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ABSTRACT

Nine seventh- and eighth-grade students who had a history of poor math achievement were selected to participate in the study. Base rate data was gathered which indicated the percent of time the students were engaged in behaviors relevant to the assigned academic tasks. During treatment a clock buzzer apparatus was placed in the room, and the students were told that they could earn free-time contingent on concomitant task relevant behavior by all the class members. The clock was allowed to run when the entire class was working on the assigned materials, which provided a visual display of the cumulative earned free-time. When any of the students behaved inappropriately, the clock was turned off and a buzzer was sounded. The group contingent conditions substantially increased the percent of task relevant behavior emitted by the subjects. A treatment reversal reduced the level of appropriate behavior, and reintroduction of group contingencies again markedly increased the group level of task relevant behavior. Alteration of teacher contingencies had little apparent effect on the students' behavior. (Author)

THE EFFECTS OF GROUP CONTINGENT REINFORCEMENT
ON STUDENT BEHAVIOR¹

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Most classroom investigations have focused on the teacher's social behavior as the prime determinant of student behavior. The positive effects of contingent teacher attention or praise on appropriate pupil behavior has been empirically verified with nursery school children (Harris, Wolf, & Baer, 1964), elementary students (Zimmerman & Zimmerman, 1962), and secondary students (Cormier, 1970). Although the manipulation of teacher attention to individual students has produced generally predictable results, recent studies which have assessed the behavior of an entire class suggest that a group contingent reinforcement may be a more efficient technique for achieving classroom control.

Group contingent procedures have usually been directed toward reducing the frequency or intensity of inappropriate behavior. Sulzbacker and Houser (1968) demonstrated the effects of group contingent reinforcement with a class of educable mentally retarded students who were exhibiting a wide variety of inappropriate behaviors. Alteration of the contingencies so that the occurrence of any of the target behaviors cost the group a portion of an anticipated recess was effective in greatly reducing the frequency of the unwanted behaviors. A somewhat similar response cost system was successful in reducing the level of classroom noise produced by a class of elementary students (Schmidt & Ulrich, 1969).

A recent detailed study (Packard, 1970) utilized a timer and red light to control group behavior in the classroom. The timer was allowed to run as long as the entire class was fulfilling the stated definition for "attending"

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behavior. When any of the students behaved inappropriately the teacher stopped the timer and turned on the red light, which signaled the class that a transgression had occurred. Fulfilling the set criteria of attending time earned the class points, or tokens, which could be exchanged for a variety of preferred activities. The group contingent procedures were successful in substantially increasing the percentage of student attention within the classroom.

The current study appraised the effect of group contingent reinforcement procedures on task relevant student behavior with teacher response contingencies experimentally controlled. In none of the previous group contingent investigations was the teacher's social behavior monitored or controlled during the various phases of the study. It is certainly possible that the implementation of group contingent procedures altered the teacher's reactions to individual students which, consequently, also contributed to changes in the respective dependent variables. A secondary objective of the present study was to assess the effect of group contingent reward on interaction among students in the class, the major focus being on how peers react to a student whose behavior jeopardized the group's reward.

METHOD

Subjects

A class of nine junior high school students who were attending summer school for remedial mathematics instruction participated in the study. All SS were of at least average intelligence according to standard IQ tests, and averaged 1.9 years below grade level in mathematics as measured by the Wide Range Achievement Test.

Apparatus

The experiment was conducted in a partially screened portion of a team-teaching complex equipped with facilities for nine students. An electric

clock 14 inches in diameter was mounted and placed on a table directly in front of the students. The clock was controlled by a remote switch connected to a 30-foot cable which allowed the teacher to start and stop the clock while moving about the room. An electric buzzer was mounted in the back of the clock and electrically connected to the system so that when the clock was turned off the buzzer (minimally audible) could be sounded continuously.

Observation Procedures

The Ss were in school from 9:00 A.M. to 11:00 A.M. each day. During baseline, one hour of classroom behavior was video-taped according to a random schedule of four 15-minute time blocks. When the experimental conditions were in effect all in-class behavior except free time activities were recorded. All observation was done by graduate students exclusively on the video tapes. The behavior of each student and the teacher was monitored for the duration of each tape. Each observation period was divided into five-second intervals, with the observer recording the first behavior that occurred in each interval. Observer reliability ranged from 82-98%, with a mean agreement of 91%.

Subject behaviors were scored in one of three categories: (1) Task relevant behavior-- S performed in accordance with teacher assigned activity. (2) Non Task relevant behavior-- S was engaged in a behavior which could not be scored task relevant, but which did not involve any interactions with a peer. The category usually identified the S as out of seat without permission, or just sitting there. (3) Interacting behavior-- S had verbally or non-verbally attended to a peer. This category was scored with a suffix to indicate whether the peer was engaged in task relevant or non task relevant behavior when the S attended to him.

Teacher behavior was also scored in one of three categories.

(1) Attending actions, which indicated the teacher had verbally or non verbally attended to a S or his academic materials. This category was scored with a suffix to indicate whether the S was engaged in task relevant or non task relevant behavior prior to the teacher's attention. (2) Instructional behavior, in which the teacher gave academic instructions to two or more students. (3) Neutral behavior, which usually described the teacher as reading or working at her desk.

Treatment Implementation

The experiment consisted of five treatment phases: baseline, group contingent reward, group contingent reward plus teacher contingent attention, and group contingent reward. Each phase of the study lasted for five days.

Prior to the collection of baseline data, the teacher and the students were allowed a two-day acclimation period in which to become accustomed to the classroom environment and the mathematics materials. The video tape-recording equipment and the clock-buzzer apparatus were introduced to the Ss by telling them that we (teacher and experimenter) were interested in recording the kinds of behaviors that went on in the classroom. The students were told that the clock would be used in a special project with them the next week. During baseline the teacher was asked to avoid interacting with the students individually and emit group instructional behavior only.

At the beginning of the second treatment phase, group contingent procedures were introduced to the Ss by the teacher's giving them the following instructions.

I want all of you to look at the clock in the front of the room. It works just like any other clock (demonstrated). I am going to use it to give all of you a chance to earn free time. As long as the clock is running all of you are earning free time, and the clock will show you how much free time you have earned.

As long as everyone in the class is doing what they are supposed to be doing, the clock will keep running. These are the kinds of behaviors which will keep the clocking running: Reading, writing, listening, being in your seat, etc. (Teacher lists behaviors on the board and operationally defines them).

Now let's talk about the kinds of behavior which might cause the clock to stop and the buzzer to sound. When you hear the buzzer it means someone in the class might be banging things, asleep or talking without permission. (Demonstrates and discusses.)

The way our experiment will work is when the clock shows you have earned enough free time to last until 11 o'clock you all may stop work and get your free time. During free time you may talk with friends, play games, watch television, go to the library, or any other activity which doesn't disturb others.

During the group contingent phase the teacher was instructed to stop the clock and sound the buzzer when any behavior which could not be scored as task relevant occurred. When it became necessary to stop the clock and sound the buzzer, the teacher was instructed to stand quietly and scan the room until she was satisfied that the entire group was engaged in task relevant behavior. The clock was then restarted.

In the third phase of the experiment, the group contingencies described above remained in effect. The teacher was additionally instructed to emit verbal and non verbal attention to individual students who were engaged in task relevant behavior.

Following the combination group and teacher contingent portion of the

experiment a partial reversal (fourth) phase was introduced. The clock-buzzer apparatus remained in position, but the Ss were told that it would not be used. However, the Ss were also told that they would still be given 57 minutes of free time every day (57 minutes equalled the mean amount of free time earned during Phases II and III). In effect the students were given a noncontingent reward. Consistent with the preceding phase, the teacher continued to emit verbal and non verbal attention contingent on task relevant behavior by the Ss.

Group contingent procedures were reintroduced for the final week of school. Procedures were identical to original group contingencies introduced in Phase II. The teacher was asked to once again become an essentially neutral stimulus; i.e., she ignored appropriate and inappropriate behavior as much as possible and issued group instruction only.

RESULTS

The group mean percentages for task relevant and non task relevant behavior for each day of the study are shown in Figure 1. Both categories were quite stable during baseline (BL) with five-day means of 67.0% for task relevant behavior and 12.8% for non task relevant activities. The introduction of group contingencies (GC-1) had an immediate marked effect on the Ss' behaviors. The task relevant category increased to a 90.2% mean for that phase, and the non task relevant category decreased to a 4.4% mean for the same phase. Addition of teacher-attention contingencies in the following (TA-GC) phase had little apparent effect on the Ss' performance, and the means for the two behavior categories were 89.5% and 6.6% respectively.

 Insert Figure 1 about here

Group contingencies were removed for the next five days, and the

groups' magnitude of appropriate behavior tended to decrease even though the teacher-attention (TA) contingencies remained in effect. Neither of the two behavioral categories reverted to BL measures, but there was a substantial decrease in task relevant behavior (mean of 78.9%) and an increase in non task relevant behavior (mean of 10.5%). Reintroduction of group contingencies (GC-2) and reversal of teacher contingencies resulted in a noticeable increase in task relevant behavior to 94.0% and a decrease to 3.5% for the non task task relevant category.

In order to identify any possible differential response by sex to the treatment conditions, the E's analyzed task relevant behavior for males (N = 5) and females (N = 4) separately (see Figure 2). There were noticeable sex differences for two of the treatment conditions. The males emitted a much smaller percentage of task relevant behavior during the BL and TA phases than did the females. The introduction of group contingent reinforcement procedures practically eliminated the difference between the two groups.

 Insert Figure 2 about here

Analysis of peer interactions revealed that S attention to both task relevant and non task relevant behavior occurred at a relatively low frequency throughout the study. However, the changes in each category followed the same general trend, i.e., S attention to both appropriate and inappropriate peer actions decreased when GC-1 was introduced, maintained approximately the same level in the following TA-GC phase, increased during TA conditions, and once again decreased when GC-2 was introduced (see Figure 3). There appeared to be substantially more attention to inappropriate behavior (mean of 10.5%) than attention to task relevant behavior (mean of 4.5%) during BL, somewhat more attention to inappropriate behavior (mean of 6.6% than to task relevant

behavior (mean of 3.2%) during the GC reversal, and practically no attention to either during the other treatment phases.

 Insert Figure 3 about here

The teacher's daily percentage of attention to task relevant behavior was plotted with the Ss' daily percentage of task relevant behavior in Figure 4. It is apparent that the teacher's behavior fluctuated substantially during most of the experiment. Teacher attention to task relevant behavior varied more than 50 percentage points during BL, with a mean occurrence of 26.2%. A similar level (mean of 23.7%) of contingent teacher attention was maintained during the GC-1 phase, but a substantial increase (mean of 49.3%) occurred under TA_GC treatment conditions. The teacher failed to maintain her level of contingent attention in the TA phase and the mean dropped to 33.5%. The final group contingent phase produced the lowest level of teacher attention with a mean of 10.2%. There was no apparent relationship between the Ss' percentage of task relevant behavior and the teacher's attention to that behavior in phases GC-1, TA-GC, and GC-2. However, the reduction in contingent teacher attention from the TA-GC phase to the TA phase may have been partially responsible for the concomitant drop in the group's level of task relevant behavior.

 Insert Figure 4 about here

The amount of free time earned by the group ranged from 53-59 minutes with a mean of 57 minutes. The variance in the daily amount of free time earned was primarily due to the class starting to work at different times rather than to penalty time, i.e., the maximum total time the buzzer was sounded on any one day was 32 seconds.

The Ss utilized the free time to participate in a variety of activities. Some of the students consistently tutored third- and fourth-grade children in reading for a half-hour each day. Others played cards, watched television, or listened to music. Two girls participated in a "How to Study" course the second half of the summer session. The favorite free time activity for all Ss was the daily 20 minute bingo game, probably because candy and chewing gum were offered as prizes. In spite of spending about half of each school day participating in free time activities, there was no apparent evidence of reinforcer satiation effect.

Although the group effects appeared stable and predictable, there was substantial inter- and intra-subject variability in some phases of the study. Daily percentages for each S's task relevant and non task relevant behavior are presented in Figure 5. Subject 1 was not clearly under experimental control although the level of task relevant behavior increased from BL. Subject 2 responded consistently to the changes in contingencies, but was absent during the GC reversal phase which made experimental control also questionable. An entirely different response pattern was illustrated by S3, who reacted immediately to the first GC phase and maintained her high level of performance the rest of the study, with only a slight decrease in task relevant behavior during the TA phase.

 Insert Figure 5 about here

Subject 4 and 6 differentially responded to the alterations in contingencies, but indicated some within phase variability. On the other hand, Subject 5 was clearly not under experimental control and her profile for task relevant behavior was quite variable. It was likely that the excessive absences from the study by S5 contributed to her inconsistent response pattern.

Subjects 7, 8, and 9 tended to respond immediately, and consistently, to the successive treatment conditions. These three Ss (all males) clearly illustrated a marked group contingent reversal effect during the TA phase, but responded quickly to the reimplementation of the final group contingencies phase.

DISCUSSION

This investigation provided further evidence to support the effectiveness of group contingent reward procedures in altering classroom behavior. The findings indicated that when sufficient incentive conditions were present, the teacher's attention to task relevant behavior had little influence on student behavior.

An analysis of baseline conditions indicated a pattern of wide intra-subject variability, which was consistent with earlier findings (Cormier, 1970; Packard, 1970). The group mean task relevant behavior was remarkably consistent from day to day during baseline, although the means appeared to be unusually high, suggesting that of other variables were contributing to the high level of appropriate behavior. The combination of a relatively new, carpeted, air-conditioned school, and the presence of a stimulating variety of programmed books and tapes, apparently produced a stimulus setting which positively enhanced the behavior of the students.

The first and second introduction of group contingent procedures were successful in raising the level of appropriate behavior from the preceding phases. The free time provision, and the use of the buzzer to signal an incident of inappropriate behavior provided powerful control over the classroom behavior. The buzzer appeared to act as a discriminative stimulus for appropriate behavior, rather than as a cue to modify a peer's behavior. At no time did the Ss act to suppress a peer's inappropriate actions.

The reinforcing value of the earned free time seemed apparent, but the aversive qualities of the buzzer were not precisely evaluated. On one occasion, near the end of the experiment, some of the Ss complained about working under the "pressure of the buzzer". They were then offered the options of going back to baseline conditions or continuing to be monitored by the clock-buzzer apparatus. The Ss chose to stay with the clock.

The addition of contingent teacher attention to the existing group contingent conditions appeared to have little effect on the student's behavior. There are two possible explanations for the lack of effect. First, the teacher was attempting to act as a relatively neutral stimulus prior to this treatment, and she may have had little reinforcing potential for the students when this phase began. Second, during the previous phase (group contingencies only) the students may have associated the teacher more with the buzzer than the clock. The teacher may have become a discriminative stimulus for an aversive event. Therefore, her attention may have had little reward value.

The slight decrease in task relevant behavior in the TA-GC phase probably occurred because the Ss appeared to be able to discriminate when the teacher was closely attending to a peer, and they could display mild non task relevant behaviors without the buzzer being sounded.

The group contingent reversal in the TA phase produced a substantial drop in group performance. However, the magnitude of contingent teacher attention decreased about 16% from the prior phase and may have also contributed to the lower frequency of S task relevant behavior. On the other hand, since the teacher had been instructed to continue attending to task relevant behavior during the TA phase, the decrement in her attention to appropriate behavior may have been simply a function of having less task relevant behavior to which to attend. In any case, the student's behavior

was not comparable to that of the preceding TA-GC phase, but was above the base line level. In addition to teacher attention to appropriate behavior, two other aspects of the setting may have prevented a complete return to baseline performance: (1) the clock-buzzer apparatus was left in the room and may have continued to cue appropriate behavior; and (2) since the teacher had previously been associated with individual monitoring procedures, her presence may have suppressed a great deal of inappropriate behavior.

These data support the efficacy of group contingent reinforcement procedures in the junior high school classroom. A relatively inexpensive device that allows the students to visually monitor the accumulation of a reward, and provides an audio signal for inappropriate behavior appears to give the classroom teacher a powerful technique for group control. An audio signal is probably more efficient than the visual cue used by Packard (1970) since the former would be more readily noticed, and the act of recognition itself would not require an action (e.g., looking away from an academic task) that could be deemed inappropriate.

There are several aspects of group contingent procedures which require further investigation. This study should probably be replicated in a more normal classroom setting which might allow for an investigation of the peer interaction following an aversive signal, as well as the precise effect of group contingencies on the qualitative and quantitative aspects of academic tasks. Also, a slightly altered research design might more adequately compare contingent teacher attention with group incentive procedures. In this case, group contingent reward appeared to provide enough systematic control so that contingent social interaction by the teacher had a negligible effect on student behavior.

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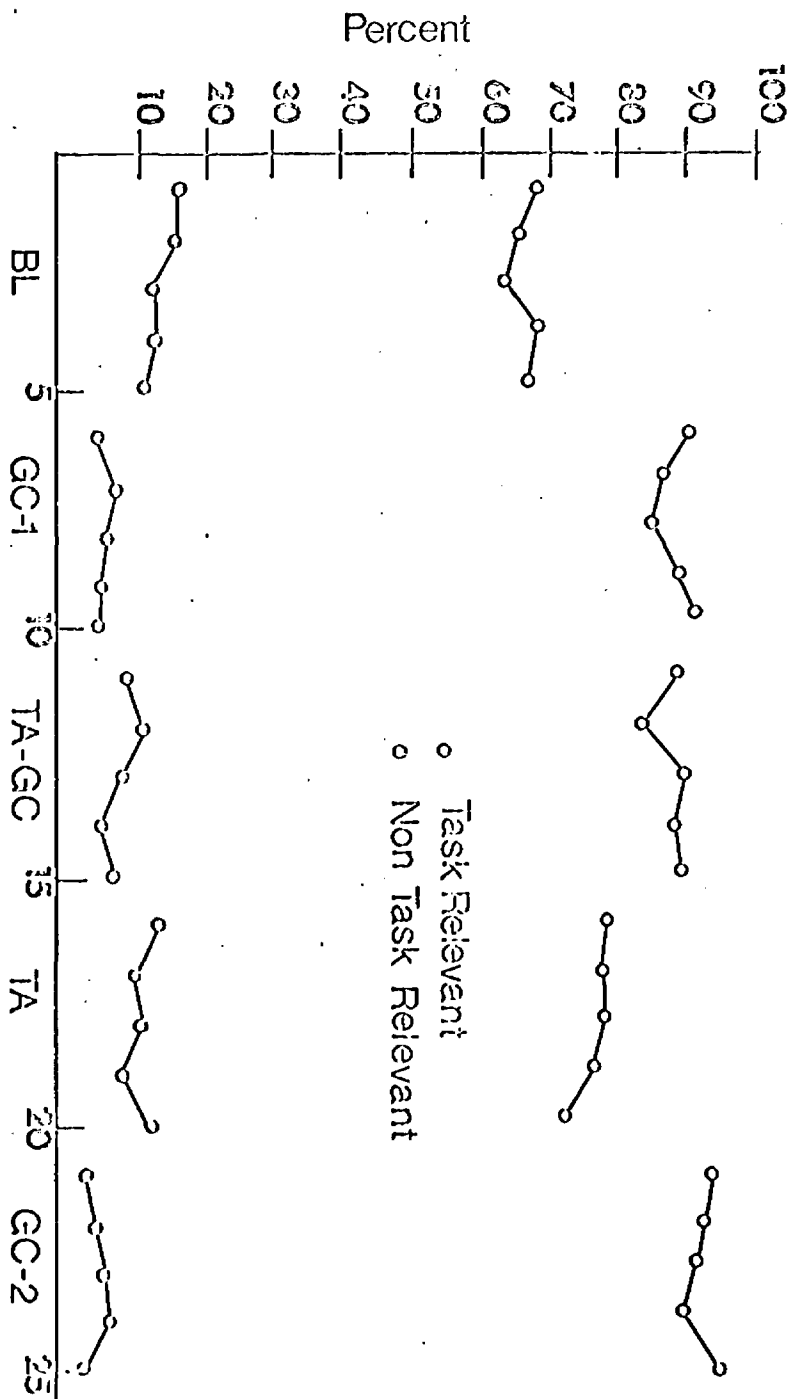
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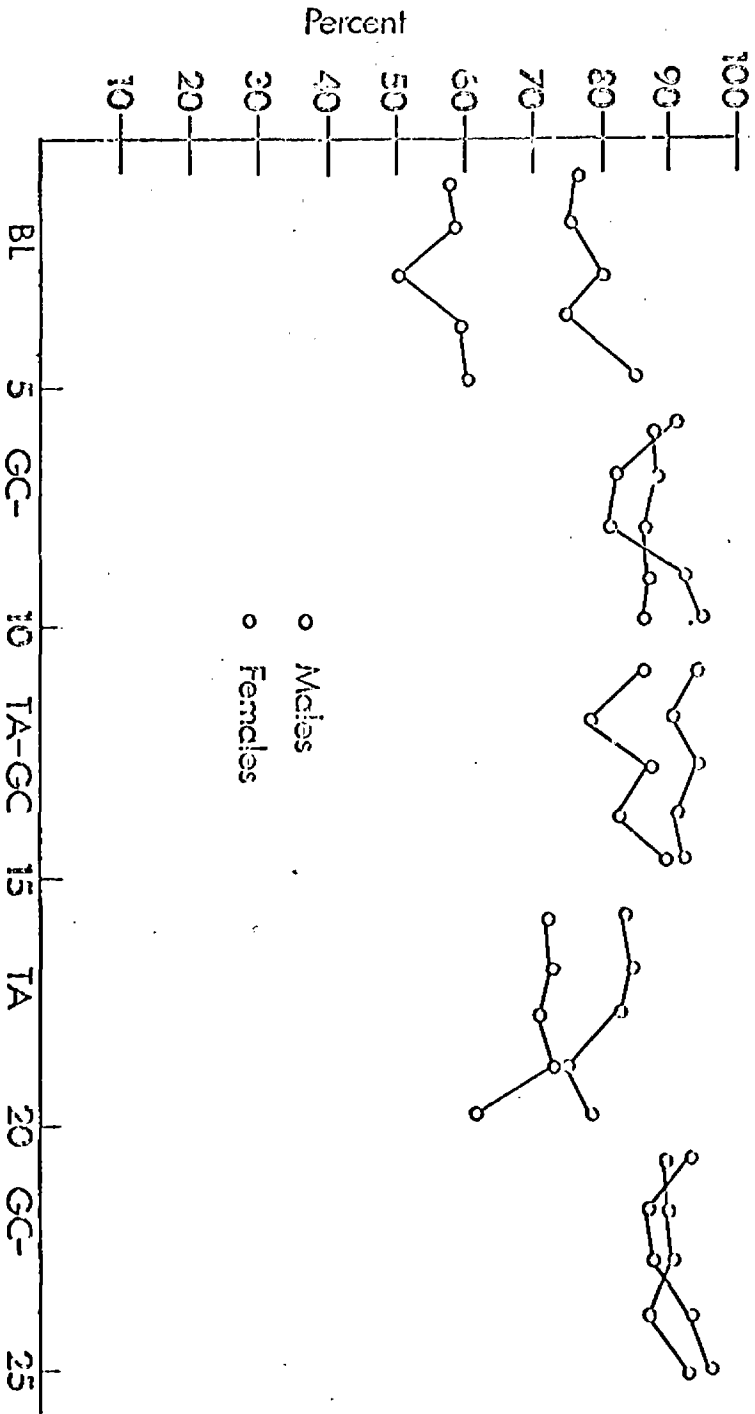
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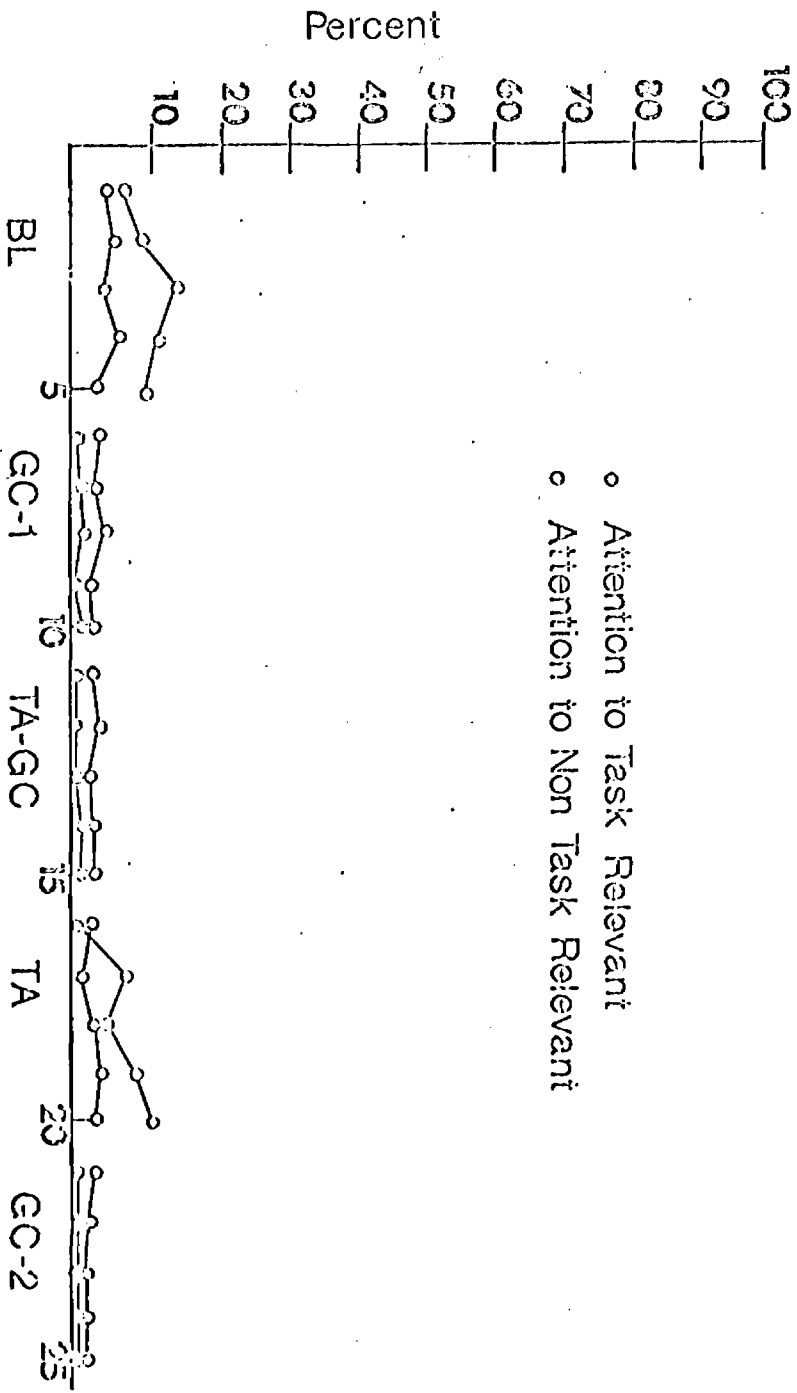
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5. Subject Task Relevant and Nontask Relevant Behaviors as a Function of Experimental Conditions.

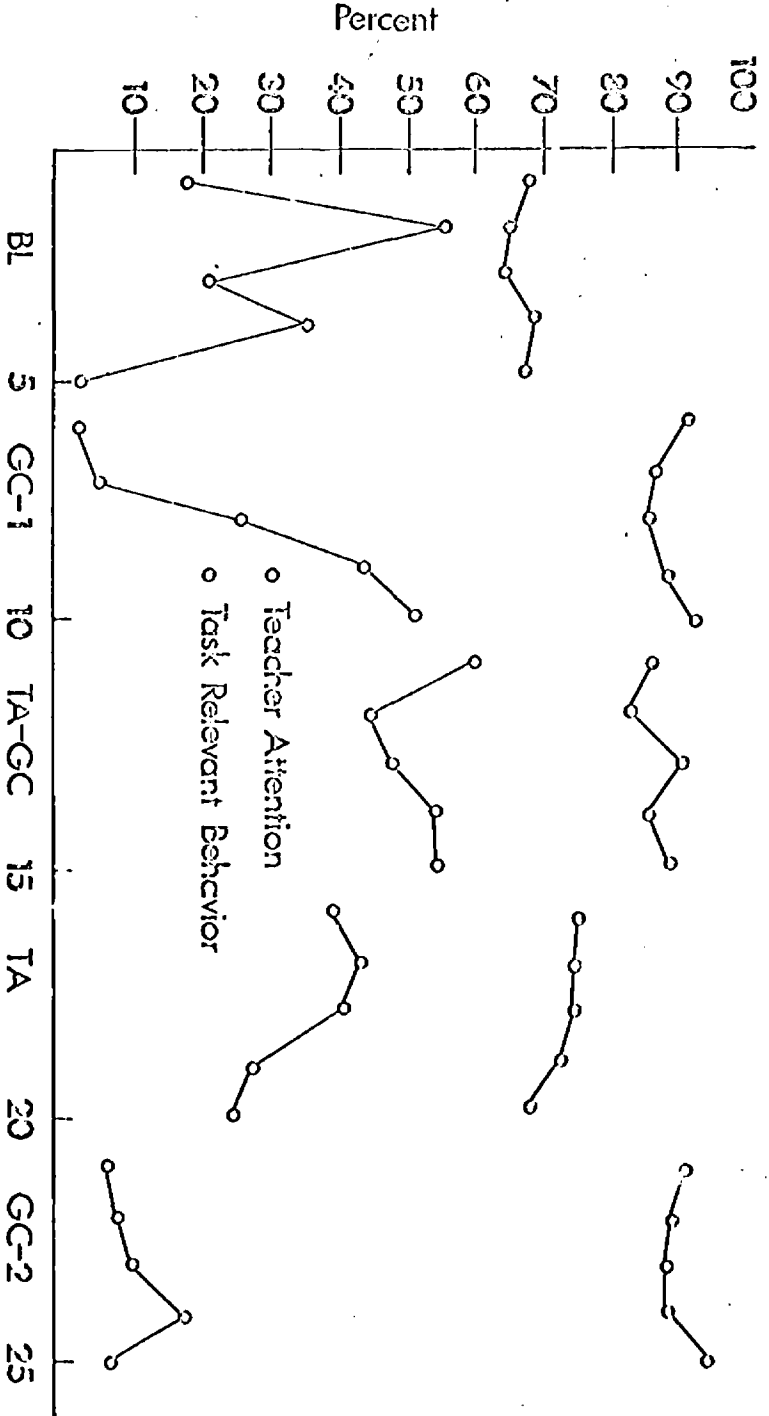


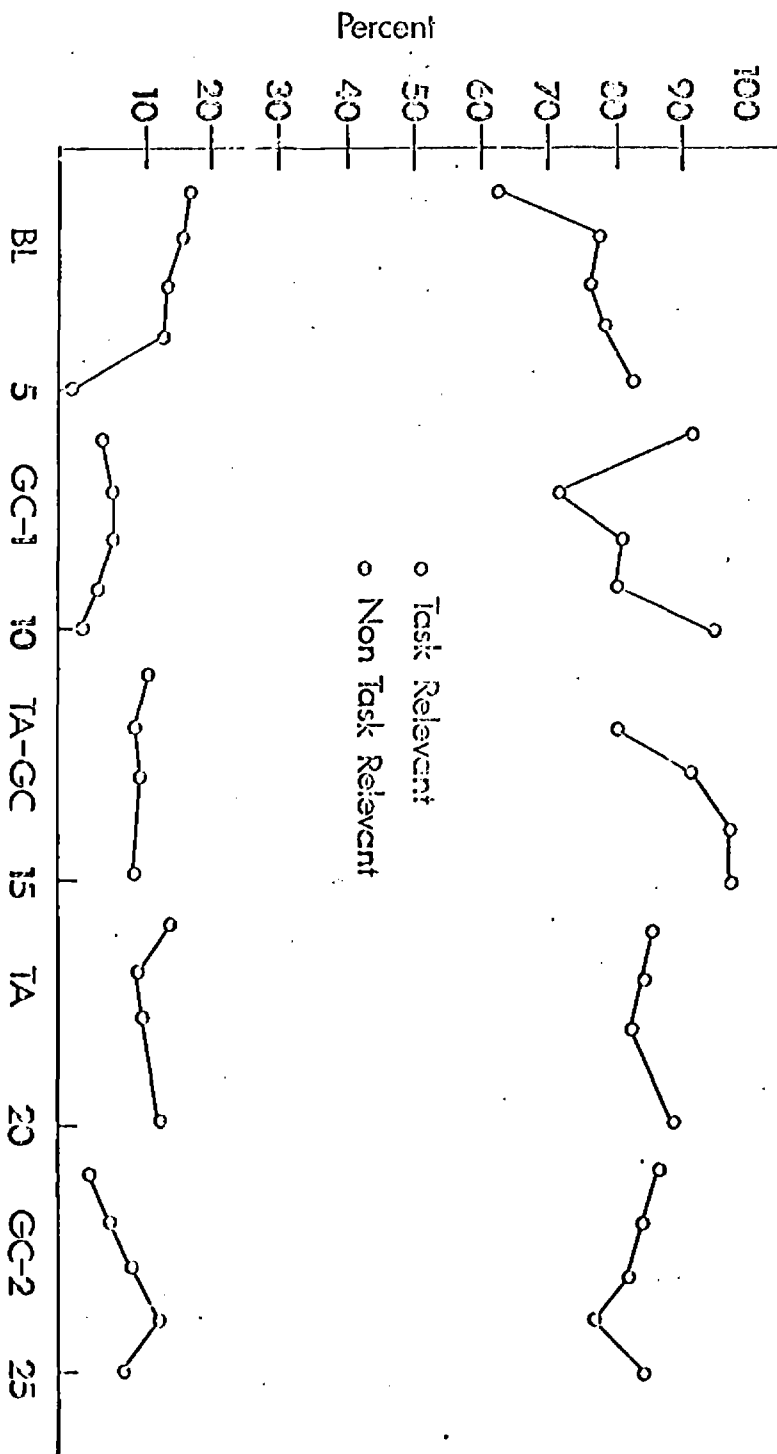


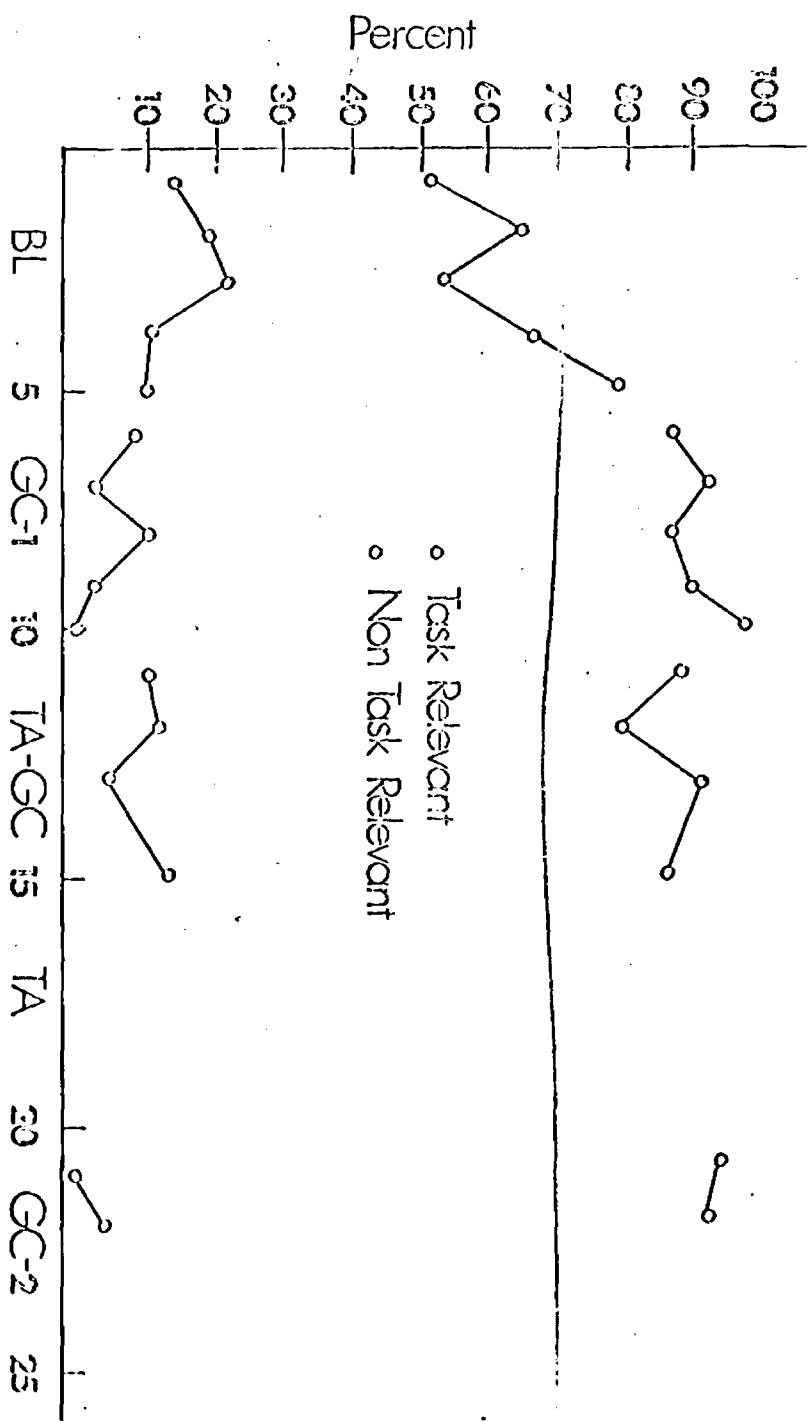


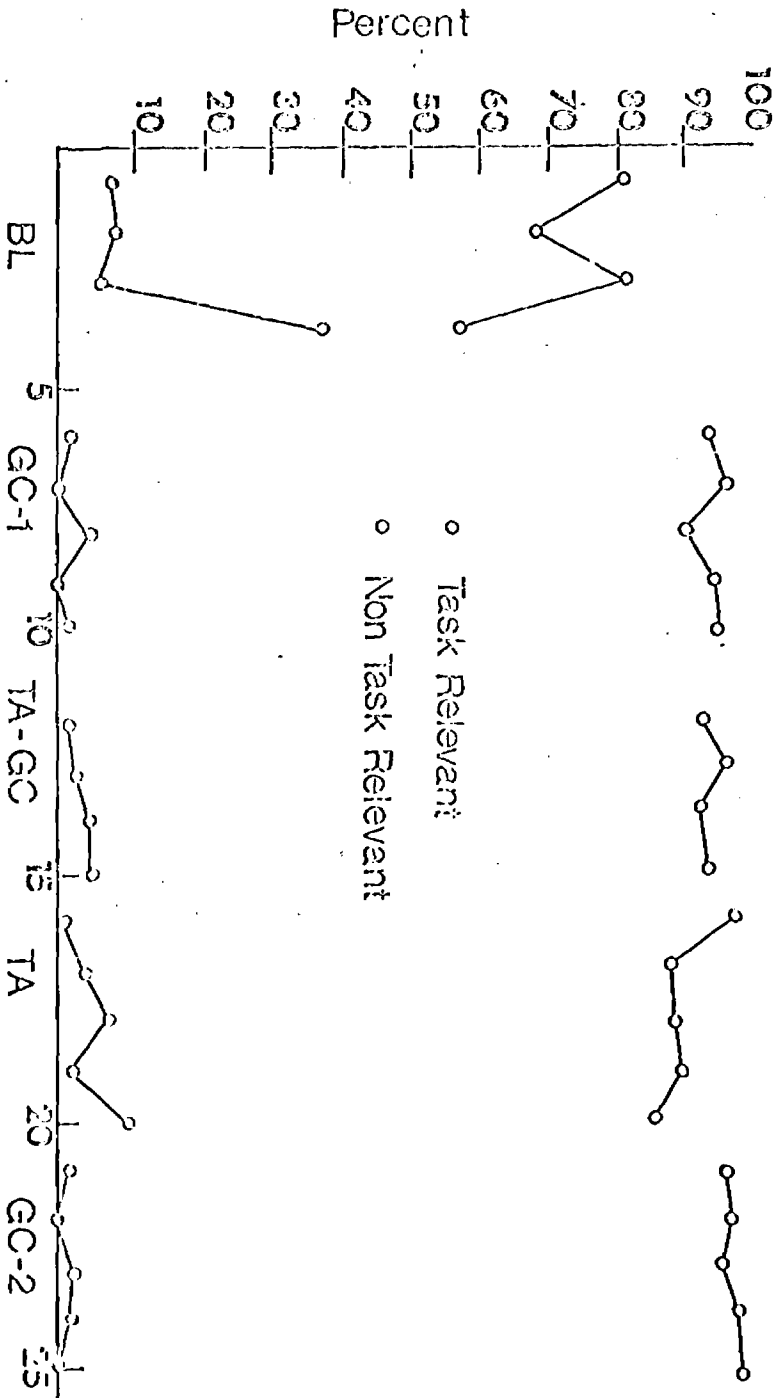
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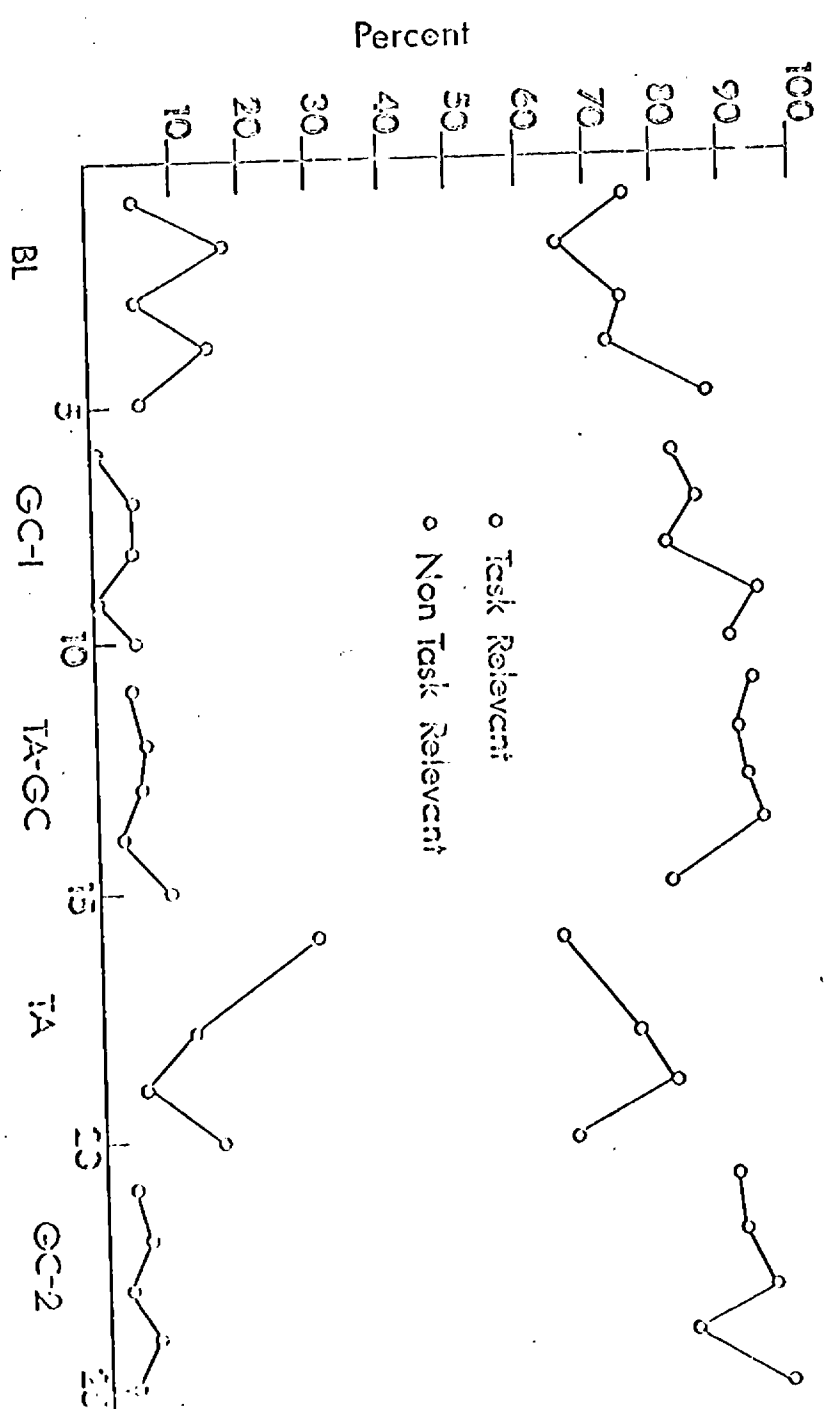




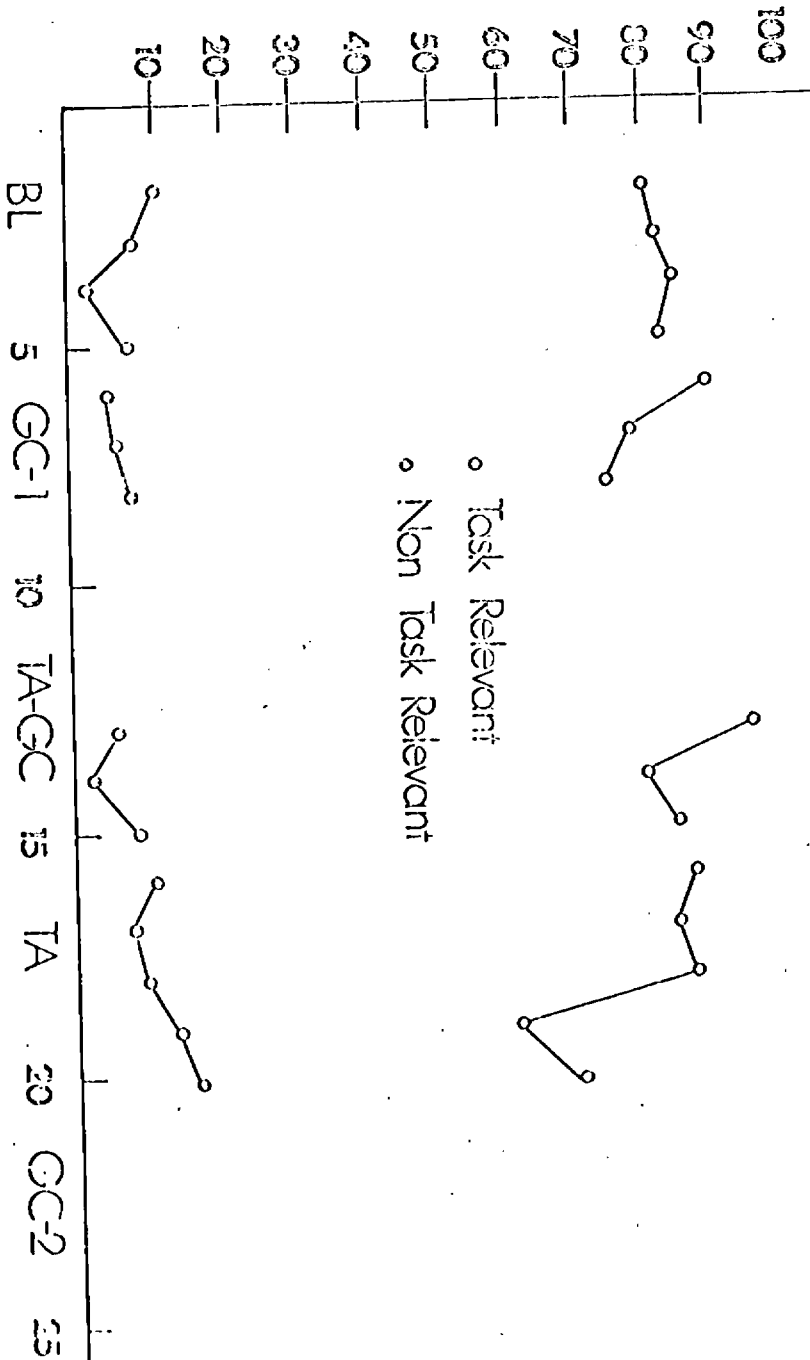




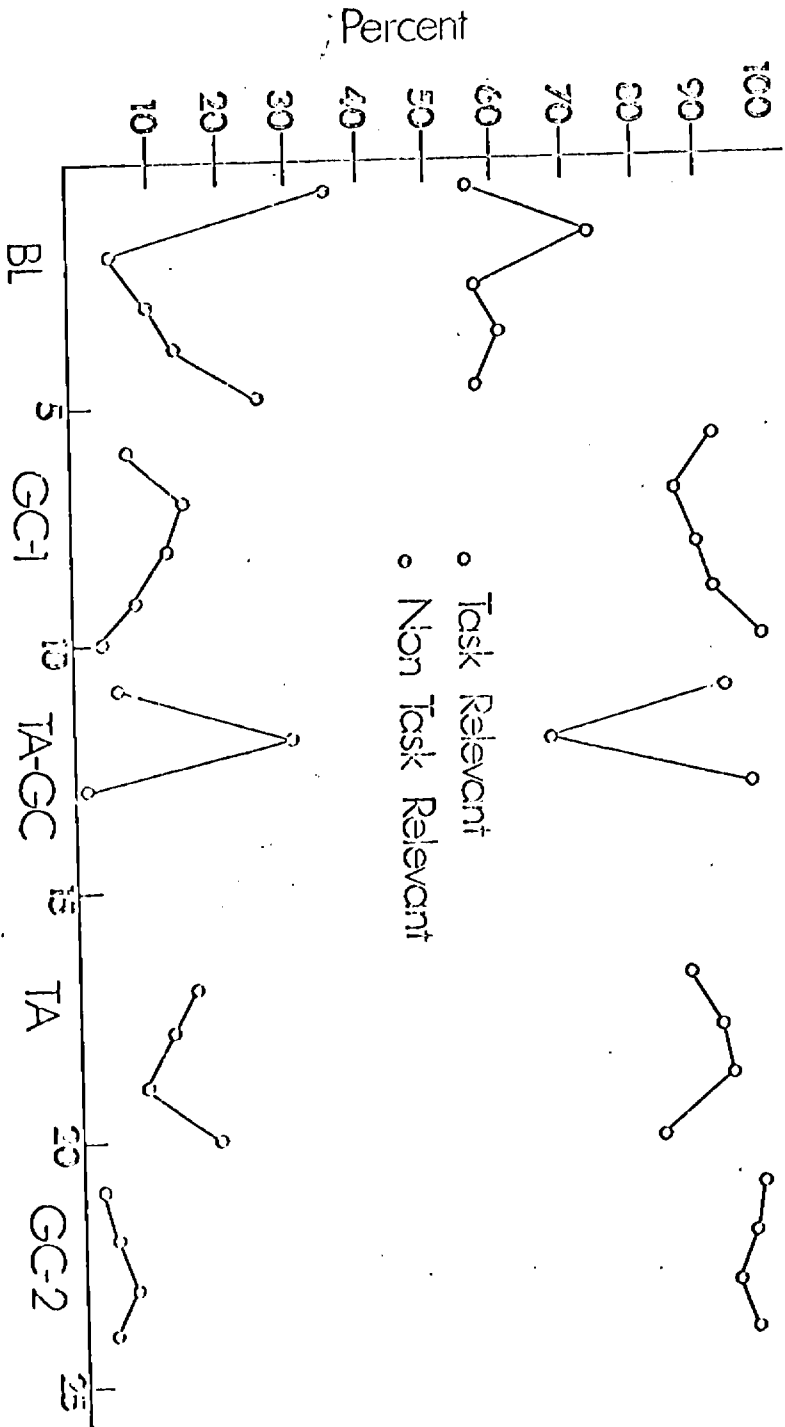
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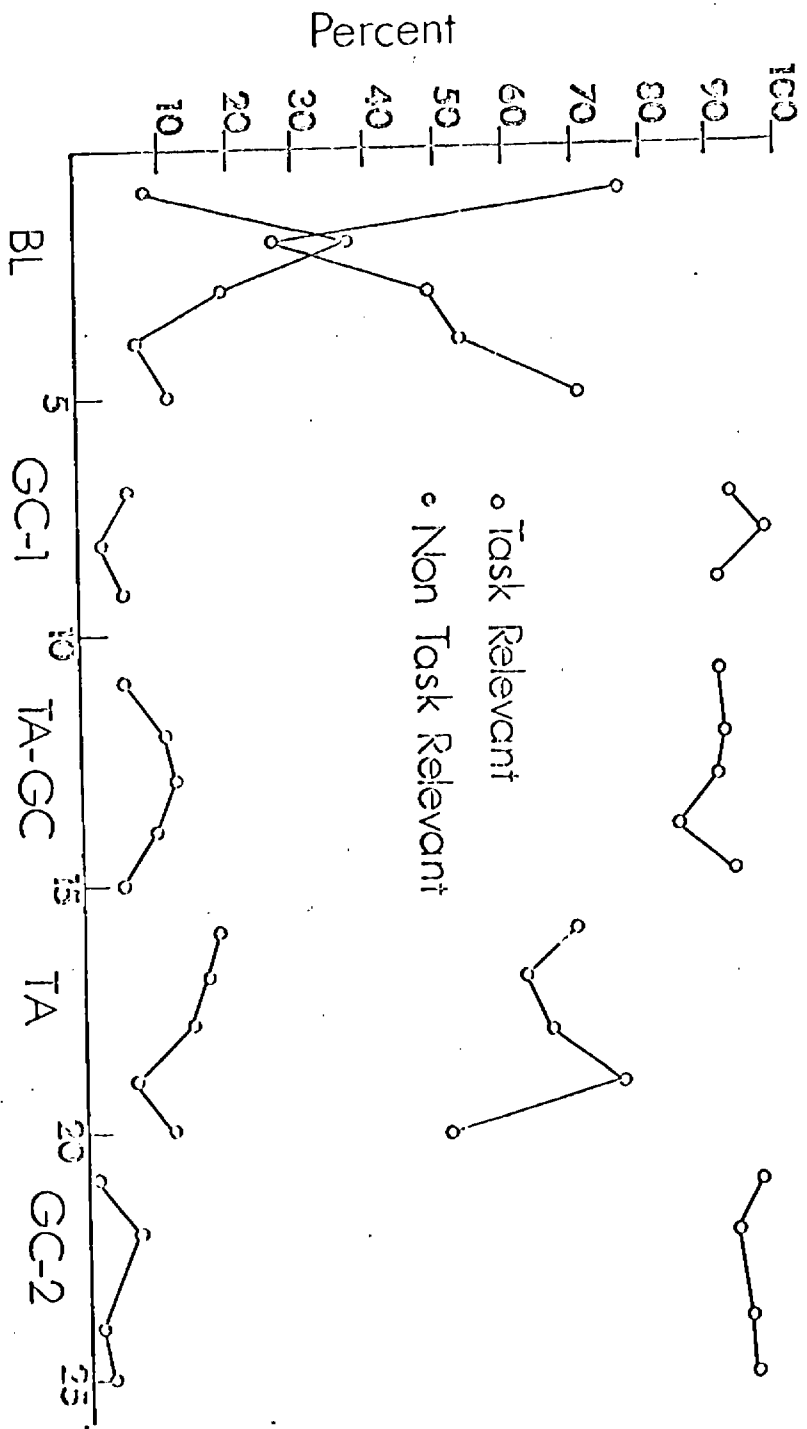


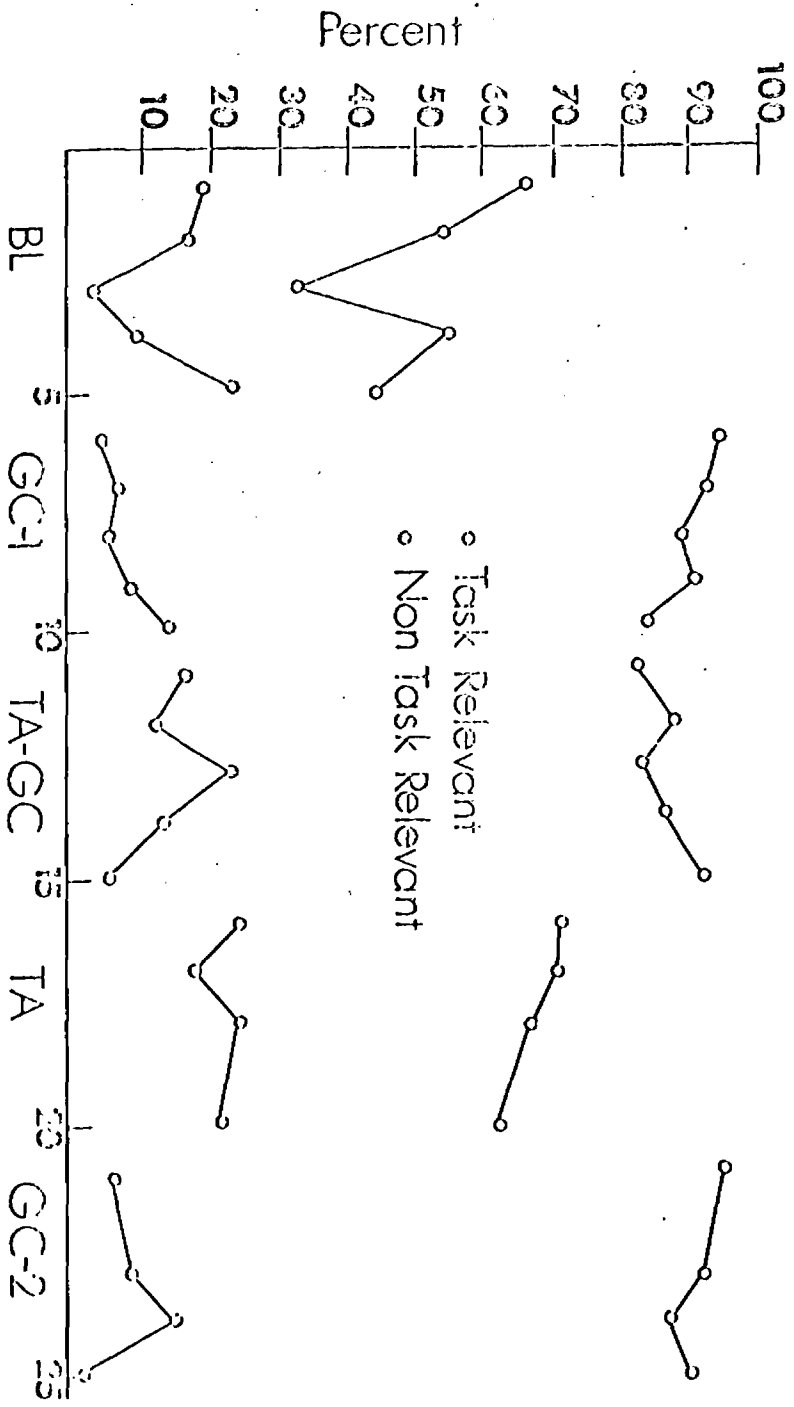
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