laterality pattern. However, as mentioned in the preceding discussion, there is no independent evidence that the suggested strategy was actually adopted. Bever (1980, p. 217) has, as a matter of fact, claimed that nonmusicians have no access to the internal structure of melodies and can only use their overall contour for recognition.

In the present experiment, subjects were asked not only to use the critical local notes for the recognition task, but in addition to report the positions on which they occurred. The purpose is thus to replicate the result of the cueing condition of Experiment 1 in a situation which provides a control for detection of the critical local differences. As control data, the results of the first session of Experiment 1, where all subjects performed the recognition task without particular instructions, were used.

Method

The material and set up were identical to the ones used on the first session of Experiment 1. However, the present subjects (eight females and ten males, aged 18–30) were required to perform two tasks on each experimental trial: a difference-spotting task and the main recognition task. They were informed, in the same way as the cueing group of Experiment 1, of the rules governing construction of the material. They were in addition asked, for each pair of target melodies, to indicate on a numerical scale the serial positions of the two differing notes. The subjects gave their differing-spotting response before the presentation of the probe melodies. The timing of each trial was the same as in Experiment 1.

Results and Discussion

The results obtained in the present experiment are presented in Table 3 along with the control data (i.e., the results of the first session of Experiment 1 averaged over all groups). The only difference between the experimental and the control group concerns the pattern of ear asymmetry.

The $f$ score obtained in the experimental group differed significantly from the one of the control group ($t_{64} = 1.680; p < .05$). The difference-spotting task had thus the expected effect on ear asymmetries, in shifting the pattern toward REA. It did so in both male and female subjects (mean $f = -16.9$ and $-14.3$, respectively). It should be remembered
TABLE 3
EXPERIMENT 2: MEAN PERCENTAGES OF CORRECT RESPONSES PER EAR AND MEAN f SCORE FOR EACH GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Left</th>
<th>Right</th>
<th>Mean</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>48</td>
<td>67.7</td>
<td>67.8</td>
<td>67.8</td>
<td>+ 2.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(23)</td>
<td>(23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>18</td>
<td>65.</td>
<td>68.3</td>
<td>66.6</td>
<td>- 15.8</td>
</tr>
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<td></td>
<td></td>
<td>(5)</td>
<td>(10)</td>
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</tbody>
</table>

Note. Numbers of subjects scoring higher on that particular ear are shown in parentheses.

that in Experiment 1 only males shifted the ear difference toward REA as a result of the analytic instruction. It thus seems that the analytic processes used here are lateralized in the same way in both males and females, and that females have recourse to such processes when these are required by an additional task. On the other hand, when subjects are simply invited to be “analytic,” males would be more suggestible to this instruction. The last notion is not new since we came upon the same conclusion in several previous studies (Peretz and Morais, 1980; 1983).

The report of critical positions reached a reasonable level of accuracy. Fifty-two percent of pitch differences were correctly localized, showing that, on the average, one out of the two critical pitches was correctly detected. With this material, the correct localization of only one critical pitch is indeed sufficient information for later discrimination of the melody targets among the probes. The subjects were thus able to follow the instruction to locate the critical notes, and it appears reasonable to attribute the observed shift in laterality pattern to the adoption of a strategy based on that knowledge.

In the present experiment, the subjects in the experimental group who had to perform the difference-spotting task in addition to the main recognition task obtained the same overall level of accuracy in the latter as the subjects in the control group who performed that task alone ($t_{64} = 0.79$). This result contrasts with that of the subjects of the cueing condition of Experiment 1 in whom overall accuracy deteriorated as a result of the cueing instruction. There is no obvious explanation for the fact that imposition of an analytic secondary task is less detrimental than the simple advice to adopt an analytic strategy.

GENERAL DISCUSSION

Our purpose was to examine if the laterality patterns exhibited by nonmusicians identifying dichotically presented melodies can be affected
by treatments designed to induce particular operating modes. The treatments were designed to induce either analytic processing, based on local details, or holistic processing, in terms of global properties such as contour, following the general working hypothesis of specialization of the left hemisphere for analytic and of the right hemisphere for holistic processing. Failure of a treatment to produce the predicted shift in lateral difference indicates either ineffectiveness in inducing the expected operating mode or inadequacy of the corresponding part of the working hypothesis. Success on the other hand brings support to both the choice of the treatment and the working hypothesis.

Treatments designed to promote analytic processing, in Experiment 1 advising to focus on the critical notes and in Experiment 2 having the subjects report the location of those notes, were effective in shifting the pattern of ear differences toward REA. These results are consistent with Peretz and Morais’ (1980) finding that subjects who reported performing the recognition task on the basis of the critical local differences had a laterality pattern significantly different, in the direction of REA, from that exhibited by those who reported no such analytic strategy. Both sets of results support the notion of a superiority of the left hemisphere for processing in terms of local parts. The earlier result however was only a correlation, so that that exact nature of the relation between the effect observed at the level of ear difference and reported strategy was debatable. It was in particular not possible to eliminate the possibility of laterality pattern and reported strategy being both consequences of some common determining factor. The present data, where a shift in laterality was produced through manipulation of strategies, demonstrate a direct causal link between operating mode and pattern of ear difference.

Accessorially, the present result shows that dealing with musical material in terms of local parts is not the privilege of musicians (Bever, 1980) nor of some well-disposed nonmusicians, as was the case for the “analytic” subjects of the previous study: most subjects can apparently adopt that kind of operating mode when suitable persuasion is applied.

By contrast, treatments oriented toward holistic processing, advising attention to overall contour or requesting aesthetic judgments, failed to produce the expected shift toward LEA. Possible explanations for that failure have been examined in the discussion of Experiment 1. One attractive explanation for the failure is that holistic processing, unlike analytic processing, which is intentional and can be influenced through instructions, is obligatory. All shifts in laterality pattern through strategy manipulations thus result from changes in degree of resort to analytic processing. It would, however, be premature to adopt that interpretation without further proof. A more trivial notion, that dichotic presentations make it difficult to follow the contour of the melodies, appears as a real possibility.
We are planning to study the effect of the instruction to attend to the contour under monaural presentation. On the other hand, contour is not the only global property of melodies. Other properties, such as the overall pitch range (Deutsch, 1978) or the implicit harmonic structure (Henninger, 1981), should be taken into consideration in future studies.

One last point concerns the ecological validity of the recognition task used in the present study, as in the previous ones in the same series (Peretz & Morais, 1980; 1983). The analytic operating mode is one made possible by the particular way in which the test was devised, with the melodies presented on each trial always differing on specific positions. It would not be effective with a less constrained material, for instance when comparing melodies which might differ in any way. One could argue that this operating mode is essentially a trick, with no particular relevance to what people do in the normal process of listening to music for the sake of enjoyment. Lack of ecological validity does, on the other hand, in the present authors’ opinion, not entail lack of theoretical importance. It was shown here that nonmusicians can manage to recruit the equipment of the left hemisphere to perform extracommputation on melodies. These operations might pertain to the same class of left-hemisphere processes that are used on a more routine basis by musicians.

REFERENCES


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