

STUDY RESULTS

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The purpose of this study was to see if the number of sub-goals reached by subjects doing a certain task could influence how the subjects felt about their performance. Also in this study it was hypothesized that depressed and nondepressed subjects might differ in their feelings regarding their performance on the task. No significant differences were found between treatment groups. Also, no significant subject-treatment interaction was obtained. There was, however, a significant subject effect. Nondepressed subjects felt significantly better than depressed subjects concerning their performance.

Many of the current cognitive theories of depression are rooted in the underlying notion that depressed people tend to have non-normal cognitions concerning their actions and associated reinforcements. Seligman's (1973) Learned Helplessness model, one of the most popular of these theories, states that depressed people tend to have the expectation that response and reinforcement are independent. Seligman believes that a depressed person employs the rationale that no matter how hard he tries, a successful result will not be due to his efforts, but due to some other variable independent of his efforts. Therefore, why should he try at all?

A study done by Miller and Seligman (1973) showed differences between depressed and nondepressed subjects' expectations of success when provided with reinforcement on a skill task. Nondepressed subjects' expectancy of success was significantly higher than depressed subjects', despite the fact that outcome was rigged at 50% success - 50% failure. However, this difference was not obtained on similarly structured chance tasks. It was concluded that nondepressed subjects change their expectation of success when they perceive reinforcement as contingent on their response. Depressed subjects, however, do not have a high degree of success expectancy regardless of whether reinforcement is response-dependent or not.

In 1979, Alloy and Abramson presented a rather different theory of depression. They found depressed subjects surprisingly accurate in their judgment of the degree of

dependence between response and reinforcement. Nondepressed subjects however showed both illusions of control and no control, depending on their perceived rate of success (the higher the success rate, the more they perceived reinforcement as response dependent). Alloy and Abramson concluded that perhaps depressives' deficits are not perceptual, as Miller and Seligman hypothesized, but motivational. Depressives may be aware of the degree of response-outcome dependence, but lack the motivation to implement a behavior that will produce success.

The plausibility of (and experimental evidence for) both of the above theories leads one to suspect that perhaps depressives' deficits are a combination of cognitive and motivational/behavioral deficits. This is one of the advantages of Action Theory. Action Theory hypothesizes that our cognitions and their associated behaviors are the result of hierarchically structured plans, goals and feedback. A plan is a "cognitive blueprint" which foreshadows action, and controls the order in which a sequence of operations is to be performed. A goal is the desired result of the plan -- what the planner hopes to achieve by employing a particular plan. Feedback is the information the planner receives by which he tests how effective the execution of his plan is in attaining his goal. Therefore, the organization of this system is such that a feedback loop is created. One can continually test the effectiveness of his plan by receiving feedback regarding how successful his plan is in attaining

resistant to change.

The Action Theorist views depression as concurring with particular styles of action: 1) They have a high degree of fit between endstate and goal (meaning they are dissatisfied with their performance unless they achieve all that they had originally planned). 2) Their goals tend to slide back (that is, if they find themselves approaching their goal, they will advance their goal to a greater level of difficulty, thus reducing the likelihood of ever reaching it). 3) They take their goals very seriously. 4) They tend to have only one plan of action. 5) Their goals are usually not well defined.

By employing Action Theory, some new questions arise concerning the nature and treatment of depression. The general area I have addressed in this study is whether a depressed person's cognitive and/or motivational deficits be detected and/or altered by manipulating a non-dynamic aspect of his environment. Specifically, I have arbitrarily manipulated the number of sub-goals reached by depressed and nondepressed subjects on a skill task, and have attempted to determine whether this manipulation can effect a change in subjects' cognitive/motivational deficits.

In my experiment, I had both depressed and nondepressed subjects perform skill tasks, with the only difference across treatment groups being the number of arbitrarily determined (by me) subgoals reached within a specified and unchanging number of trials. In my original hypothesis I had hoped to

begin to formulate answers to the following questions: Do depressed and nondepressed subjects differ in their optimal rate of goal attainment (meaning, is there a certain number of pre-set goals to be reached within the task that will help the subjects to feel better about their performance? Also, is this number different for depressed and nondepressed subjects?)? Can manipulating the rate of goal attainment effect a change in depressed and nondepressed subjects' assessments of past performances and/or predictions of future performances? Can subjects' self-assessments act as self-fulfilling prophecies to effect a change in actual performance? Can falsified feedback concerning response correctness serve to enhance performance?

METHOD

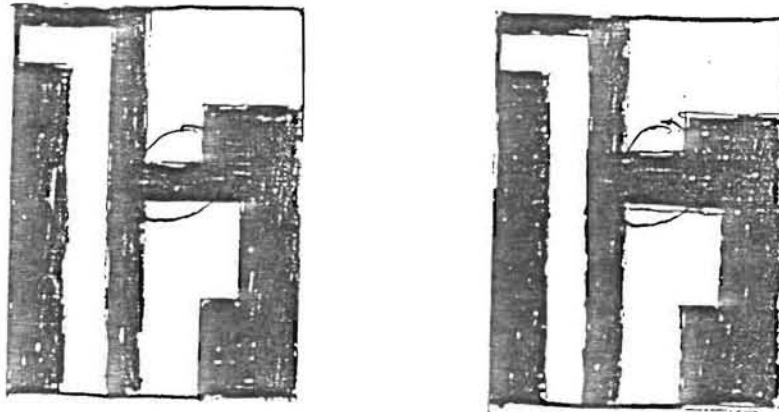
Subjects

Thirty subjects, fifteen depressed and fifteen nondepressed, were chosen from the U of P undergraduate population based on their scores on the Beck Depression Inventory. Students scoring over 8 on the BDI were used as depressed subjects.

Design

For every subject, an 8K Commodore computer flashed, for three seconds each, a series of 120 paired graphic patterns. Each presentation displayed one pattern on the left side of the screen and one pattern on the right side of the screen. Any particular pair was randomly generated as either identical or very slightly different.

Different



Each subject's sole task was to indicate whether he believed the patterns to be identical or different. After going over the instructions and doing five practice trials, subjects' responses were recorded. The written instructions were as follows:

This is a study on goal reaching. You will be shown 120 paired patterns that will flash on the screen for about 3 seconds each. Your job will be to say whether the patterns are the same or different. You will indicate your answer by pressing SAME if you think the patterns are the same, or DIFF if you think the patterns are different. After this, press RETURN.

After (10, 20 or 30 appeared here) trials you will be told how many of your responses were correct. You will then be asked to rate how you feel about your performance on that

last block of trials . You will rate yourself on a scale from one (very bad) to ten (very good) by pressing the appropriate keys. This rating should not necessarily correspond to the percentage of correct answers you obtained.

Also, before each block of trials, you will be asked to predict how you will feel after completing the upcoming block of trials. This rating will be on the same one to ten scale.

After 120 trials, the screen will display "The experiment is over." At this point, please call me.

We'll begin with five practice trials.

After reading and understanding the directions, subjects were asked to verbally go over what exactly they were to do, and then performed on the five practice trials. After this, the experimenter left the room for the actual experiment.

The only manipulated variable was the rate of intermittence of goal attainment, and hence the number of assessments and predictions. In other words, the number of trials in each block, and the number of blocks within the 120 trials were varied. The thirty subjects were divided evenly into two sets of three groups: both depressed and nondepressed groups receiving 10, 20, and 30 trial blocks.

Group	SAMPLES	# Feedback Trials		# Feedback Trials		total Trials
		PREDICTION	ASSESSMENT	PREDICTION	ASSESSMENT	
N4		10		10		120
N6		20		20	9 more blocks	120
N12		30		30	3 more blocks	120
D4		10		10	1 more block	120
D6		20		20	9 more blocks	120
D12		30		30	3 more blocks	120
					1 more blocks	120

The falsified feedback, which was semi-randomly obtained, was arranged as follows:

12 goal groups: 4,6,5,6,4,7,7,7,6,7,8,8 correct answers respectively by block.

6 goal group: 10,11,14,13,16 correct answers respectively by block.

4 goal group: 15,17,20,23 correct answers respectively by block.

Note that the 6-goal and 4-goal groups' feedback was obtained by grouping corresponding 12-goal group feedback.

Thus, all subjects, regardless of group, received the same feedback.

RESULTS

A significant ($p < .05$) difference was obtained in overall prediction means and overall assessment means between depressed and nondepressed subjects. There were, however, no significant treatment effects (for predictions, $F = .164925$, for assessments, $F = .0006$ -- accept H_0), indicating

ANOVA SUMMARY

PREDICTIONS

SOURCE	SS	DF	MS	F RATIO
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BETWEEN SUBJ

A (S)	22.8778	1	22.8778	5.67017 $p < .05$
B (Tr)	1.33087	2	.665436	.164925
AB (S*Tr)	2.45575	2	1.22787	.304323
SWB error	96.8345	24	4.03477	

WITHIN SUBJ

C (T)	5.57831	3	22.8778	2.84865 $p < .05$
AC (S*T)	.668062	3	.296021	.453502
BC (Tr*T)	1.24817	6	.208028	.318698
ABC (S*Tr*T)	1.52954	6	.254924	.390541

C X SWB 46.9976 72 .652744
 where S = Subject (D or N), Tr = Treatment (10, 20, or 30 trials), and T = Time

ANOVA SUMMARY

ASSESSMENTS

SOURCE	SS	DF	MS	F RATIO
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BETWEEN SUBJ

A (S)	32.2415	1	32.2415	6.64914 $p < .05$
B (Tr)	.0585938	2	.0292969	6.04187E-03
AB (S*Tr)	4.91699	2	2.4585	.507013
SWB error	116.375	24	4.84894	

WITHIN SUBJ

C (T)	108.1031	3	32.2415	25.2455 $p < .01$
AC (S*T)	1.32145	3	.423687	.798957
BC (Tr*T)	5.30365	6	.913975	1.43255
ABC (S*Tr*T)	7.42432	6	1.23739	1.68782

C X SWB 47.1929 72 .655457
 where S = Subject (D or N), Tr = Treatment (10, 20, or 30 trials), and T = Time

PREDICTIONS

Treatment	Depressed	Nondepressed
12-goal	6.125	6.595
6-goal	5.6	6.65
4-goal	5.6	6.7
\bar{y}	5.775	6.64
S	.303	.05
S^*	1.29	1.34

ASSESSMENTS

Treatment	Depressed	Nondepressed
12-goal	5.935	6.495
6-goal	5.475	7.025
4-goal	5.7	6.7
\bar{y}	5.703	6.74
S	.23	.26
S^*	1.48	1.38

(Note that depressed subjects predictions were on the whole higher than their assessments. This finding fits the action theorists model of depression: the degree of fit between endstate and goal was apparently not achieved. On the other hand, nondepressed subjects rated higher in assessing, rather than predicting their performance).

*S was usually large due to the change in ratings over time - due to the changing feedback

that no optimal rate of goal attainment was obtained.

There was no significant interaction between subject and treatment for predictions ($F=.304323$) or assessments ($F=.507013$), indicating that there was no significant difference in depressed and nondepressed subjects' optimal rate of goal attainment.

There was, as is intuitively obvious, a strong time effect, indicating significant differences in ratings over time. For predictions, $F=2.84$ ($p<.05$), and for assessments $F=55.245$ ($p<.01$). When remembering that subjects were receiving increasingly positive feedback, this result is not surprising.

An insignificant subject-time interaction was obtained (for predictions, $F=.318$, and for assessments $F=1.43$), indicating that depressed and nondepressed subjects' ratings were not significantly different in their rate of change over time.

Finally, there was an insignificant subject-treatment-time interaction, indicating that depressed and nondepressed subjects did not differ in their rate of change in ratings, regardless of treatment group.

As for correct answers over time, no significant results were obtained anywhere (see line graphs 5,6,7,12,13,14, 19,20,21,24,27).

DISCUSSION AND SPECULATION

I had originally hypothesized that once a subject reached a sub-goal his confidence might be raised sufficiently to increase his prediction of success on the following block of trials. Therefore, the more goals he reaches over a given period of time, the more often his confidence is raised, the higher his next prediction might be. Similarly, the more goals he reaches, the more likely he is to be pleased with his performance.

My hypothesis was based on my own experiences as an experimental subject. I am constantly doing battle with myself over whether I should try to perform as well as possible to boost my self-esteem, or whether I should perform as quickly as possible since the task is usually quite boring and I want to get done with it. I tend to moderate between the two. So although I try to do well, I get satisfaction out of knowing that I am continually getting closer to the end of the experiment. Thus I hypothesized that the more often one is reminded that he is nearing the end of the experiment, the better he will feel.

I had thought that since depressed people are often bored by the routine in their lives, reaching a greater number of sub-goals could, at least in part, make them feel better about their perceived routinized ways.

However, one can employ a different interpretation as well; the more often one is told how far he has gone, the more often one is reminded how far he has got to go!

Let us now turn to the questions asked earlier and see how the data answer them. The first question asked was: do depressed and nondepressed subjects differ in their optimal rate of goal attainment? Looking at bar graphs A and B, one can see that nondepressed subjects consistently both predicted they would feel better about their performance, and assessed their feelings as better than depressed subjects. The ANOVA summary confirms this significant difference. Thus we can conclude that the 1 to 10 rating scale used was indeed sensitive to differences between depressed and nondepressed subjects. However, an optimal rate of goal attainment was not obtained for both depressed and nondepressed subjects. Possible explanations for this insignificance will be discussed in the answer to the following question.

The second question asked whether manipulating the rate of goal attainment could effect changes in depressed and nondepressed subjects' assessments of past performances and/or predictions of future performances. As it turned out, manipulating the rate of goal attainment had no significant effects on subjects' ratings (see ANOVA and line graphs 3,4, 10,11,17,22,23,25,26). It is possible that individual subjects' idiosyncratic cognitions concerning the

desirability of constant reminders regarding fractional task completion obscured any interesting results that could have been obtained. It is, of course, also possible that the rate of goal attainment has no bearing whatsoever on subjects' feelings about their performance. Perhaps in a future study, during debriefing the experimenter could ask subjects just exactly how they felt about being constantly reminded (or not constantly reminded, as the case may be) how far along in the task they are. Another possibility might be to run within-subject treatment variations to see if a particular subject prefers one rate of goal attainment over another. Such a study could pick up individual differences in these cognitive appraisals (again, if in fact these differences exist).

The third question asked if assessments and predictions could act as self-fulfilling prophecies to affect a change in actual performance. One might reason that nondepressed subjects ratings might indeed improve their actual performance: as positive feedback increases over time, ratings would go up (indicating that subjects feel better about their performance). With these improved feelings, it might be possible that achievement motivation increases as well, and so the subjects might try harder at the task, and possibly succeed more often.

On the other hand, one might hypothesize that depressed subjects' performance might not improve. Most findings indicate that depressives tend to selectively attend to negative feedback, and attribute positive feedback to an independent variable. Thus depressives' ratings might not increase over time, indicating that they are not feeling as good about their performance. Thus achievement motivation might not be as strong.

Despite the fact that all subjects were given the same amount of feedback, differences between depressed and non-depressed subjects' ratings were obtained. One could possibly attribute the difference in these ratings to a difference in the actual performance between depressed and nondepressed subjects. However, no such difference in actual performance was obtained. Line graphs 7, 14, and 21 -- comparisons between depressed subjects actual performance and nondepressed subjects actual performance -- indicate no significant differences in the actual number of correct answers obtained.

Thus we can conclude that actual performance had little if any bearing on subjects' ratings (and/or vice versa). It seems that no dynamic change in subjects' outlooks were obtained: depressed subjects anticipated feeling not as good and indeed did feel not as good as nondepressed subjects.

This is consistent with most findings concerning depressives' reduced performance and reduced performance capabilities.

An Action Theorist might predict these results, as they could be interpreted as consistent with the finding that depressed people have a high degree of fit between endstate and goal. It could be that depressed subjects set their goals too high and thus were dissatisfied with anything but that optimal performance. This, as already stated, is merely an adequate interpretation of the findings. Unfortunately, the collected data are not sufficient to conclude that this is actually the case. Perhaps in a future study subjects could be asked to state how many correct answers they want to obtain on the upcoming block of trials. "Nice" data from such a study may make the action theorist's interpretation of the findings not only a consistent one, but a correct one.

There is, however, a result here that is inconsistent with most findings. Remember that feedback was regularly increased for all subjects from approximately 50% success to approximately 80% success. According to most findings, depressed subjects' predictions and assessments should not increase with this feedback, as depressives tend to selectively attend to poor feedback, and tend to attribute positive feedback to external agents. However, depressed and non-depressed subjects significantly increased ratings over time,

yet did not significantly differ in their rate of increase over time. There was apparently no selective attention to negative feedback on the part of depressed subjects. Retaining this null hypothesis seems counterintuitive and could possibly be due to the lack of severity in subjects' depression. However, remember that depressed and nondepressed subjects' grand mean ratings were found to be significantly different. Another possibility that reduces the significance of this finding (and, unfortunately, the significance of all these findings) is that n per cell was only five. In future studies, in which more liberal amounts of time (and money?) might be spent, n per cell would certainly be increased at least twofold.

The last question originally asked was: can falsified feedback concerning the correctness of response serve to enhance performance? As already noted, nothing significant was obtained in a comparison of correct answers over time. This was an admittedly weak hypothesis, and was only included because an answer would be easily obtainable from the data. Not surprisingly, results indicate a negative answer to the question.

As part of debriefing, I of course told all subjects that the feedback they received was falsified -- totally

independent of their actual performance. Many, in fact the majority of subjects told me that they did have their suspicions regarding the honesty of the feedback, but rated themselves based on what the computer told them anyway.

Many seemingly did this for my sake: "I figured that was what was expected of me so I played along." One subject did let her suspicions affect her answers, and so was replaced.

Three subjects said that they initially believed the feedback to be false, but as the feedback improved, they began to lose their suspicions. Two of these three subjects were nondepressed. This appears consistent with the idea that nondepressives selectively attend to positive feedback.

Another interesting finding: three subjects asked to see their actual results (how many correct answers they actually obtained). All three of these subjects were males. When I told this to a grad student friend of mine, he said he often obtains similar results in experimental situations: male subjects seem much more involved and interested in performing as well as possible.

The task used was picked for a variety of reasons. First, true feedback was very difficult to obtain. Second, it did not require any special skills or abilities, so the subject could not attribute a poor performance to any idiosyncratic inability or an external agent (although I

did hear a stray comment of "I'm terrible at things like this" once in a while). Third, it is a skill task with an empirically ascertainable answer, thus subjects could not (and did not) claim that the correct answer was obscured. Interestingly, many subjects reported that they initially did not find any differences in the patterns, but as time went by, they noticed differences more and more. However, rarely was a steady improvement in actual performance obtained. This could indicate that performance was too heavily reliant upon luck. If a subject's performance doesn't change, yet he spots differences more often later in the task, perhaps random guessing could produce similar results. In future studies a task should be devised that both makes true feedback exceedingly difficult to obtain and that is a skill task in which luck does not play a significant role in performance.

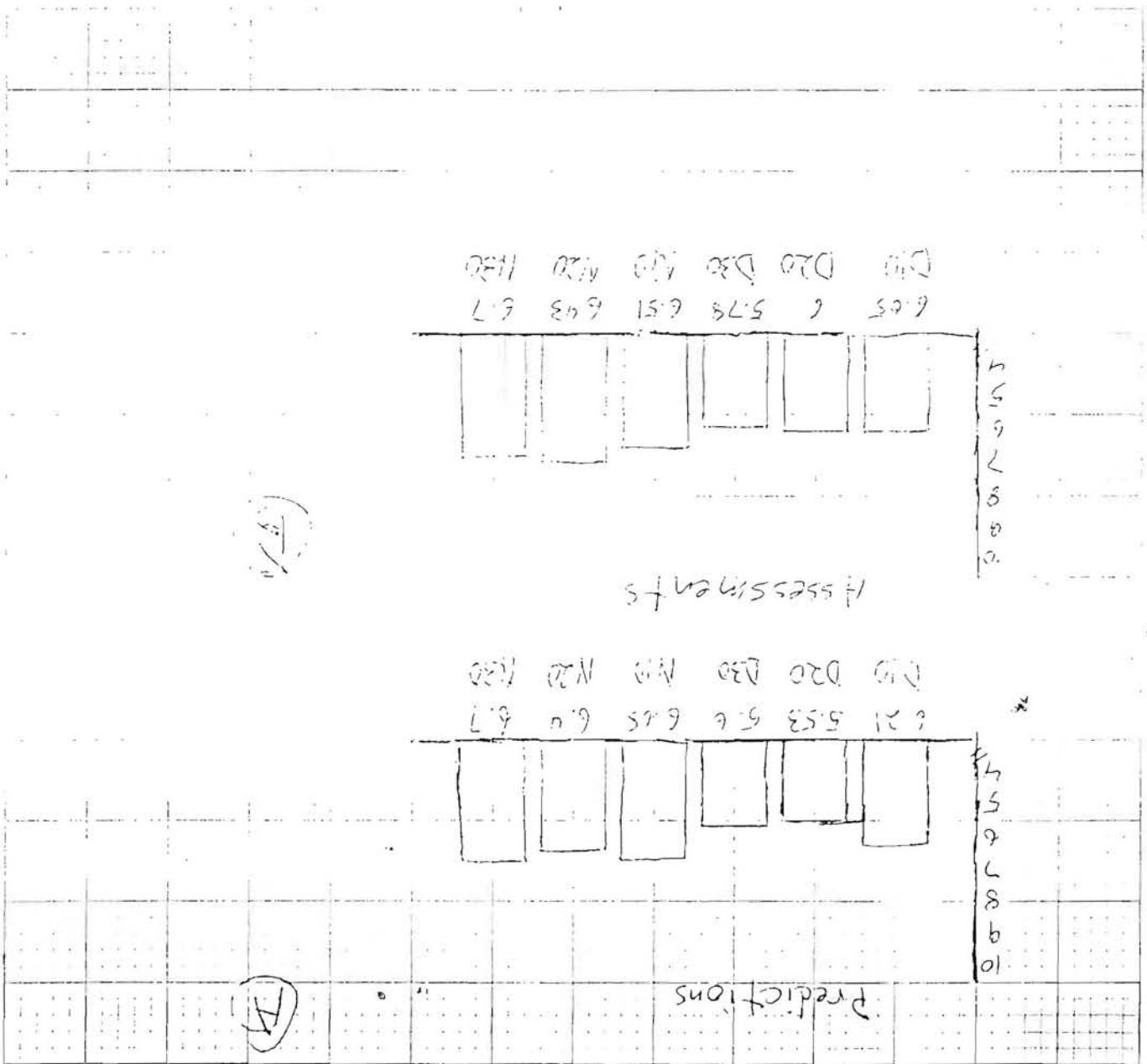
The falsified feedback presented problems on two levels. First, subjects often felt they did better or worse than the number correct reported on the screen, thus their suspicions were aroused regarding the feedback's truthfulness. Secondly, even if their suspicions were not aroused due to lack of fit between perceived performance and feedback, suspicions were often aroused when subjects noted that the feedback was ever-increasingly positive. This is obviously an area in which future studies will have to be modified.

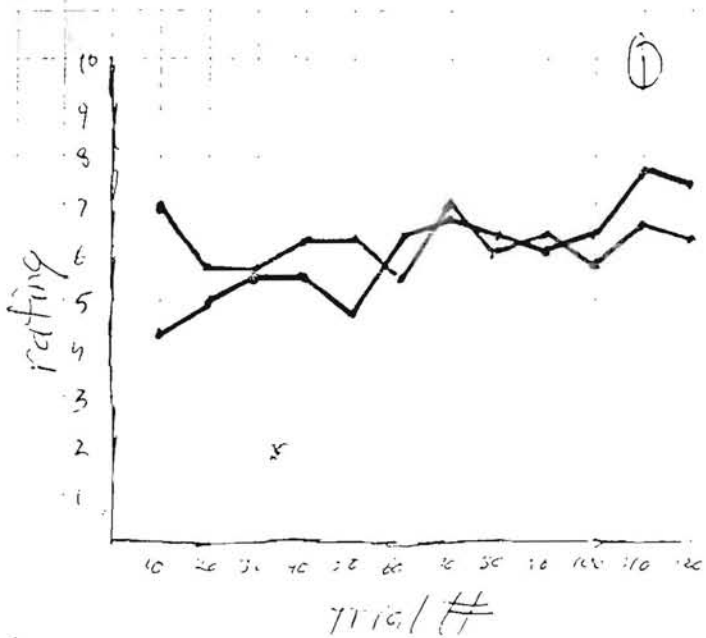
CONCLUDING REMARKS

Certain action styles that depressed people seem to possess have been obtained from this study. First, the notion that depressed people have a high degree of fit between endstate and goal was supported in these findings in two distinct ways. Depressed subjects had lower ratings than nondepressed subjects, which could be interpreted from an Action Theory vantage point. And second, Depressed subjects' predictions were higher than their assessments, indicating that they expected to feel better than they actually did feel. Thus the degree of fit between endstate and goal was not sufficient for them to feel better than they had predicted. Common to many theories including Action Theory is that depressed people tend to set too high goals for themselves, and thus are constantly dissatisfied with their performance, as their goals exceed realistic limits. It should also be remembered that nondepressed subjects expected to feel better than depressed subjects expected to feel, and then in fact felt better than they had anticipated. It seems nondepressed subjects may not have had such stringent regulations on the degree of fit between endstate and goal.

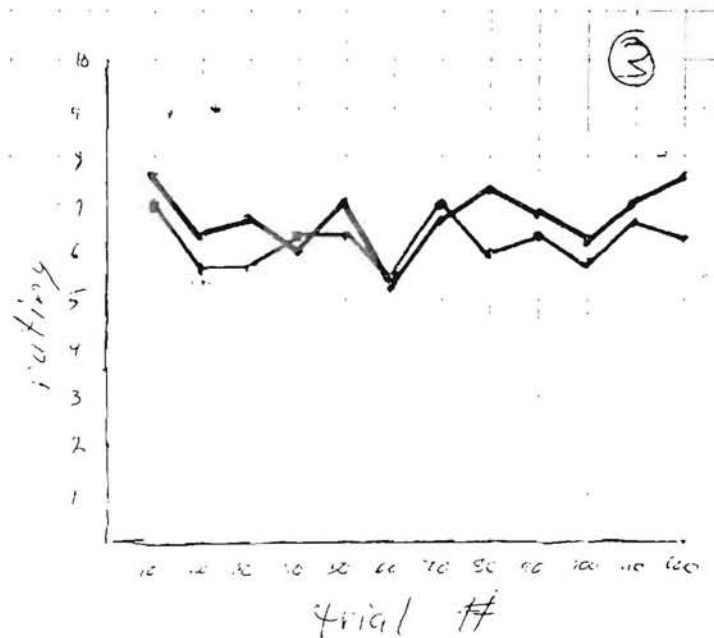
Although no significant treatment effect was obtained, there still seems to be something in my hypothesis that

seems intuitively correct. This study did not make such a finding (some possible explanations were discussed). However, the number of variations on this design (both those mentioned here and those not yet considered) provide me with the impetus not to give up yet. Especially attractive is the notion of running within-subject treatment variations. Perhaps in the near future I will be able to attempt such a study.

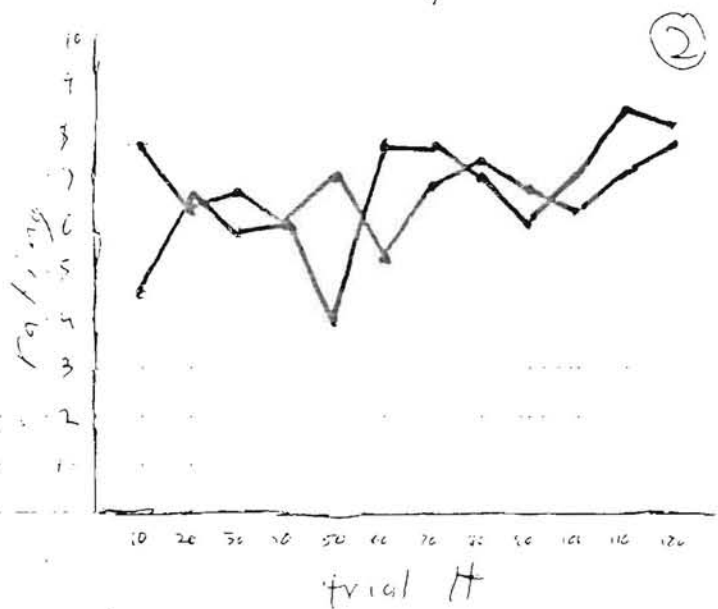




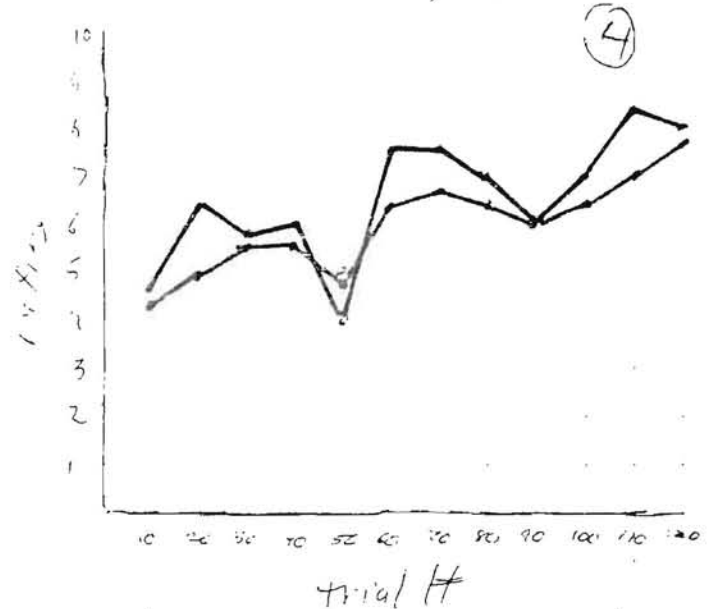
• Predictions vs. • Assessments
over time for group D10



• Predictions in group D10
vs. • Predictions in group N10

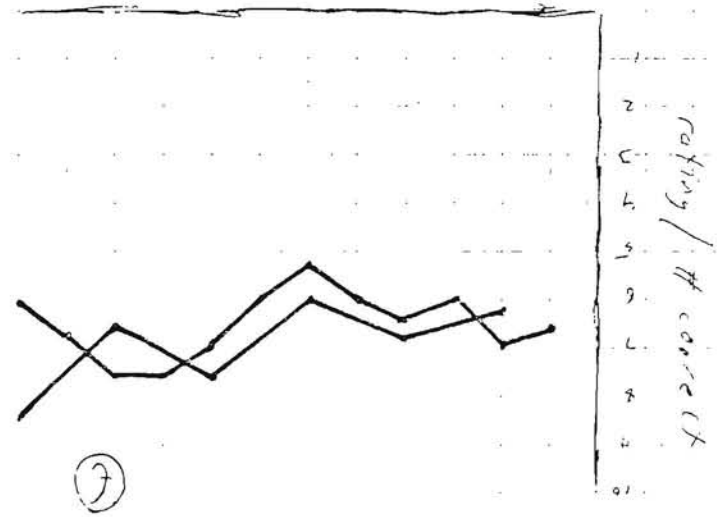


• Predictions vs. • Assessments
over time for group N10

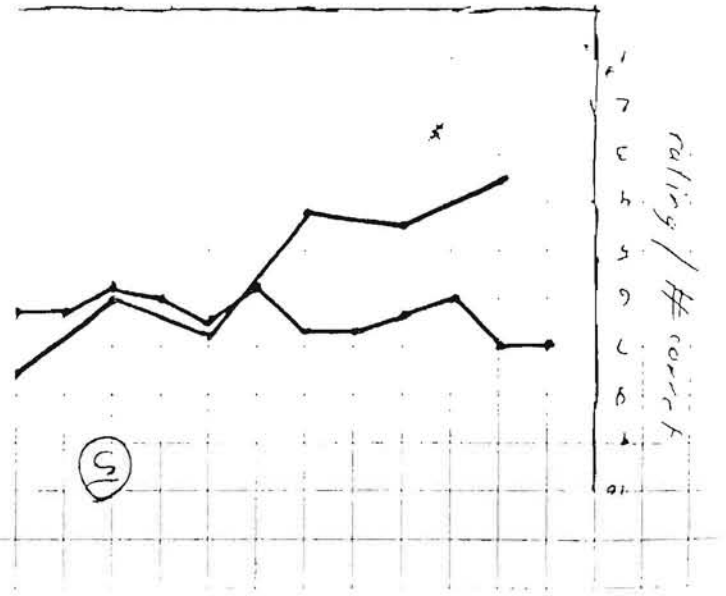


• Assessments in group D10
vs. • Assessments in group N10

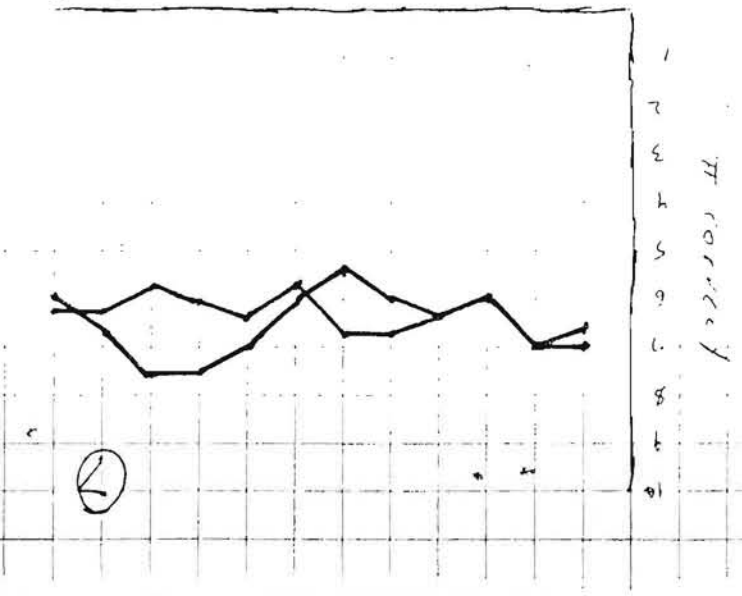
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 • # assessments in N20
 trial #



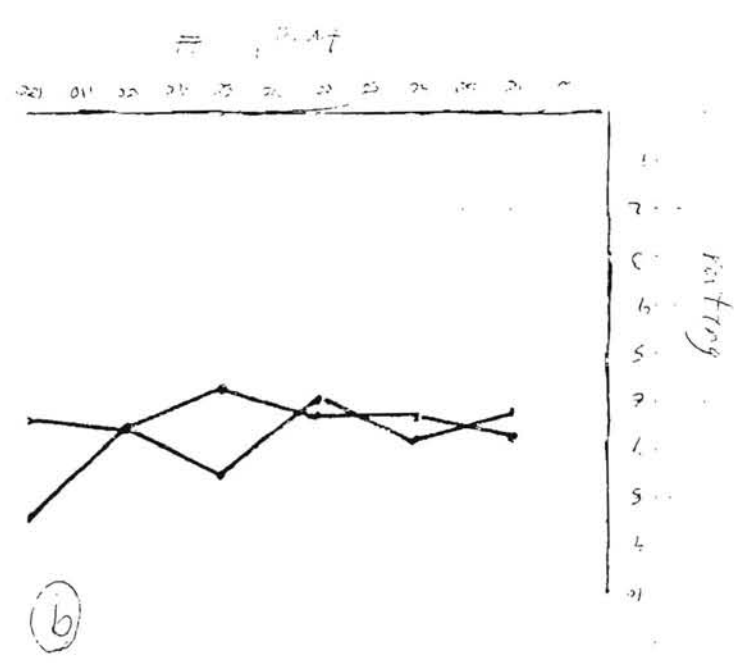
• # correct answers in D2C
 • # assessments in D2C
 trial #



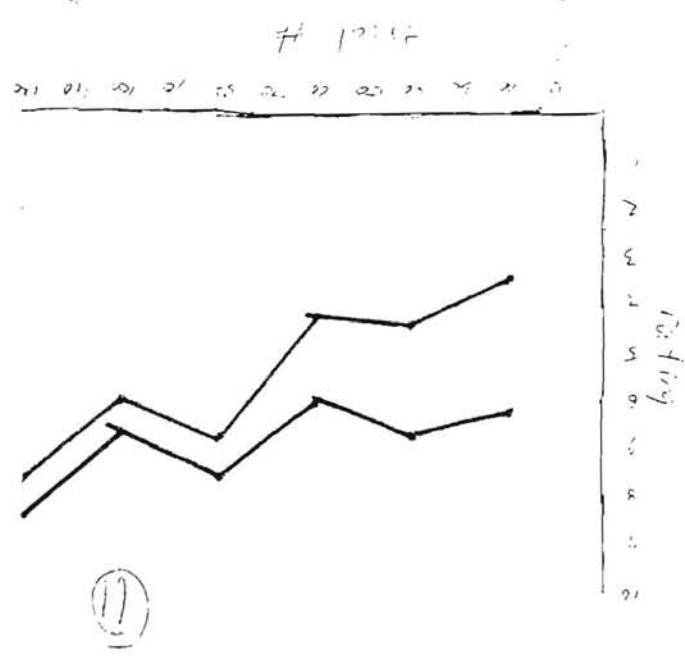
• # correct answers in D2C
 • # assessments in N20
 trial #



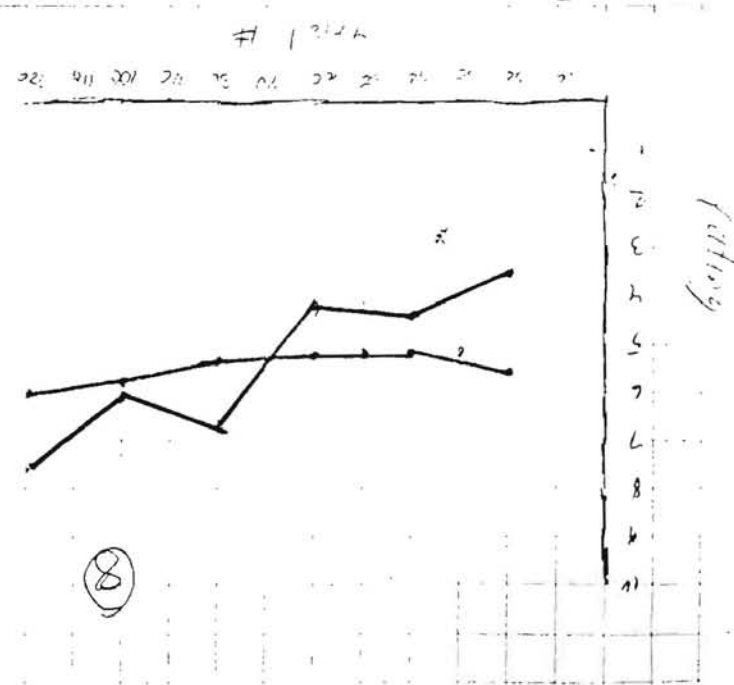
• Predictions vs. Assessments
 given from group N2C



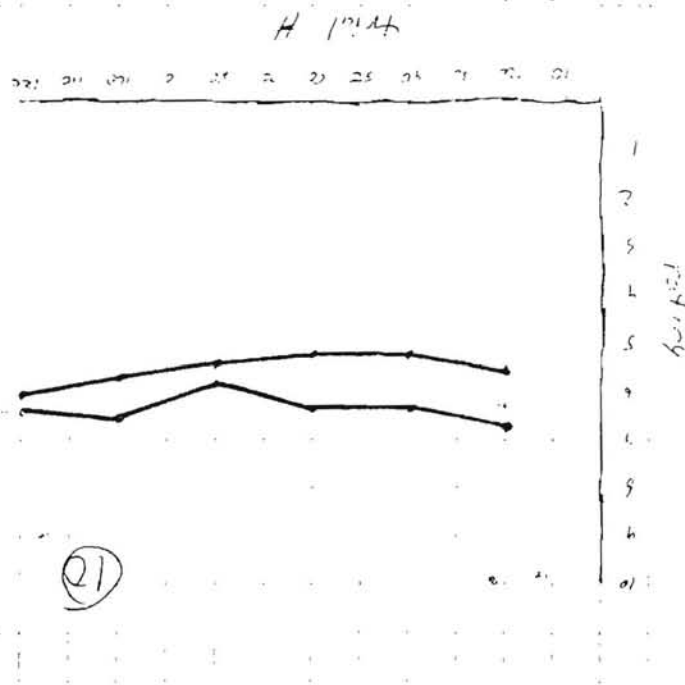
• Predictions vs. Assessments
 given from group N2C



• Predictions vs. Assessments given
 time in group D2C

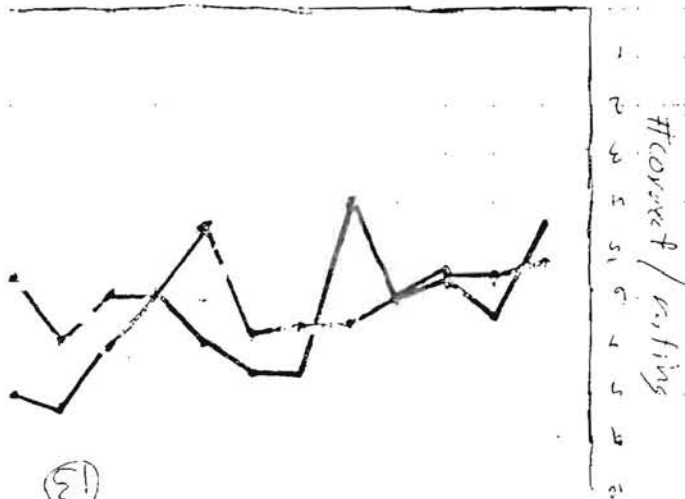


• Predictions vs. Assessments given
 time in group D2C



• # correct answers in NIC
 • Assessments in NIC
 Trial #

10 20 30 40 50 60 70 80 90 100 110 120

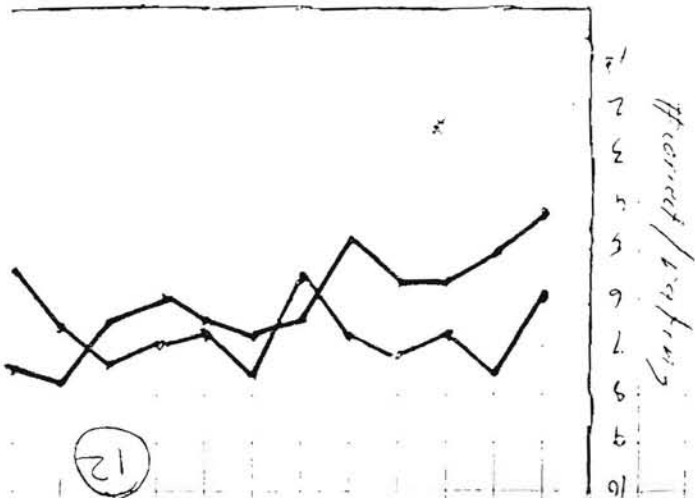


(13)

• # correct answers in DIC
 vs Assessments in DIC

Trial #

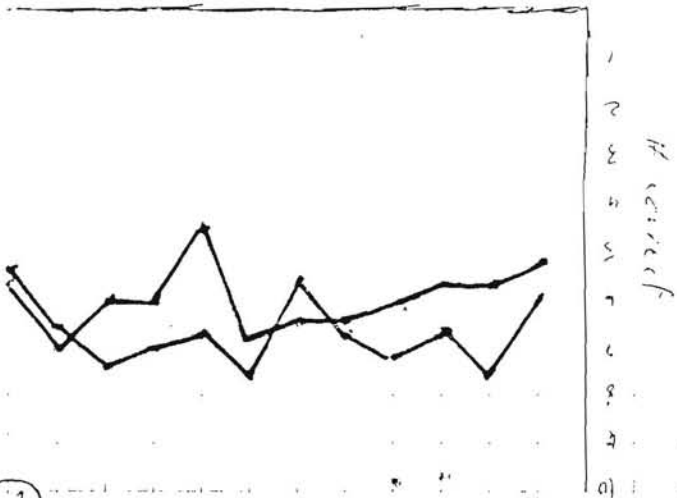
10 20 30 40 50 60 70 80 90 100 110 120



(12)

• # correct answers in DIC
 vs # correct answers in NIC

10 20 30 40 50 60 70 80 90 100 110 120

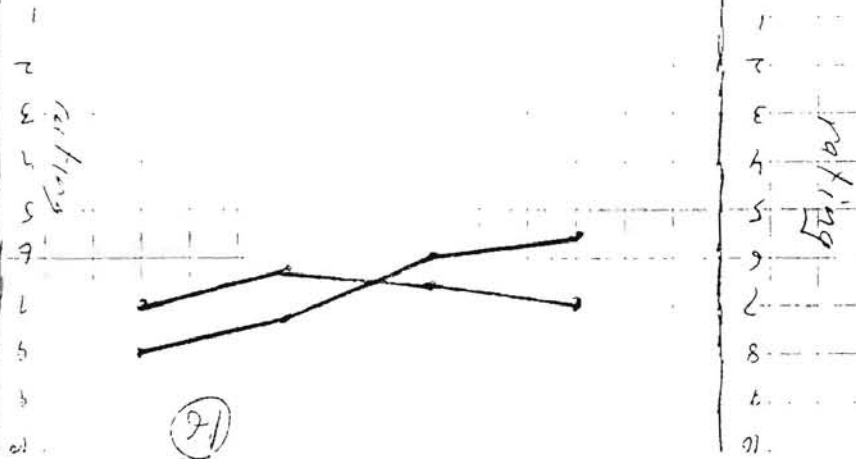


(11)

• Predictions vs Assessments
 over time for group N3C

Trial #

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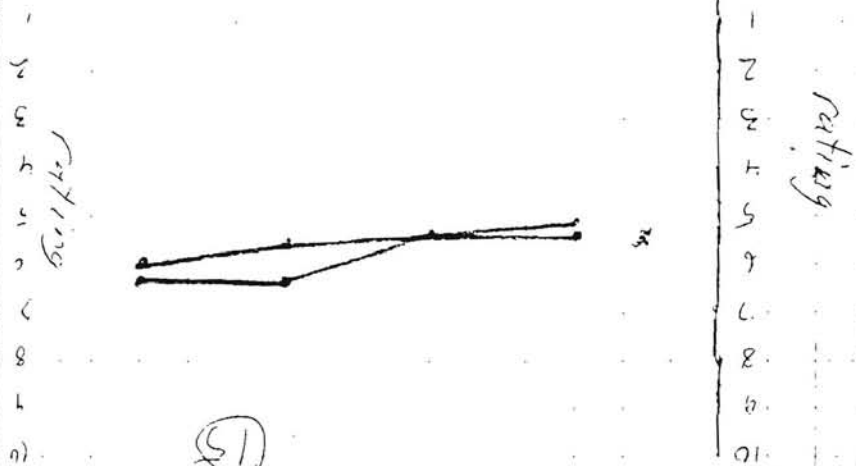


(16)

• Predictions vs Assessments
 over time for group D3C

Trial #

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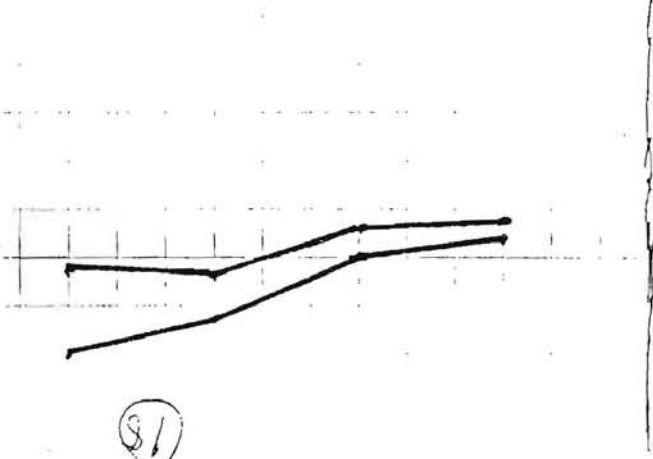


(15)

• Assessments vs Predictions
 over time for group N3D

Trial #

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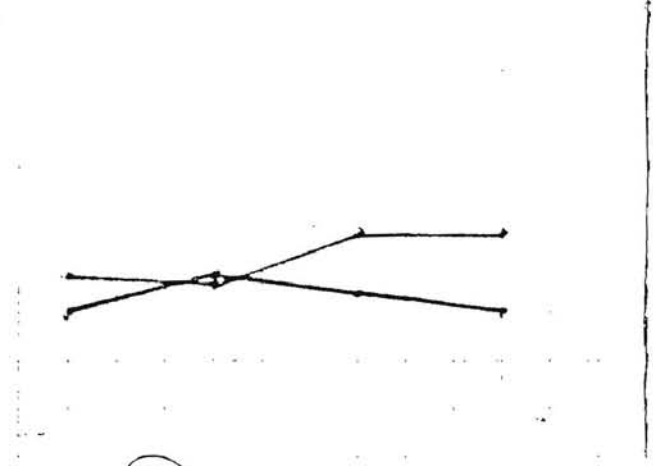


(18)

• Predictions vs Assessments
 over time for group D3D

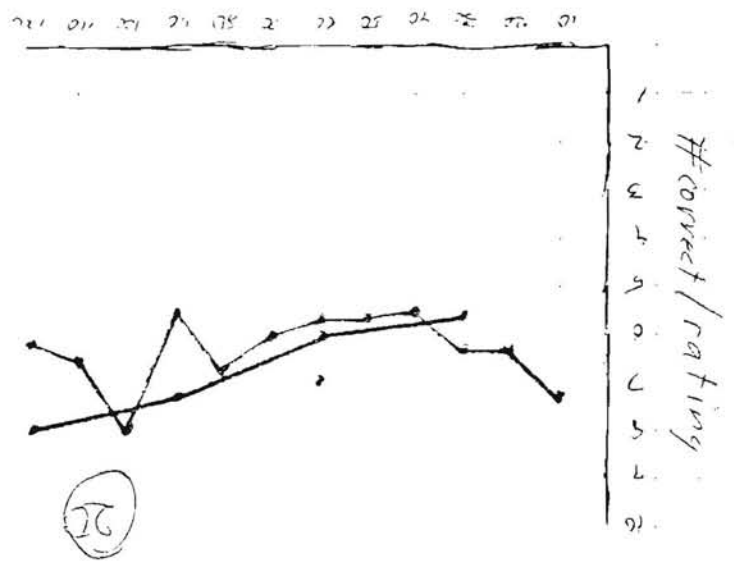
Trial #

10 11 12 13 14 15 16 17 18 19 20

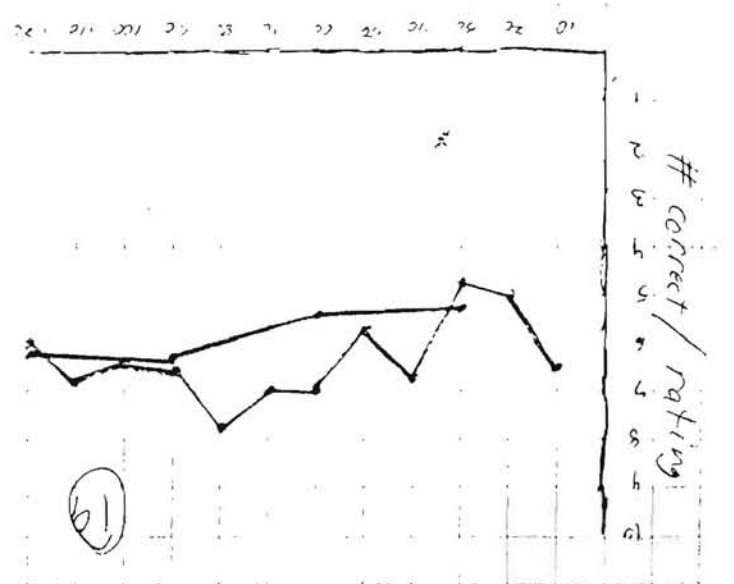


(17)

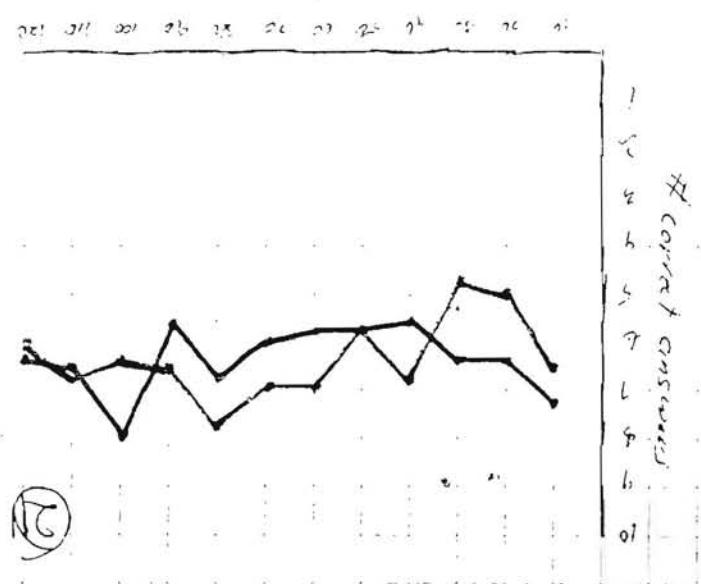
• # correct answers in D30
 • # correct answers in N30



• # correct answers in D30
 • # correct answers in N30

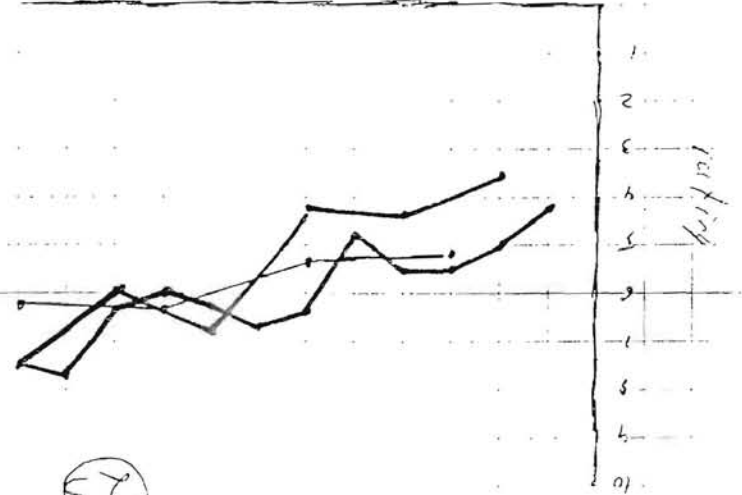


• # correct answers in D30
 • # correct answers in N30



● Assessments in D 10
 ● Assessments in D 20
 ● Assessments in D 30

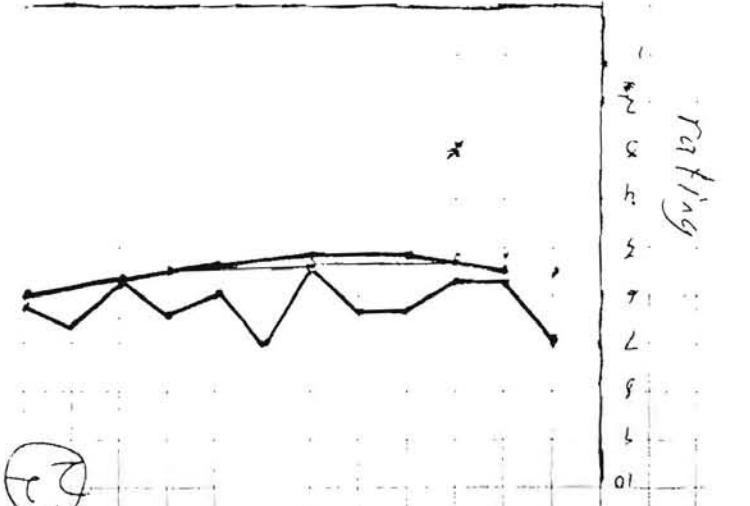
trial #



(23)

● Predictions in D 10
 ● Predictions in D 20
 ● Predictions in D 30

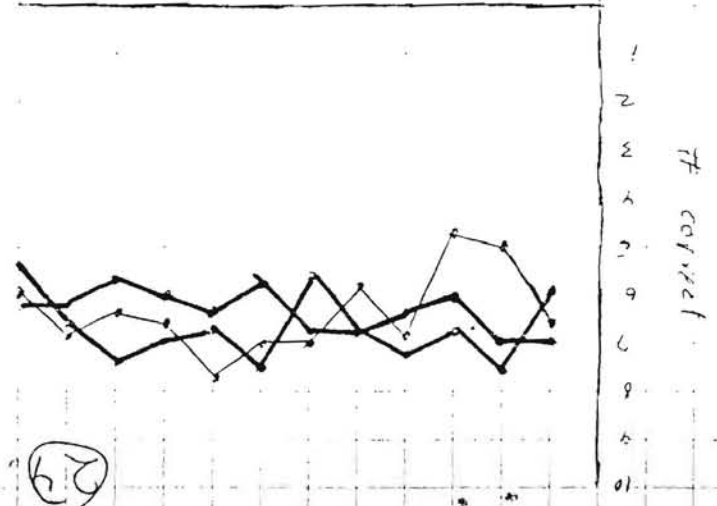
trial #



(22)

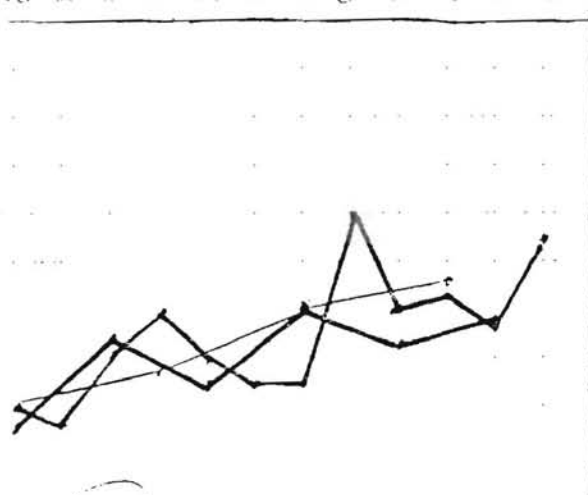
● # correct in D 10
 ● # correct in D 20
 ● # correct in D 30

trial #



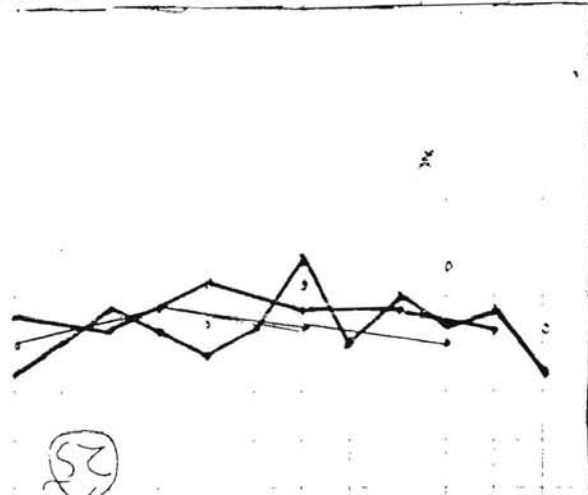
(24)

• # correct in N3C
 • # correct in N2C
 • # correct in N1C
 Trial #



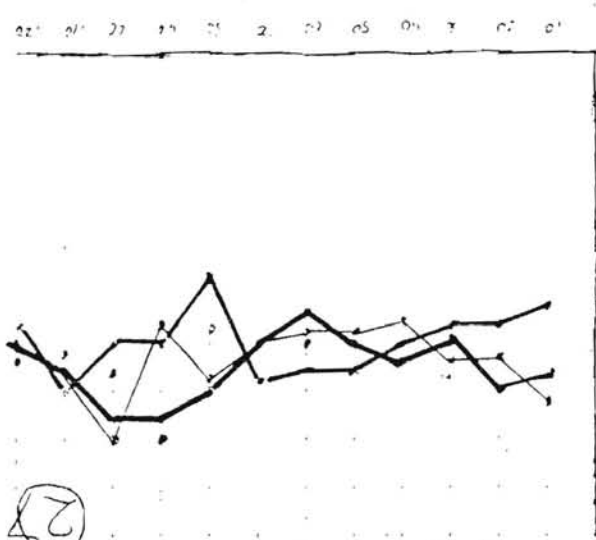
(24)

• Predictions in N3C
 • Predictions in N2C
 • Predictions in N1C
 Trial #



(25)

• # correct in N3C
 • # correct in N2C
 • # correct in N1C
 Trial #



(27)

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