The Effect of Music as a Distraction on Test-Taking Performance

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It has been assumed that test administrators must carefully attend to external variables such as heat, light, ventilation, physical comfort, and audio disturbances, which may affect a test-taker's performance (Anastasi 1968; Freeman 1962; Goldman 1961; Horst 1966; Thorndike & Hagen 1964). Prescott (no date) has developed a step-by-step guide for test administration to assure uniformity of testing and to minimize the effects of interference that may contaminate test results. Writers of basic measurement texts and test manuals tend to reinforce the assumption of rigid adherence to standardized testing conditions. Anastasi (1968) cautions: "It is important to realize the extent to which testing conditions may influence scores. Even apparently minor aspects of the testing situation may appreciably alter performance [p. 58]."

The literature examining the effects of variations in testing atmosphere is somewhat sparse. Henderson, Crews, and Barlow (1945) explored the effect of music as a source of distraction during the taking of a test. They concluded that the distraction effect of music depended on both the type of music and the complexity of the testing material. Super, Braasch, and Shay (1947) found no significant difference in mean scores on the Otis Quick Scoring Test of Mental Ability between experimental and control groups when a trumpet was played nearby, when someone burst into the testing room to ask a question, when a noisy argument took place outside the door of the test room, and when the timer went off five minutes before the actual end of the testing session. Standt (1948) found no significant differences in mean scores when he used three groups—a control group, an experimental group which was urged to work accurately, and an experimental group which was interrupted every 30 seconds by a buzzer going off.

Finally, Jerison (1959) studied the effect of noise on human functioning in a laboratory setting. He suggested that noise creates or increases psychological stress, which is the cause of changes in functioning. One must conclude from these few studies that there is a lack of

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research support for what can only be termed a common sense principle that test administrators must carefully control certain kinds of external variables that might influence test results.

Distractors such as music often have been used in industry to increase worker output (Gatewood 1921; Kerr 1943, 1944; Smith 1947; Wyatt & Langdon 1938). Music has been found to relieve physiological and emotional tension (Hyde 1924; Krugman 1943; Miller 1967). The effect of music on a student's concentration when studying has also been studied with some contradictory results (Cantril & Allport 1935; Meenes 1954; Mitchell 1948). Music has been effective in industrial use; with regard to other uses, the evidence seems contradictory.

Obviously, common sense dictates concern with distractions as they affect a person's performance, both in education and industry. Test administrators must especially be concerned with distracting effects in test-taking situations. The purpose of this study was to test the effect of music as a distractor on the test-taking performance of 10th-grade high school students.

PROCEDURES

All 10th-grade students in a high school in a rural farm community formed the initial subject pool. However, due to classroom space limitations only 175 of the 199 enrolled 10th graders could be tested at the same time. Therefore, seven subjects who were 18 years old and approximately three years above the expected age for 10th graders were dropped from the initial subject pool. Thirteen subjects who were 17 years old were designated as a substitute subject pool, to be tested only if other students were absent on the day of the testing.

Absenteeism on the day of the testing was great enough so that all alternate subjects who were in school that day were used, providing a total of 167 subjects who were part of the study. The sex and age information presented in Table 1 indicates that the subjects were fairly evenly distributed across the

TABLE 1

Distribution of Subjects by Group, Sex, and Age

Group	Sex		Age	
	M	*F*	*Mean Age*	*SD*
Control (C) ($n=33$)	18	15	15.8	.69
Rock (R) ($n=34$)	16	18	15.8	.62
Folk (F) ($n=35$)	20	15	15.7	.67
Classical-instrumental (CI) ($n=34$)	17	17	15.8	.66
Classical-vocal (CV) ($n=31$)	17	14	15.7	.69
Total	88	79		

treatment groups by sex and that the mean age was about the same in each group.

Prior to testing, subjects were randomly assigned by sex to one of five treatment groups (see Table 1) through the use of a table of random numbers. The purpose was not only to use a random selection of subjects by group but also to distribute the subjects proportionately by sex. Since the investigation's purpose was to study the effect of music on test-taking, the five groups were randomly defined as Control (C) where no external noise was introduced (these testing conditions may be considered as ideal); Rock (R) where rock music (Herbie Mann—*Memphis Underground*) was played during testing; Folk (F) where folk music was played (Crosby, Stills, and Nash); Classical Instrument (CI) where symphonic music (*Classical Symphony* by Prokofief) was played; and Classical Vocal (CV) where opera (*The Great Kirsten Flagstaad*) was played.

In an effort to control for the effect of external variables on test results, the following criteria were met for all test groups.

1. Test administration took place from 9:00 A.M. to 9:50 A.M. on a Wednesday; all five groups were tested simultaneously.

2. The school building was less than one year old and was equipped with acoustical tile in the ceiling (which reduced the possible echo effects in classrooms), uniform temperature control in all rooms, fluorescent lighting sufficient to provide uniform candle power in all sections of each room, equal floor space in each room used for testing, windows of equal size, and new furniture for subjects of the combination desk variety. (There was sufficient desk-chair seating appropriate for left-handed persons; this factor is sometimes overlooked during testing situations.) Seating capacity for each room was 35.

3. The school building was approximately 200 to 500 feet away from a minimally used highway, thus reducing the possible effect of road noise.

4. During the testing period, freshmen, juniors, and seniors were all attending an assembly in the school auditorium, which was located at the point in the school building farthest away from the testing area.

5. All electronic school bells and other possible noise-making equipment were turned off during testing, with the exception of the central heating facility.

6. A custodian was stationed at the entrance to the building wing where testing took place to keep any stray persons out of the area.

In effect, maximum control was instituted over all possible external interferences during test administration. Internal psychological interference referred to by Jerison (1959) was considered to be randomly distributed among the five groups since all subjects were assigned to their particular condition in random order.

Three standardized instruments were selected as the data-gathering tools: the Basic Skills in Arithmetic Test (Wrinkle, Sanders & Kendel no date); the Differential Aptitude Test; Language Usage-Spelling Test (Bennett, Seashore & Wesman 1966); and the Self-Concept of Ability Scale (Brookover, Paterson & Paterson 1962). It was felt that the types of questions on each of the instruments were all within the expected performance range of high school sophomores, thereby minimizing any possible effect due to test anxiety. In addition to the instruments

mentioned, each subject was requested to respond to a student information sheet through which basic demographic data was gathered (Heyer 1970). Each of the five groups took the test in a different order to eliminate the possibility of systematic order effects.

An experienced test examiner was assigned to each group. A stereo record player was positioned at the front of the classroom for each of the four experimental groups. The record player volume was set so as to be clearly audible in all parts of the classroom. Volume controls were adjusted prior to testing to insure clear sound in all parts of each room but not enough sound to carry from one room to another. Music was turned on after all students had been seated in each room and continued to play during all announcements, instructions, presentations of materials, and testing. Total testing took 40 minutes. Since each record played for 20 minutes and only one side of each record was used, the music in each experimental group was repeated once.

Each student was provided with a booklet containing the three tests and a student information sheet. The following statement was read to all the subjects prior to testing:

> The Educational Psychology Department of the University of Texas is conducting a study to find out how conditions in the classroom affect the scores you get on tests. We want you to know that we are not interested in your test scores as much as we are interested in the atmosphere in the room in which you take the test. Your test scores will only be seen by us from the university.

All test directions were standardized and read to the subjects by the test administrator. All tests were timed as shown: arithmetic—15 minutes, spelling—8 minutes, self-concept scale—5 minutes, and student information sheet—5 minutes. One 50-minute class period was sufficient for test administration and data collection. At the termination of testing, record players were turned off and each administrator discussed the parameters of the investigation with the subjects.

RESULTS

The means and standard deviations presented in Table 2 for each of the three tests by group indicates that close similarities existed. A t test applied to all mean score combinations between groups yielded no significant mean differences ($p \leq .05$), indicating that the four types of music played during testing did not affect the subjects' test performance. Not only did the presence of music not affect achievement test scores in arithmetic and spelling, it did not affect self-ratings on a self-concept measure, regardless of the music type used as a distractor.

Data collected from the student information sheets indicated that subjects preferred rock music far above the other three types. Yet the mean scores for the rock music group were similar to those of all other groups. Even when subjects were exposed to background music they did not like, their mean scores did not vary significantly from those of all other groups.

Further data collected from the student information sheets is summarized in Table 3. A review of this data indicates that the great majority of the subjects study with some form of background distractor, such as TV, radio, records, or noise in general. The subjects may have tuned out the background music in order to attend to the test-taking task.

TABLE 2

Means and Standard Deviations for Arithmetic, Spelling, and Self-concept

Group	Arithmetic		Spelling		Self-Concept	
	M	*SD*	*M*	*SD*	*M*	*SD*
Control ($n=33$)	30.82	13.53	69.82	15.92	26.33	5.61
Rock ($n=34$)	29.18	12.11	69.79	15.06	27.18	4.81
Folk ($n=35$)	34.11	13.73	67.94	16.54	27.17	3.96
Classical-instrumental ($n=34$)	31.65	12.37	67.44	15.63	25.62	4.20
Classical-vocal ($n=31$)	32.35	12.24	70.32	15.35	27.00	4.33

This may account for no observable significant differences between groups. This assumption has been reported by Morgan (1916): "In general, an increased out-put of energy compensates for the effect induced by distractive stimuli and thereby serves to overcome any diminuation in observable out-put [p. 84]." Subsequent investigations by Laird (1929), Ford (1929), and Harmon (1933) tended to corroborate this assumption. Since the majority of subjects do study with some type of distraction, one may speculate that the present experimental situation was not a new experience and therefore not a distracting one.

One final observation may be noted. Because music or some other distractor so frequently accompanies subjects' studying, music may be assumed to raise their morale. Music in industry has been observed to raise workers' morale but not production (Kerr 1944; McGehee & Gardner 1949; Operano Manufacturing Company 1945; Smith 1947; Wyatt & Langdon 1938). The presence of background music for subjects in this investigation may make studying and test-taking less tedious, boring, and anxiety-producing.

Since noise is a part of our daily environment (air conditioning, piped-in music, TV, street noise, etc.), one must

TABLE 3

Groups Studying with Distractions by Percentage

Groups	TV		Radio		Records		Noise in General	
	Some	*Never*	*Some*	*Never*	*Some*	*Never*	*Some*	*Never*
Control ($n=33$)	85	15	82	18	61	39	85	15
Rock ($n=34$)	77	23	94	6	56	44	88	12
Folk ($n=35$)	80	20	91	9	71	29	91	9
Classical-instrumental ($n=34$)	82	18	82	18	79	21	97	3
Classical-vocal ($n=31$)	71	29	77	23	68	32	87	13
Average %	79	21	86	14	67	33	90	10

question the common sense assumption that distractions will necessarily affect test results adversely. The lack of any significant findings in this investigation would tend to refute the validity of this assumption.

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