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July 25, 1980

The purpose of this study was to examine videotaped teacher and performer behavior during several high school ensemble rehearsals to determine the predictability of a dependent variable, frequency of off-task behavior, by the following carrier variables: performance time; nonperformance time; frequency of social and academic approvals and disapprovals, stops, complete and incomplete teaching units, errors, and teacher eye contact. Subjects were six high school ensemble teachers and randomly selected students from two mixed choruses, three bands, and one orchestra. Videotapes, using two cameras and a special effects generator for a split-screen effect, were made for ex post facto analysis. The predictability of off-task behavior carrier variables was examined, using a multiple regression analysis. The variability of off-task behavior caused by individual teacher differences was accounted for in a repeated measures design. Results indicated a strong relationship between off-task behavior and individual teachers, nonperformance activity, and teacher eye contact. The carrier variables in this model accounted for 81.38% of the off-task variability.

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Prediction of Performer Attentiveness Based on Rehearsal Activity and Teacher Behavior

Effective teaching may be defined to the degree that an evaluation of the effect of observed teacher behavior on student behavior is possible. Previous studies have focused on teacher/conductor behavior (Forsythe, 1977; Moore, 1976; Murray, 1975; Thurman, 1976; Wagner & Strul, 1979; Yarbrough, 1975), student/performer response (Forsythe, 1977; Froehlich, 1979; Murray, 1975; Yarbrough, 1975), and student/teacher interaction in classes and rehearsals (Erbes, 1972; Forsythe, 1975; Froehlich, 1979; Kuhn, 1975; Madsen & Alley, 1979; Madsen, Wolfe, & Madsen, 1975; Murray, 1975; Nolin, 1971). These studies clarify specific teacher characteristics and class activities that

may affect attentiveness. Attentiveness in music classes and rehearsals may be related, in part, to teacher reinforcement. For example, on-task student behavior was greater under highly approving teachers than under highly disapproving ones (Forsythe, 1975; Kuhn, 1975). Approval reinforcement significantly increased attentiveness (Forsythe, 1975), following classroom rules (Kuhn, 1975), and positive attitudes toward choral rehearsals (Murray, 1975). Furthermore, relationships may exist between off-task behavior and social disapproval, approval, and teacher errors (Forsythe, 1975).

Results of these studies demonstrate that attentiveness in music classes and rehearsals may also be related to the class or rehearsal activity. For example, children seemed less off-task in music classes than in other classes, regardless of the approval, disapproval, or error ratios of the teachers (Forsythe, 1975). In a study that examined attentiveness in various classroom activities, students were more on-task during activities that required active participation than during passive activities, such as instruction and verbal student/teacher interaction (Forsythe, 1977). Other studies indicated that verbal instruction produced the least on-task behavior and that singing activity produced the most (Madsen, Wolfe, & Madsen, 1975). Students are more on-task in choral and instrumental music rehearsals than in general music and other classes, despite low approval ratios of conductors (Madsen & Alley, 1979). These results suggest that music performance or active, rather than passive, tasks may be intrinsically reinforcing.

Data from a study on magnitude of conductor behavior (Yarbrough, 1976) indicated that, when a conductor's behavior is dynamic and dramatic, it may affect student performance, attentiveness, and attitude. Three of the four choral groups studied received their lowest performance ratings under the low magnitude condition; on-task percentage was higher during the high magnitude condition, and student attitude ratings were higher following the high magnitude condition.

The purpose of the present study was to define and analyze a complete teaching/learning model and its relationship to specific dependent variables, such as performance, attentiveness, or attitude. Specifically, the study examined videotaped teacher and performer behavior of several high school ensemble rehearsals to determine the predictability of frequency of off-task behavior by the following carrier variables: performance time; nonperformance time; frequency of social and academic approvals and disapprovals, stops, complete and incomplete teaching units, errors (including reinforcement and teaching sequence mistakes), and teacher eye contact (Mosteller & Tukey, 1977).

PROCEDURE

Subjects were six high school ensemble teachers and randomly selected students from two mixed choruses, three bands, and one orchestra. Rehearsals, conducted by the regular teachers, were videotaped in the regular rehearsal rooms at the normal rehearsal times. Two media technicians and audiovisual equipment surrounded the group during the recorded rehearsals, which took place approximately two weeks prior to a performance.

Videotape equipment included one Sony AV 3600 videorecorder, two Sony AVC 3200 video cameras, two Sony f = 16 - 64 mm zoom lenses, one Sony CVM

1128* television monitor, one Sony SEG-1 special effects generator, one Realistic 33-1056 condenser microphone, one Realistic 33-1057 stereo microphone mixer, and one Craig 2261 cassette audio tape recorder. A prerecorded cassette tape providing the verbal cues "observe" and "record" was mixed into the sound recorded on videotape. One video camera was focused on a maximum of six students during each "observe" interval and was rotated on the "record" cue throughout each rehearsal so that all ensemble members were randomly observed several times. The other video camera was focused on the teacher for the entire rehearsal.

After videotaping was completed, two trained observers viewed the videotapes and recorded overt student off-task behavior and teacher eye contact. Observation was time sampled and consisted of 10-second observe intervals and five-second record intervals.

Student behavior was defined as follows: (1) on-task active—when students are supposed to be performing, they must look at either the music or teacher; (2) on-task passive—when students are not supposed to be performing, they must be quiet and look at the music, teacher, or ensemble members who are performing; (3) on-task other—students must follow instructions given by the teacher; (4) off-task—students are observably not on-task (Madsen & Yarbrough, 1980, p. 56).

Observers counted the number of performers in view and those observably off-task for each 15-second interval. A percentage of off-task behavior was then computed for each eight-minute rehearsal segment by dividing the number of students off-task by the total number observed for that segment. Four measures of off-task behavior were obtained for each of the six rehearsals observed.

Teacher eye contact was counted and recorded according to the following definitions: (1) groups—conductor looking at entire group or section for at least three continuous seconds, (2) individual—conductor looking at individual in group or accompanist for at least three continuous seconds, (3) music—conductor looking at music for at least three continuous seconds, (4) other—conductor looking at something other than group, individuals, or music for the entire interval (Madsen & Yarbrough, 1980, p. 63). Total teacher eye contact was considered the sum of the frequency of group and individual eye contact.

A verbatim typescript of each rehearsal, prepared as a basis for further behavioral analysis, was used in conjunction with the videotape to measure seconds spent in performance and nonperformance. Continuous time in minutes and seconds was recorded in the left-hand margin of the script, using a stopwatch accurate to one-tenth second. A notation was made in the script each time the teacher stopped the music. A change of activity was noted if it lasted three or more seconds. Performance was defined as playing or singing by the entire ensemble or by its smaller sections. Nonperformance was defined as teacher instruction, teacher reinforcement, or anything not involving students' music performance.

¹Observation procedures were based on techniques developed in previous behavioral and descriptive research (Madsen & Madsen, 1974; Madsen & Yarbrough, 1980; Thurman, 1976), with the exception of the procedure for complete and incomplete teaching units, which was developed for this study and is based on the teaching/learning model presented by Becker, Englemann, and Thomas (1971). Observer agreement was computed by dividing total agreements by agreements plus disagreements. Average agreement was .91.

The typescript was also used in conjunction with the videotape to analyze and count complete and incomplete teaching units. A complete teaching unit consisted of sequential parts: (1) teacher presentation of a task, (2) student response, and (3) teacher reinforcement.

Each part was delineated into categories and was coded. The codes were entered in the left-hand margin of the typescript. Teacher presentation was coded "1" and was divided into four categories, which were coded and defined as follows: 1a, academic task presentation (telling students how to play a passage or where to begin playing); 1s, social task presentation (telling students how to behave or making announcements about future activities); 1c, conducting task presentation (a nonverbal modeling of the music or a nonverbal conducting signal for dynamic changes, beginning to play, stopping, style, phrasing, and tempo); and 1o, off-task statements (those not related to social or academic tasks).

Student response was coded "2" and was divided into four categories, which were coded and defined as follows: 2p, performance by the entire ensemble; 2s, sectional performance; 2v, appropriate verbal response; and 2nv, nonverbal response.

Teacher reinforcement was coded "3" and was divided into six categories, which were coded and defined as follows: 3va, verbal academic or social approval (positive statement about student behavior); 3vd, verbal academic or social disapproval (negative statement about student behavior); 3fa, facial approval (a positive facial gesture); and 3fd, facial disapproval (a negative facial gesture). Errors were coded and defined as: 3va or 3fa (encircled), approving of an inappropriate behavior; 3vd or 3fd (encircled), disapproving of an appropriate behavior; 3vd/fa or 3va/fd (encircled), conflicting feedback (verbal expression is different from facial expression). Sequence errors included reinforcement not related to the task presented and presentation of a new task, followed by reinforcement of a previous task.

Teaching units were then analyzed for completion and content. Videotapes were again observed with coded typescripts to carefully note and accurately describe facial expressions, subtle approvals and disapprovals, and sequence errors. All units that followed a 1-2-3 sequence without error were considered complete. A 1-2 sequence, in which student response was performance by the entire ensemble or by sections, was considered complete because music performance may serve not only as student response but also as reinforcement.

Incomplete units consisted of a teacher presentation of a task followed by: (1) not allowing student response, (2) a nonmusical student response with no teacher reinforcement, or (3) teacher reinforcement with no intervening student response.

Using the coded transcript, academic and social approvals, disapprovals, and errors were identified and counted. A verbal or facial reinforcement was counted as one approval or disapproval. A verbal reinforcement paired with a facial reinforcement was counted as one approval or disapproval if the reinforcements agreed, and as one error if the reinforcements conflicted.

Each teacher and ensemble was videotaped for one complete rehearsal. Each rehearsal was analyzed in four eight-minute segments, excluding warm-ups and announcements. The complete data set consisted of percentage of off-task behavior; number of seconds during which performance (entire group plus

sectional) and nonperformance occurred; frequency of stops, academic and social approvals and disapprovals, errors, teacher eye contact, and complete and incomplete teaching units.

The predictability of off-task behavior by the frequency or percentage of carrier variables was examined, using a multiple regression analysis (Mosteller & Tukey, 1977; Neter & Wasserman, 1974). Carrier variables for the regression analysis were the percentage of nonperformance and disapproval; and frequency of errors, stops, teacher eye contact, and complete and incomplete teaching units. The variability of off-task behavior caused by individual teacher differences was accounted for by using a repeated measures design.

Data were analyzed, using a multiple regression technique (Statistical Analysis System, General Linear Models Computer Program, release 79.3 A, Syracuse University) (Table 1). Carrier variables were selected and entered in hierarchical order of perceived importance based on results of previous research literature.

By studying the sums of squares values for each carrier variable, one can compare the relative contribution of each variable to the prediction of off-task behavior. Table 1b portions out the sums of squares for Model 1050.70. The F values for each carrier variable represent partial F values; therefore, they are affected by the order in which the carrier variables are entered. This explains, in part, the importance of entering carrier variables in a priori hierarchical order.

Table 1—Multiple Regression Analysis

	Source	df	SS	MS	F	p	R ²
(a)	Model	12	1,050.70	87.56	4.01	.01	.8138
	Error	11	240.42	21.86			
	Corrected Total	23	1,291.12				
(b)	Teachers	5	823.75		7.54	< .003	
	Nonperformance Time	1	101.40		4.64	< .05	
	Disapprovals	1	.08		0.00	< .95	
	Errors	1	.91		.04	< .84	
	Stops	1	12.20		.56	< .47	
	Teacher Eye Contact	1	87.15		3.99	< .07	
	Complete Teaching Units	1	3.06		.14	< .72	
	Incomplete Teaching Units	1	22.15		1.01	< .34	

RESULTS

Results indicate a strong relationship between off-task behavior and the individual teachers ($p < .003$), nonperformance activity ($p < .05$), and teacher eye contact ($p < .07$). Data show minimal relationships between off-task behavior and disapprovals ($p < .95$), errors ($p < .84$), stops ($p < .47$), complete teaching units ($p < .72$), and incomplete teaching units ($p < .34$). The carrier variables in this model accounted for 81.38% ($R^2 = .8138$) of the off-task variability. A strong relationship exists between the predicted values (represented by the carrier variables data) and the observed values (represented by the percentage of off-task [dependent] variable).

A more detailed examination of percentages of off-task time, approvals, disapprovals, comparing performance versus nonperformance rehearsal time revealed more off-task behavior during nonperformance activity for all six teachers, more performance than nonperformance time for five of the six teachers, more approval during performance for four of the six teachers, and more disapproval during nonperformance for four of the six teachers (Table 2).

Table 3 shows frequencies of academic and social approvals and disapprovals and total approvals and disapprovals. Data show a low frequency of social reinforcement and a high frequency of academic reinforcement. Two of the six teachers were more approving than disapproving.

Table 2—Percentage of Off-Task, Time, Approvals, and Disapprovals during Performance and Nonperformance

Teacher	Performance			Nonperformance		
	Off-Task	Time	Approvals	Disapprovals	Approvals	Disapprovals
A	25.90	38.26	54.16	45.84		
B	13.82	57.68	80.89	19.11		
C	9.52	68.67	45.00	55.00		
D	8.06	55.35	23.84	76.16		
E	6.32	53.63	72.62	27.38		
F	12.30	59.09	24.58	75.42		
Mean	12.65	55.45	50.18	49.82		

Teacher	Performance			Nonperformance		
	Off-Task	Time	Approvals	Disapprovals	Approvals	Disapprovals
A	34.66	61.74	37.60	62.40		
B	26.19	42.32	53.87	46.13		
C	37.11	31.33	48.26	51.74		
D	24.11	44.64	40.67	59.33		
E	23.38	46.37	35.38	64.62		
F	31.94	40.91	21.72	78.28		
Mean	29.56	44.55	39.58	60.42		

Table 3—Frequency of Academic Versus Social Reinforcement; Total Approvals and Disapprovals

Teacher	Academic			Social			Total
	Approvals	Disapprovals	Approvals	Disapprovals	Approvals	Disapprovals	
A	36	52	3	1	39	53	
B	86	32	2	8	88	40	
C	25	30	1	1	26	31	
D	27	57	3	0	30	57	
E	67	50	1	3	68	53	
F	22	66	2	5	24	71	
Total	263	287	12	18	275	305	
Mean	43.83	47.83	2.00	3.00	45.83	50.83	

Data showed that students are most on-task under teachers with most eye contact and most off-task under teachers with least eye contact. There was no discernible pattern in the data concerning frequency of stops. (See Table 4.)

Teaching units were analyzed for completion (Table 5). A unit that contained a student performance response was considered complete. Because the quantity of units varies with the amount of time spent in each activity and because activity is a strong carrier variable, it may not be possible to analyze teaching units as contributors to off-task behavior.

Table 4—Percentage of Off-Task, Frequency of Eye Contact, and Stops

Teacher	Off-Task	Eye Contact	Stops
A	30.75	42	52
B	18.71	108	58
C	17.69	55	38
D	13.42	117	39
E	13.24	95	53
F	20.33	69	47

Table 5—Frequency of Complete Units, Incomplete Units, Errors, and Percentage Off-Task

Teacher	Units			Errors	Off-Task %
	Complete	Incomplete	Off-Task		
A	74	80	13	13	30.75
B	111	64	23	23	18.70
C	48	56	12	12	17.68
D	76	24	3	3	13.42
E	110	72	9	9	13.24
F	71	54	21	21	20.33

DISCUSSION

Because of few rehearsals and great variability among teachers, caution should be used in generalizing the results of this study to other rehearsal situations. However, some strong relationships justify further discussion.

More on-task behavior occurred during performance time than during non-performance time, which supports previous research, indicating that music or activity may be intrinsically reinforcing. During nonperformance there were more disapprovals than approvals. However, because of the low frequency of social reinforcement as compared to academic reinforcement, it may be unwise to conclude that disapprovals increased off-task behavior. Few social tasks were presented or reinforced during these rehearsals. Perhaps future research will focus on teacher effectiveness in social task presentation/reinforcement versus academic task presentation/reinforcement. The dependent variable for social task reinforcement might be attentiveness, and the dependent variable for academic task reinforcement might be performance.

Many incomplete teaching units, those in which the teaching sequence did not include an opportunity for student response, were observed. Many reinforcement errors involving sequence mistakes (reinforcement that had nothing to do with the task presented) were also observed. Regardless of the number of incomplete units and the number of errors, these variables contributed minimally to off-task behavior. To further isolate possible effects of instruction, future research should focus on the relationship of the teaching unit sequence to academic and musical achievement, attitude, and attentiveness. The quality and completeness of teaching units may affect academic and musical learning. Furthermore, academic reinforcement may affect academic learning, social reinforcement may affect attitude and attentiveness, and activity (performance versus nonperformance) may affect attentiveness and musical achievement. Because there may be little transfer from teaching/learning of academic tasks to teaching/learning of social tasks, these effects should be isolated.

Data suggest variables that may contribute to students' attentiveness during nonperformance rehearsal time. For example, eye contact had a strong relationship to on-task behavior because the least teacher eye contact produced the most off-task behavior. Data also showed the absence of teaching and reinforcing of social on-task behavior. Previous research (Madsen & Madsen, 1974) indicated that, with more than 20% off-task behavior in the classroom, academic learning suffers. Therefore, teaching and learning may be more efficient if the social task is taught. The teacher who spent the most time in nonperformance had the most off-task student behavior. The most effective balance of time spent in performance and in instruction should be explored and carefully maintained.

This study may serve as a model for future descriptive research in natural settings. Data may be added to the established computer bank of teaching data. As observations increase, generalizations can be drawn from the results. Because the teaching/learning environments were videotaped, other variables may be added and observed in the future. Recommendations for further analysis include other dependent measures, such as performance quality and student attitude; a comparison of age groups (elementary, junior high, adult) and abilities (professional and amateur); and promising independent carrier variables that are controlled in carefully designed experiments. Promising independent carrier variables from this study are activity (performance and nonperformance) and eye contact.

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October 15, 1980