Effects of Differences in Environmental Stimulation
upon the Language Output of Aphasic Patients

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All clinical aphasiologists are familiar with the variability of the aphasic patient in dealing linguistically with his environment. At one moment the patient appears to comprehend quite well what is said to him and will respond quite adequately, even using complete grammatic and syntactic structures. Shortly afterward, the same patient gives evidence of lack of understanding the language he sees or hears and will experience difficulty in retrieval and in verbal responses. When we are asked the cause of such variability in the patient, we are too often prone to relate it to the "nature of his aphasia" or to physiologic factors. Indeed, such reasons are valid ones. For those of us who are soundly oriented from our medical backgrounds in training, we may find it difficult to accept other possible causes for the aphasic patient's fluctuation in language usage.

Such time-to-time variability in linguistic comprehension and expression is not totally restricted to the aphasic individual, however. Most speakers who are neurologically normal experience moments of failure in recalling names or in paying close attention while listening. We would all agree that these fluctuations in normal individuals are due to a variety of influences. In the normal speaker, we attribute them to "thinking about other things," to a waning of attention, or to letting the mind wander. We may even relate them to an emotional feeling toward the speaker or the subject of what is being discussed; such emotional feelings make it harder for one to report his feelings about a certain topic to a particular individual.

If situational or emotional factors affect normals, so also must they be influencing the language of aphasic patients. Some speech pathologists have attempted to study the effect of interpersonal behavior upon the responses of the aphasic patient. Stoicheff, at the University of Iowa,[1] systematically varied her interactions with aphasic patients. She confirmed our belief that the patient who receives positive assistance will do better than the patient who is treated in a critical, non-supportive manner.

The present study was begun because of the interest of Robert Milisen, Emeritus Professor on our staff at Indiana University. He encouraged me to read a series of transcripts that he had in his possession. We discussed ways that the information might be studied. The material was originally collected by his former student, Mrs. Lucille Thomas Kaplan, a speech pathologist at the Veterans Administration Hospital in Louisville, Kentucky. I read the transcripts and felt that they were too valuable not to receive further study.

Mrs. Kaplan had tape recorded the verbal interactions taking place in several patients' rooms 24 hours a day for periods up to 10 days. For several patients there was also one pre-operative day of recordings to be used as a base-line. All patients had been evaluated as having aphasic problems prior to their brain surgery. None received language therapy during their hospitalization when the recordings were made. Two microphones--

one at the head of the bed and another at the foot--were used. A continuously operating tape recorder was placed beneath the bed. Tapes were changed regularly. A group of dedicated volunteers, including Mrs. Ellen Milisen, listened to the tapes and spent hundreds of hours preparing the typed transcripts. The original study by Mrs. Kaplan dealt with the type of and severity of language disturbance as related to the location of the surgical lesions.

In preparing for this study of observed variability in response to various social stiuations, I devised a means of evaluating and coding the stimuli from the environment, and the responses of the patients to these stimuli. From the transcripts one could determine the day, the approximate time of day, and the general identity of the persons interacting with the patient. These persons--we may call them "stimulators to the patients"-- were nurses, physicians, male attendants, visitors, family members such as wives, sisters, etc.

From the conversations between the patient and these persons, one could also infer something of the social nature of the interactions. Some of these persons displayed attitudes that were considered supportive of the patient in general. Others were considered non-supportive persons; they failed to say things which were positive, helpful or conducive to good communication. Thus, I classified each conversational segment from the "stimulator" according to the general tenor of the interaction as <u>Supportive</u> or <u>Non-Supportive</u> of the patient's general well being. I also classified the specific remarks of these persons in the patient's environment according to whether the remarks were <u>Threatening</u> or <u>Non-Threatening</u>. Threatening remarks were those statements about the patient's verbal communication that would most likely be viewed by the patient as a threat to his continuing verbal interaction with that person. Thus there were four categories[2] to describe the manner of the "stimulator" and the nature of the remarks that were made about the patient's speech:

Supportive--Non-Threatening
Supportive--Threatening

Non-Supportive--Non-Threatening
Non-Supportive--Threatening

We might hypothesize that as we descend this hierarchy that the responses from the patient would deteriorate in quality because of the increasing tension or anxiety related to the "poorer" interaction situations.

An example of the <u>Supportive-Non-Threatening</u> interaction is one in which one visitor asked the patient, "Can you read the newspaper?" The patient responded, "Funnies and . . . ." The visitor encouraged the patient by saying, "You said you read the funnies and. . . ." Thus, prompting the patient to continue, "Funnies and the---headlines." The visitor wrapped up this segment by saying, "They tell you pretty much what's going on."

A <u>Supportive-Threatening</u> situation might be where the wife said, "I love you! Why can't you even tell me how much you love me?"

An example of a <u>Non-Supportive-Non-Threatening</u> situation is one where the nurse did not listen well to the patient.

Nurse: "Who is the person you want us to notify in case of emergency?"
Patient: "My dad or . . . ."
Nurse: "Well, do you have any other relatives besides your father?"

Patient: "George Brown."
Nurse: "How do you spell that?"
Patient: "B-R-O-W-N!"

An example of the most discouraging situation, Non-Supportive-Threatening, can be found in the wife of Patient Two. Typical remarks from her were:

"You'll try to talk for me, won't you? He's like mother and her bird."

"Hi! Can you say 'Mary'?"

"Do you want to see your Mama (referring to herself)?"

"Did you see the doctor today? Huh? Huh? I'm afraid that he's not going to talk."

"Does something hurt? So you wanna make 'poo'?" as she offered her 48 year old husband a bed pan.

To this last question, the patient rolled out a series of expletives. Then his wife reprimanded him for saying such things and concluded, "What if the minister were to hear you!"

Returning to the evaluation process, each patient response was evaluated according to its relevance to the stimulus statement, to its completeness in grammatic structure, to its functional appropriateness in furthering the conversation, to its length, and to the level of its propositionality. The Porch Index of Communicative Ability (PICA) scoring system was used. A 15 indicates that the patient made a complete, efficient, accurate response. A 12 indicates an incomplete structural response that is related to the stimulus. A 4 indicates an incomprehensible but differentiated verbal output from the patient. For other number interpretations please refer to Porch's instructions.[3] Other coded modifiers were used to indicate the length of the response in number of words, what type of sentence was used (declarative, interrogative open-ended or closed, exclamatory, etc.), and what level of propositionality was used (low; such as "yeah" or swearing, or higher levels of cognition).

Although the prime interest was on the response of the patient, the stimuli given to the patient were also coded in a similar fashion according to the type of sentence, length, and level of propositionality. Thus, in a future research effort, I hope to be able to report whether a relationship exists between the nature of the stimuli and the quality and quantity of the responses from the patients.

I feel that a remark used by the late Wendell Johnson about his research in stuttering is quite appropriate to me at this time. He used to say, "Today we are in the midst of an experiment. If I return in a year or two-- as I would like   to address you again , I hope to say more and different things than I am saying today." I'm in the midst of this study. I had originally planned only to look at a few factors. Then it became apparent that if I did not study all facets and each patient response, rather than doing random samples, I would fall short of a proper analysis. Because of the increased depth of the study, only two patients of the series of six are completed.

For each patient there are 1000 or more verbal responses. These have been coded and punched onto IBM cards, thanks to the efforts of my Indiana University freshman son, David. But I am completely at the mercy of the computer center advisor with reference to factor analysis, regression curves, etc. Until all patients in the series have been completed, this data will not be available. Therefore, this presentation is one of descriptive, clinical data.

If only physiologic factors were active in the aphasic patients, we would expect a steady improvement in the goodness of quality of their responses over time in all types of social interactions with persons in

their environment. Thus, a plot of their responses should show a rather rectilinear curve. If a plot of the patients' responses show fluctuations over time, we may say that they are related either to physiologic changes in the brain or to other factors, possibly environmental ones. If our plot of responses should show a pattern of variability with better responses regularly related to certain persons in the patient's environment and poorer responses with other persons, then we might infer that the interpersonal factors are just as relevant, if not more so, as those elusive possible physiologic differences.

Each patient interaction was plotted according to the PICA score on a time basis for the entire time of the recordings in the hospital. The overall responses of both patients show a tri-modal distribution. Most responses were 12's (incomplete statements); quite a few are 15 and 13's (complete or complete but delayed responses); the others drop to "4 to 3 country" (unintelligible differentiated or undifferentiated remarks, respectively). Some idea of this plotting can be gained by referring to Figure 1, which displays samples of interactions involving Patient One over several days.

Over time, fewer of the poor responses and more of the better responses were found. In Figure 1, longer periods of time during the days are filled with higher quality responses as represented in samples of days 7 and 8, for example. Besides an overview of patient responses, one can isolate the interactions with specific stimulators in the patient's environment. The "oval envelopes" in Figure 1 show responses of the patient to a clerk, his physician, and a nurse.

The most striking example of differences in verbal output to different individuals can be seen in Figure 1 on the morning of the seventh post-operative day. In the first envelope are the responses of the patient as he speaks with his physician (MD); these responses indicate variations from 3 to 15 with a majority of 12's. Then after the physician leaves the room, the patient continues to talk with the morning nurse (Nurse #1, not in an envelope). Notice that his responses stabilized in a positive fashion, never dropping below 12's with many at the 14 and 15 levels. Since these records indicate a continuous session one morning, the patient is responding differently in a very short span of time with these two different individuals.

Later that same day with the evening nurse (Nurse #2) the patient shows great variability again. He responds with as many poor responses as good ones.

Another way to view the overall responses of the patients is to study the ratio between the "good" and the "poor" responses as might be defined in PICA terms by grouping all responses 8 through 16 as "good" and 1 through 7 as "poor." In Figure 2, although there are obvious variations from day to day, Patient One shows a trend toward overall improvement over time. We would expect this type of change on any basis--either on a physiologic basis or an interpersonal adjustment basis. More importantly, if the improvement in linguistic output over time is only related to physiologic improvement, we should see the same rectilinear curve regardless of the persons with whom the patient is interacting in his environment.

Let us consider how the patient does act under the four different situational conditions mentioned earlier. We can display the patient's responses over time under Supportive or Non-Supportive and Threatening or Non-Threatening conditions.

In Figure 3, we see samples of the responses of Patient Two under these various conditions. Condition 1 (c1) <u>Supportive-Non-Threatening</u> shows some
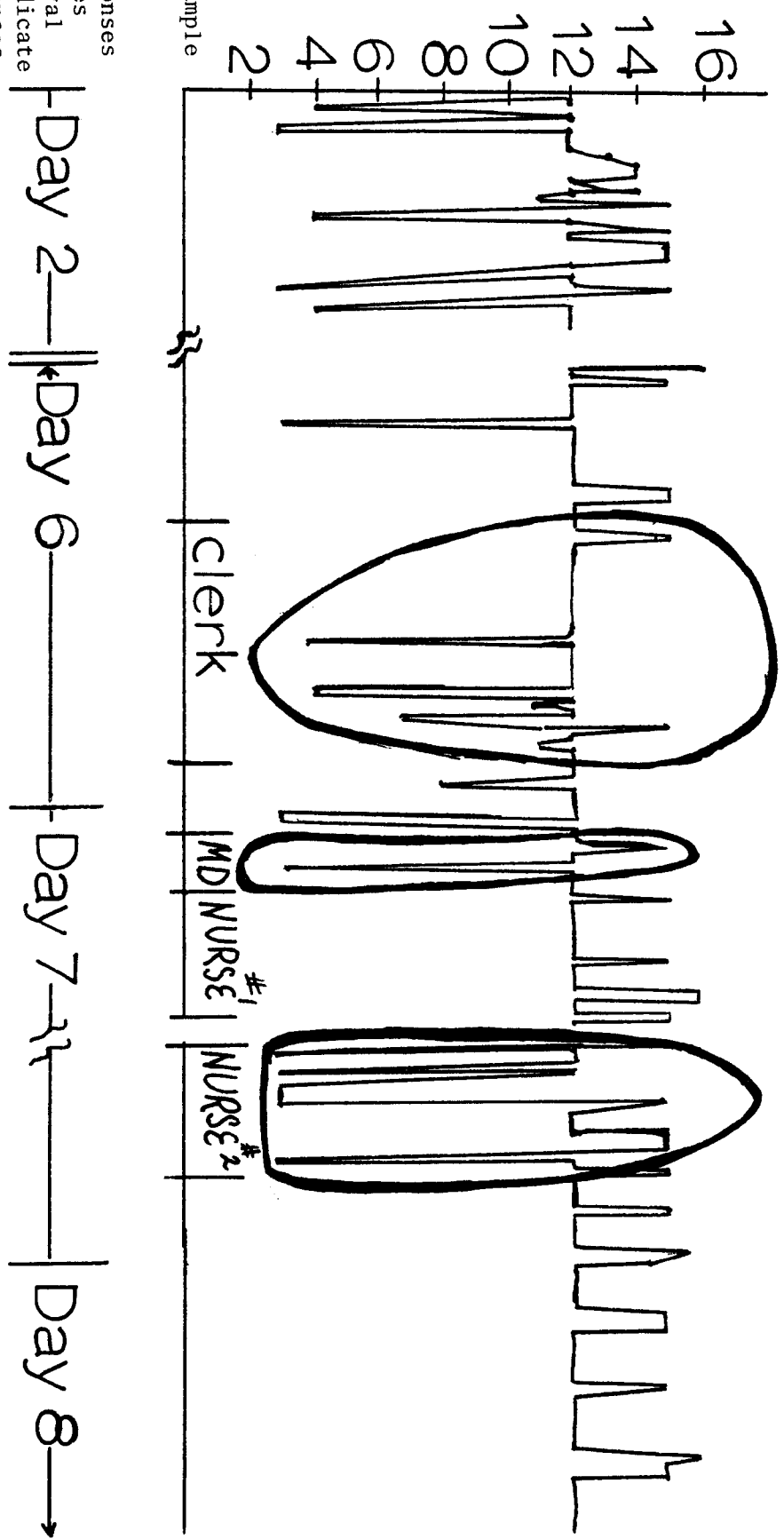
Figure 1. Sample Responses by Patient 1. Patient responses in PICA scores over time; oval envelopes indicate patient responses with a particular individual as identified in the transcripts.
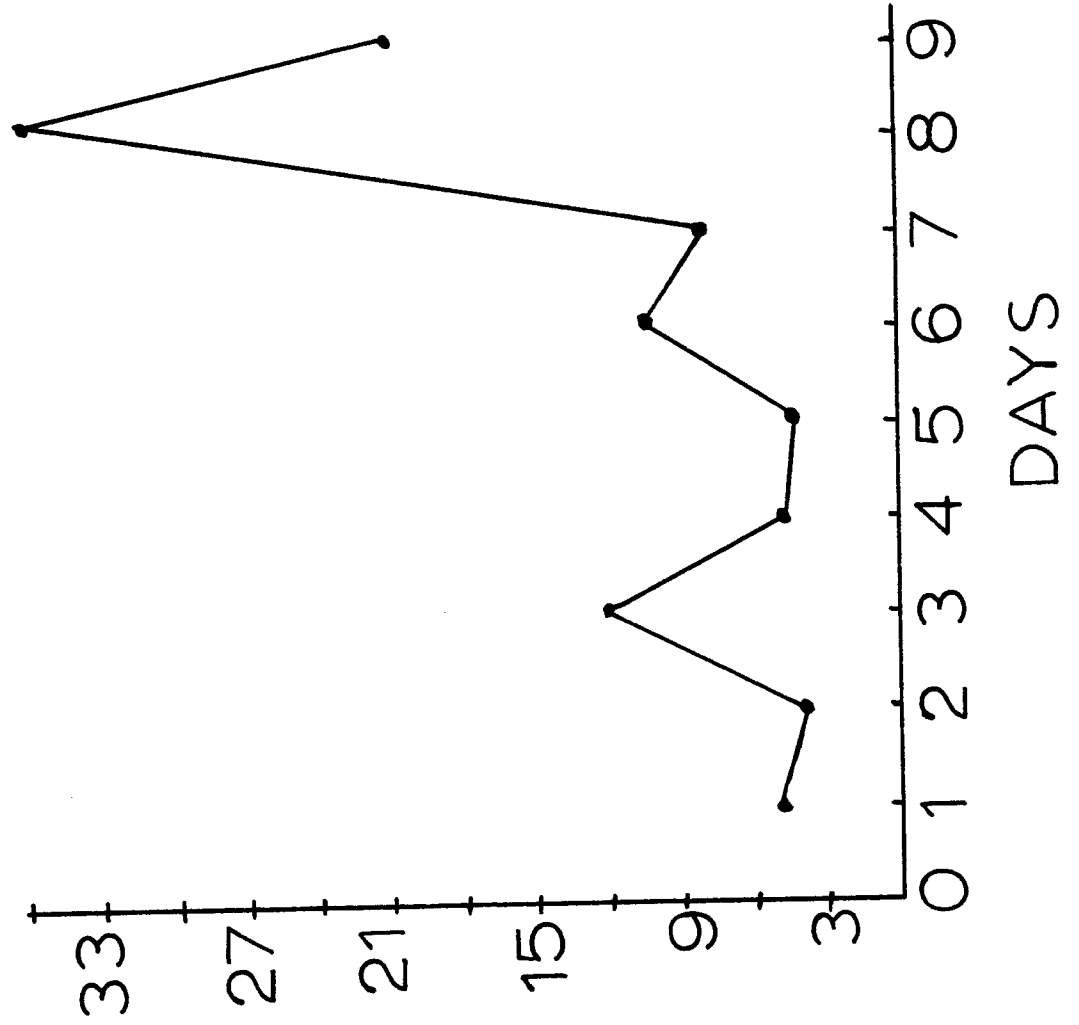
Figure 2. Response
Ratios of Patient 1.
Ratios of good (PICA
8-16) responses to
poor (PICA 1-7)
responses for patient
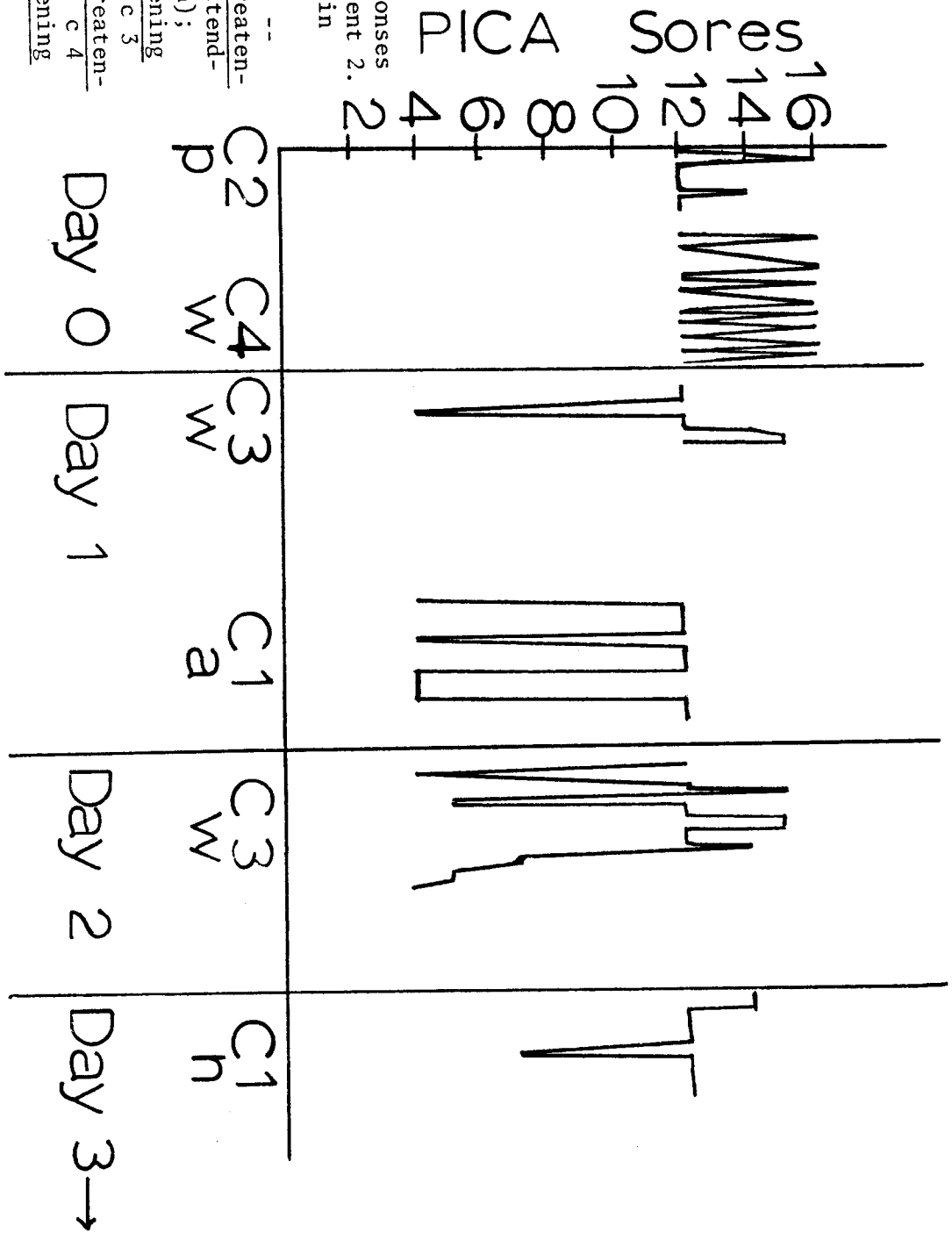1 over nine days of
recordings.

Figure 3. Sample Responses by Conditions for Patient 2. Patient 2's responses in PICA scores under four situational conditions --
c 1 Supportive-Non-Threatening with a hospital attendant (a) and a nurse (n);
c 2 Supportive-Threatening with a physician (p); c 3 Non-Supportive-Non-Threatening with his wife (w); c 4 Non-Supportive-Threatening with his wife.

variability as the patient responded to a male attendant (a) on Day 1 when the responses ranged from 4's to 12's with more of the latter being seen; other variability is seen with the nurse (n) on Day 3 when the responses were between 7 and 14 with most again at the 12 level. In this same figure, Condition 2 (c2) Supportive-Threatening can be seen with the physician (p) on the pre-operative day (Day 0). The patient's responses ranged from 12 to 16. Condition 3 (c3) Non-Supportive-Non-Threatening can be seen with the patient's wife (w) on Day 1 and again on Day 2; both samples show variability in the patient's responses. The last condition (c4) Non-Supportive-Threatening can be seen during the pre-operative day as the patient responds with his wife (w). It is interesting to note that this patient had mostly Non-Supportive treatment from his wife and that he responded to her, but to no one else during his hospitalization, by using profane language. He also appeared to have done equally well in his pre-operative day whether the situation was a Supportive or a Non-Supportive one.

Now to return to Patient One, who had very few instances of Non-Supportive conditions. In Figure 4, the mean numbers of responses by environmental situations are displayed. We see that the patient does about as well when the general conditions are Supportive regardless of whether the remarks are Threatening or Non-Threatening. The dashed line represents Threatening remarks about his speech; both lines, however, represent Supportive conditions. There were only four examples during his hospitalization of Non-Supportive conditions; they have been noted as x's and o's, but not "graphed." In this same figure, the variations on the first two days are remarkable. The patient did better during day one in response to threatening remarks, but plunged in the face of the same types of threatening remarks on the second post-operative day.

For Patient Two, we see, in Figure 5, the mean numbers of responses according to environmental situations, beginning with a pre-operative day (Day 0). His responses over time are quite similar to those of Patient One; compare the solid lines of Figures 4 and 5, which indicate their responses to Supportive-Non-Threatening situations. A comparison of the two patients' dashed lines, indicating their responses to Supportive-Threatening situations appears to be different. While Patient One shows a general improvement in both of these Supportive situations, Patient Two shows a general trend for a negative curve over time for the Supportive-Threatening situation. Patient One had too few Non-Supportive situations to plot, but Patient Two had many such situations, especially when interacting with his wife. In Figure 5 Patient Two shows much variability in his responses under Non-Supportive-Non-Threatening situations (x's) and under Non-Supportive-Threatening situations (o's), the trend of both curves is in a negative direction.

It is interesting to note that Patient Two fought hard against his wife in face of Condition 3 (Non-Supportive-Non-Threatening) for the first two post-operative days, then steadily declined in his responses under this condition.

Although generalizations cannot be drawn definitively until all six patients have been studied, some preliminary trends have emerged. Both patients show improvement in language usage over time when under Supportive-Non-Threatening environmental situations. Patient Two, the only one of the pair of patients to have sufficient numbers of Non-Supportive situations to analyze, shows negative curves over time between his quality of responses and the Non-Supportive situations. The lack of uniform improvement over time as shown in Figure 5 for the Non-Supportive conditions indicates that whatever improvement there may be in language, which is a function of
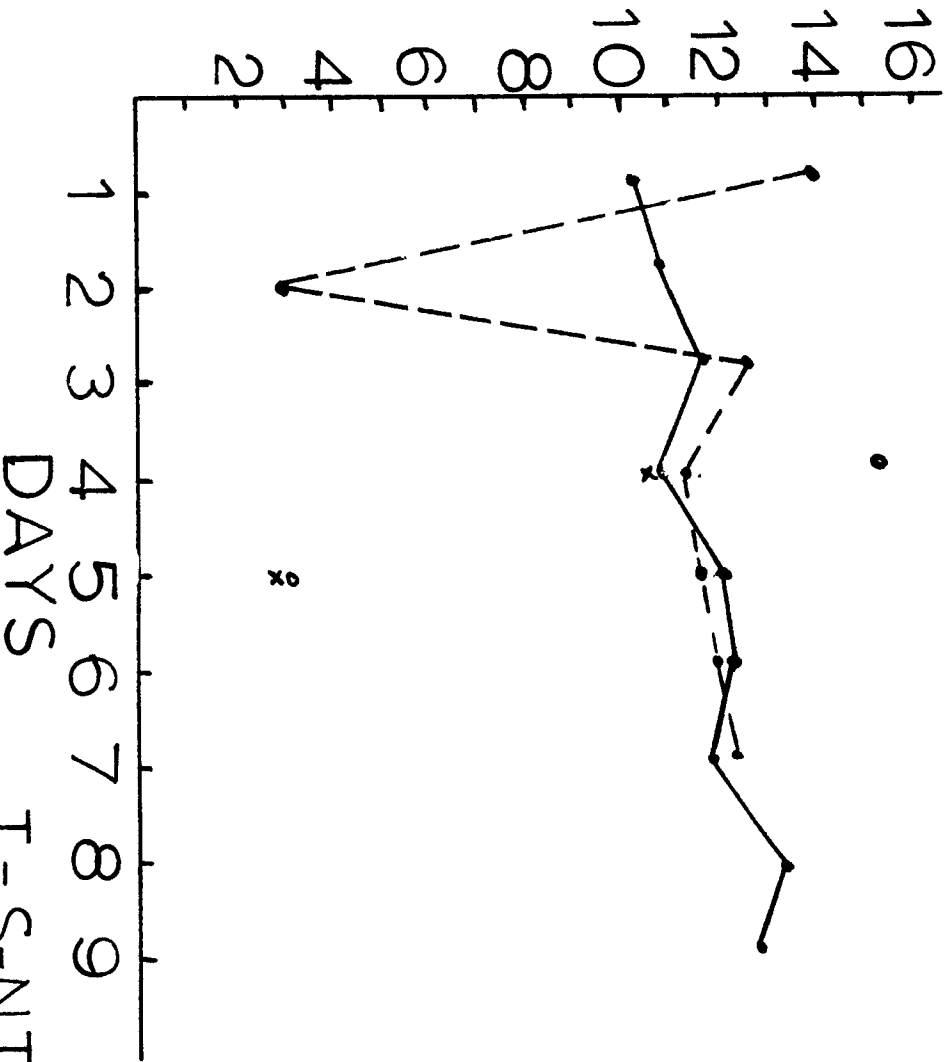
Figure 4. Response Means for Patient 1 by Situations. Patient 1's response means in PICA scores for nine days of recordings under four situational conditions.

RESPONSE MEANS
by situations
PATIENT ONE

DAYS

I = S-NT ———
II = S-T – – –
III = NS-NT × × ×
IV = NS-T ° ° °

RESPONSE MEANS
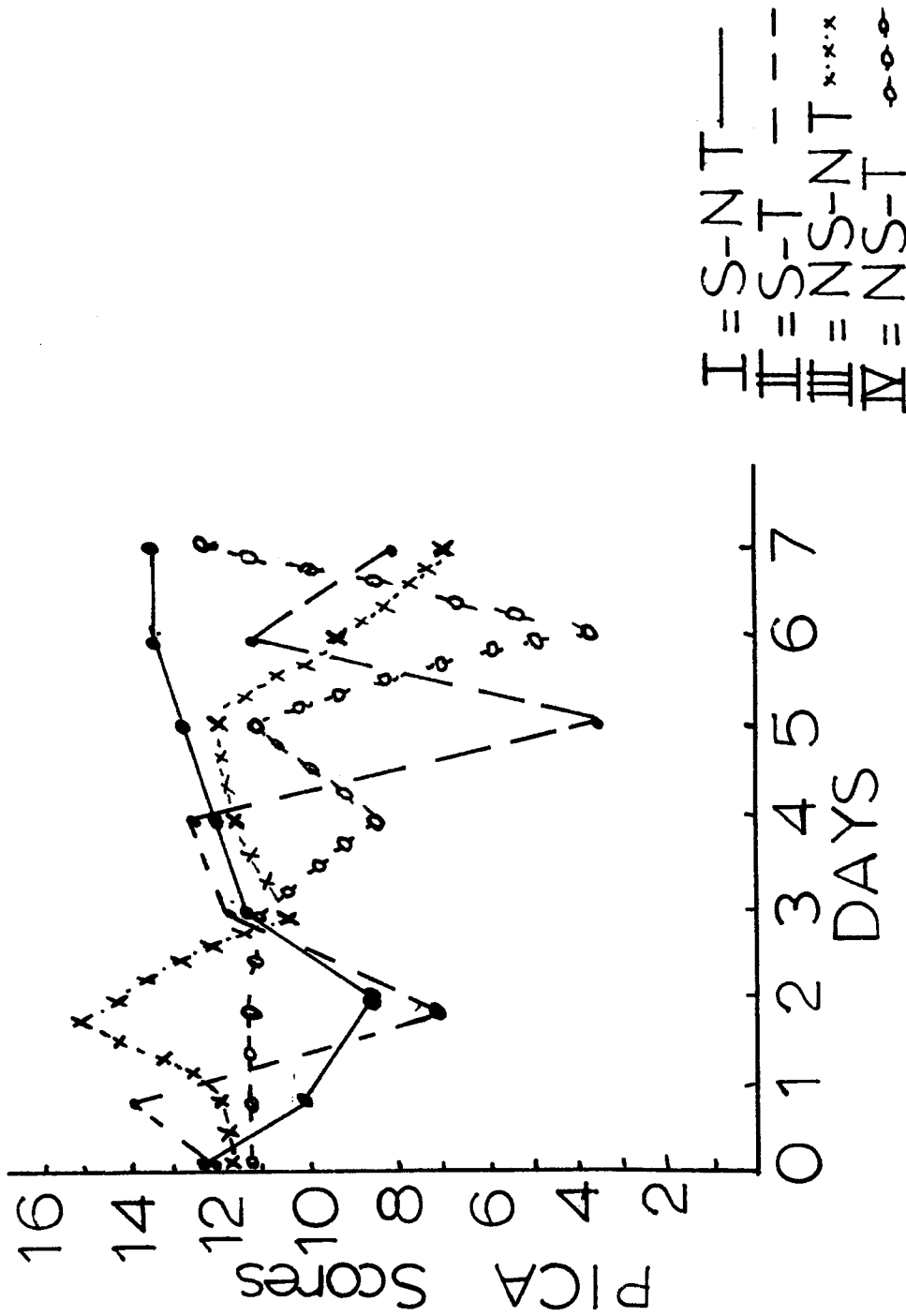## by situations
PATIENT TWO

Figure 5. Response Means for
Patient 2 by Situations.
Patient 2's response means in
PICA scores for eight days of
recordings under four situational
conditions.

I = S-NT ———
II = S-T − − −
III = NS-NT ×××
IV = NS-T φφφ

physiologic improvement, cannot be found when the patient is in a <u>Non-Supportive</u> environment.

From a clinical point of view, this study reminds us once again of the importance of providing the patient with a supportive environment to assist in the recovery of language. We can also note the importance of the speech pathologist's reaching all the persons in the patient's environment and explaining to them how vital their reactions are to the patient's well-being.

References

1. Stoicheff, M.L. Motivating instructions and language performance of dysphasic subjects. <u>Journal</u> <u>of</u> <u>Speech</u> <u>and</u> <u>Hearing</u> <u>Research</u>, 3:75-85 (1960).

2. Classification system, an outgrowth of discussions with Robert Milisen.

3. Porch, B.E. <u>Porch</u> <u>Index</u> <u>of</u> <u>Communicative</u> <u>Ability</u>, Vol. 2, revised. Palo Alto: Consulting Psychologists Press, 1971.

Discussion

Q: Is it possible that your classification could have been affected by knowing what the patient responses were from the transcripts?

A: That is very possible. As a way of trying to overcome that, I used random samples of statements from the people in the patients' environment without the patients' responses and asked my colleagues what they felt the situation to be; that is, whether the statements were Supportive or Non-Supportive. I did the same thing with reference to the classifications of Threatening and Non-Threatening; here I took 50 selected statements and asked my colleagues to judge whether they would assume the remarks to be threatening or not to the continuation of a conversational interaction. Although I did not run correlations, there was good agreement between my independent decisions and their judgments.

Q: We need to inform others about how important their interactions are.

A: I am glad you brought that up; there have been several people here in this Clinical Aphasiology Conference who have touched on that same point. We need to train the people who are spending the most time with the patients. In this study, the patients were all adult males in a Veterans Administration Hospital. The personnel who spent the most time with the patients were male attendants. One good example of the support from such personnel is the interaction which one attendant had of dropping by the patient's room and saying, "Hello, Capt'n!" regardless of whether or not the patient were an officer. He would usually visit for a while, encourage quite a bit of verbal interaction and always "joke" about something. He never put any demands upon the patient for verbal interaction and the patient often responded well by using complete sentences even though he did not do so with other visitors. Surely we have an obligation to inform those persons who spend a great deal of time with the patient in the early recovery period of just how important their interactions are. Such people are hospital attendants, nurses, aides, physicians, and the family members who appear to "cluster" about the patient constantly in those first few days of recovery.

Q: Is there a way to know how various persons differ? That is, what is it that makes one nurse more supportive and helpful than another one?

A: That is far beyond my plan to study. I can study the types of remarks and the types of patient responses as I have said. There is no easy way to get that out of the computer, though. I can laboriously tease such information out of the transcripts, of course. I have done that already to some extent. For example, each statement is coded by number on the transcript and on the equivalent IBM card. For any segment, we can turn to the transcript and study just what was said-- verbatim. That is the way I knew Patient Two was so angry and swearing at his wife when she asked if he wanted to "make poo."

Q: We have a clinical psychologist on our staff who gives courses in how to deal with patients. So we might have those services to assist us.

A: I have worked in hospital settings where the psychologists were not very conversant with aphasia and its related disorders. Such psychologists were not particularly helpful. Others are different, of course. We have a psychologist on our staff who has much information about aphasics and is most helpful in counseling spouses and families. Surely we must make use of the best help we can obtain from such supportive personnel.

Q: It is commonly thought that something about the personality of the aphasic is a manifestation of the way he was before with intensification. Do you have enough information from observation of the patient or his wife--such as Patient Two--to be able to predict who might need counseling?

A: I have had no personal interaction with any of these patients or their stimulators.

Q; Is there anything in the pre-operative day that would help account for Patient Two's 16's?

A: In the pre-operative day, his wife was constantly demanding things from him. She was constantly testing him. First of all, he was having trouble obviously and had already been classified as aphasic. His wife was constantly asking, "Can you read this?" "Can you say this?" etc. He was trying to respond to her. Some of his responses were well-detailed and explicit responses. Some were fragments.

Q: Do you think that we could serve some prophylactic function by being able to predict what type of spouse or family might most need counseling?

A: It would be nice if we could. This present study will probably not contribute to such findings, however. But the individual is the main factor. How he responds; how he reacts. Patient Two, for example, really "plugged" away against his wife's non-supportive behavior for the first two post-operative days. He held out well with her pre-operatively, as you will recall. Then after the second post-op day, he declined rather steadily in face of her non-supportive treatment.

Q: Did you find any differences with reference to time of day?

A: That is one of the answers we will leave to the computer after the series of six patients have been completed. All the responses are coded and we can determine the time of day from the changes of the nursing shifts in the hospital. Then we can roughly determine the time within each shift. I don't see any definite trend from just "eyeballing" the data, however.

Q: Do you have data about the neurologic stability of these patients?

A: I do not have it in my data, nor in this study. The purpose of this present review of the data was to determine the influence of various types of interpersonal treatment upon the language responses of the patients. Obviously all of the patients were relatively unstable in this study. They had all had brain surgery and the data was collected in the first few days post surgery. Infromation about the site of lesion and the extent of aphasia was studied by Mrs. Kaplan in the original investigation.