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ABSTRACT
                This study attempted to determine if the achievement
of fourth grade students with high or low dominance characteristics
would be affected by differing social reinforcers during a study of
multiplication facts using a CAI system. The experimenter identified
the high and low dominant students by means of a group personality
test developed by Porter and Cattell. The students in each category
were then randomly assigned to two treatment groups. One group
received both praise and reprimand from the computer while the other
group received reprimand only. The results of the experiment
indicated that the use of reinforcement patterns of praise and
reprimand alone did not affect achievement in a relatively
short-range CAI study with high and low dominant fourth grade
students. The experimenter suggests that prior to the use of CAI for
instructional purposes, long-range studies of
social-reinforcer-personality-trait relationships should be
implemented. [Not available in hardcopy due to marginal legibility of
original document.] (Author/RL)

A STUDY OF THE USE OF CERTAIN SOCIAL REINFORCERS

IN COMPUTER-ASSISTED INSTRUCTION

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Classroom teachers, in reacting to student responses,
frequently use more words than"right" or "wrong". These
teacher responses are often augmented by words of praise,
such as "Good work", or of reproof such as "Don't get
careless now." These words of praise and reprimand (reproof)
are sometimes called social reinforcers. Apparently the
choice of appropriate reinforcers is based upon many
variables besides the accuracy of student responses. It is
very possible that two students who give correct responses
to questions of relatively equal difficulty will receive
dramatically different social reinforcers. One might be
given lavish praise, while the other would not. Teachers
often defend such differentiation of the basis of student
personality. One hears such teacher statements as "Johnny
needs confidence and I give him all the encouragement I can"
or "Mary is self-sufficient; I need not do anything extra
in order to motivate her." Since the best models to follow
in developing programs for computer-assisted instruction
(CAI) are probably the behavior patterns of "live" teachers
and since, teachers deem social reinforcers to be important,
it seems reasonable to assert that a workable strategy for·
the selection and presentation of social reinforcers is

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out.

needed for CAI, and it would seem that the presentation
of reinforcers should not only be related to the accuracy
of responses but to the personality of the learner as well.

Stolurow (1) suggests that CAI systems use the student's
ability, personality, and knowledge in making decisions
while the student is learning. Past research (which may
not be directly applicable to the CAI situation) offers
few guidelines because, as recent survey shows, only a few
studies took personality into consideration (2). Frase (3),
however, found that reproof alone was more effective than
praise for aggressive college students studying logic
materials from programmed textbooks. His research also
led him to conclude that "....social reinforcement phenomena
(with printed stimulus materials) observed in a programmed
learning task demonstrated the same characteristics as
reinforcement phenomena observed under direct verbal
interaction of $\underline{E}$ and $\underline{S}$." (4)

This study sought to determine if the achievement of
fourth grade students at the Indiana State University
Laboratory School with high or low dominance characteristics
would be effected by differing social reinforcers during
their study of the multiplication facts through a CAI
system. (5) The authors of the group personality test
used in this study (6) use the terms assertive, independent,
aggressive, and stubborn to describe high dominant children
identified by the test and obedient, mild, conforming and

submissive for the low dominant. Thus the former would tend to be similar to the aggressive students studied by Frase. Because of the evidence to suggest that the aggressive would do better with reprimanding reinforcers alone and the belief that the low dominant might be inhibited by reprimands alone and tend to respond better to total guidance, the reinforcement patterns of reprimands alone (for incorrect answers); and praise (for correct responses) and reprimand (for incorrect) were used.

The Students

The ISU Laboratory school serves an urban attendance district in Terre Haute, Indiana, for the Vigo County School Corporation. The students chosen for this study were from the two fourth grade rooms and ranged in age from 9 to 11 years. Sixty-five percent of the students were 9 years old at the inception of the study and one student was 11 years old. Nine were boys and 11 were girls. Their Lorge-Thorndike non-verbal IQ scores ranged from 74 to 128 with a mean of 102. In their classrooms, the students were divided into equal groups according to mathematical ability, one of the teachers taught all of high ability students, the other taught the remainder. The teachers used the same textbooks and re-markably similar methods of teaching.

The CAI System

The computer-teacher in this study was an IBM Model 1130 which was programmed to present the multiplication

facts, one at a time, via its console-typewriter, judge

the student response which was also typed in, write a

reinforcing statement and give the correct answer if

necessary. A more detailed description is given in an

earlier article. (7)

The phrases used as social reinforcers were:

GOOD

FINE

YOU ARE DOING VERY WELL

RIGHT

VERY GOOD (Student's name)

NICE WORK (Student's name)

GOOD WORK

CORRECT KEEP IT UP

YOU ARE DOING VERY WELL

KEEP UP THE GOOD WORK

NO. XX IS THE RIGHT ANSWER

ERROR, XX IS THE RIGHT ANSWER

THINK, XX IS THE RIGHT ANSWER

THAT IS NOT VERY GOOD, XX IS THE RIGHT ANSWER

THAT IS NOT THE RIGHT ANSWER, XX IS THE RIGHT ANSWER

WRONG, XX IS THE RIGHT ANSWER

WRONG, XX IS THE RIGHT ANSWER TRY AGAIN

If, during the course of the teaching session, a student

answered an item correctly five consecutive times, the item

would be retired and the following message typed:

CONGRATULATIONS, THIS PROBLEM WILL NOT BE ASKED AGAIN TODAY.
On the other hand, if a student answered an item incorrectly
three times, the item would again be retired and this
message presented after a statement of reproof from the
above list: YOU NEED HELP WITH THIS ITEM? PROBLEM, I WILL
NOT ASK IT AGAIN TODAY. These statements indicating item
retirement were another source of social reinforcement.

The multiplication facts were presented randomly
within categories of difficulty. The student would then
type in an answer. If it was correct the computer would,
at the option of the experimenter, randomly select and print
one of the phrases of praise from the list above. If the
answer was not correct a reprimand could be typed along with
the correct answer. The reinforcement options available
were praise, reprimand, both, or neither.

Procedure (8)

A timed test over the 100 multiplication facts was
administered to the fourth graders described previously.
Students with scores which indicated a non-mastery of the
facts as the five second recall level were given the group
personality test previously mentioned. The tests were
hand scored and the national norms given in the test manual
were used to identify the high (70th decile and above)
and low (40th decile and below) dominant. children.

The twenty students selected were again tested over
the multiplication facts (the pre-test) and were then each

given four 20 minute sessions with the CAI system. The
sessions were about a week apart. They were tested again
a week after the termination of the sessions (post test) and
11 weeks later (retention test). The tests were machine
scored and the responses analyzed by the ISU Research and
Testing Center which reported Kuder-Richarson Formula 20
reliability coefficients of .89,.95 and .97 respectively.

The students in each category of high-low dominance
were randomly assigned to two treatment groups. One group
received both praise and reprimand from the computer-teacher
while the other received reprimand only. The means of the
test scores for the students assigned to each cell are
given by Table 1.

MEANS OF ACHIEVEMENT TEST RESULTS

Dominance	Reinforcement					
	Praise and Reproof			Reproof alone		
	pre	post	ret'n	pre	post	ret'n
High	44.8	73.0	77.4	59.4	86.6	82.4
Low	47.2	70.0	68.6	42.0	67.3	64.0

Table 1

An analysis of variance design assuming a fixed model
for three factors (dominance, reinforcement, achievement)
with repeated measures on the third factor (achievement)
was utilized. The results were analyzed according to a
computational procedure described by Winer (9). Since the
scores of two students were not available for the retention
test, all their scores were deleted from the data and an

unweighted means computation utilizing the harmonic mean
was used in order to compensate for the unequal cell
frequencies. The results are summarized in Table 2.

ANALYSIS OF VARIANCE SUMMARY TABLE

Source of Variation	Sum of Squares	df	MS	F
Between subjects	11,289	17		
Dominance	1,488	1	1488	2.35
Reinforcement	151	1	151	.238
Interaction	753	1	753	1.19
Subjects with groups	8,880	14	634	
Within Subjects	9,944	36		
Trials (Achieve ment)	7,357	2	3679	*54.19
Dominance x Achievement	86	2	43	.63
Reinforcement x Achievement	73.1	2	35.6	.54
Dominance x Reinforcement x Achievement	51.6	2	25.8	.38
Achievement x Subjects with groups	1,901	28	67.9	

$F(1, 14; .05) = 4.6$

$*F(1, 28; .01) = 7.64$ (Conservative test)[10]

Table 2

The procedures lead to the conclusions that at the .05
level of confidence, there is no statistical reason to
reject the hypotheses that:

1. High-low dominant personality traits were not
   related to achievement in this situation.

2. The type of social reinforcement employed (praise
   and reprimand vs. reprimand alone) does not effect
   achievement.

3. There are no interaction effects. That is, no
   particular combinations of personality and
   reinforcement lead to greater achievement.

The analysis did show, however, that there are
differences between the measures of achievement. A further
analysis using the Scheffe Test (11) for differences between
pairs of means lead to the conclusions, at the .01 confidence
level, that the post-test scores are different from the
pre-test and that the post-test scores did not differ from
the retention test scores.