Assessment And Counseling With Aphasic Drivers

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Speech clinicians typically have a considerable amount of contact with aphasic patients and their families during a period of profound change and adjustment. Often this involvement may necessitate counseling in personal or domestic areas. One such area in which we are asked, or may feel compelled to provide guidance involves the decision whether or not to return to driving. When we reflect upon the decreased independence and potentially fewer opportunities to participate in previously enjoyed vocational, social, and recreational activities when driving is restricted, the question assumes importance in the overall rehabilitation of aphasic persons.

It would appear that many aphasic patients decide to relinquish their licenses; however, a European study of brain-injured men (Walker et al., 1969) found that 65% of this population returned to driving. Within a language maintenance group at our hospital, 50% had returned to driving without formal assessment, counseling, or retraining. This fact, together with the occurrence of several specific requests within the past year to provide help to aphasic patients who desired to drive prompted us to seek a practical, systematic answer to the question, "Whom do we help?" which would identify (1) which aphasic patients have potential to return safely to driving with some assistance; and (2) which persons are at risk as potential drivers.

Coincident with our attempts to deal with this question was the establishment at our hospital of a program in driver retraining which was part of the Rehabilitation Medicine Service. Our interaction with other members of the rehabilitation team involved in the driver retraining program strengthened our belief that the speech pathologist has unique skills and valuable information to contribute to the assessment and counseling of aphasic drivers. Aphasic patients desiring to return to driving may require: (1) evaluation of the influence of linguistic deficits upon driving abilities and upon pre-driving test performances; (2) assistance in locating driver re-education services; (3) help with preparation for the oral or written driver's examination; (4) counseling to maximize comprehension of negative factors which weigh against return to driving; and (5) in some cases, assistance with bus schedules or other alternative methods of transportation.

The purpose of this paper is three-fold: First, to briefly review the literature relative to aphasic individuals and driving performance; second, to present a model of a team assessment and counseling protocol which was developed for use at our hospital; third, to present the results of a pilot study which examined the usefulness and practicality of this assessment protocol.

In searching the literature we found that there is little data available regarding the impact of aphasia on driving competency, or guidelines concerning a method for systematically looking at the aphasic patient who desires to drive. Matsko and his colleagues (1975), in comparing a group of aphasic subjects with normal controls on a simulated driving task, concluded that

overall rating of communication skills was a good indicator of driving potential. Their group described as having "functional" communication did not perform significantly differently on a simulated driving task than did a group of normal controls; however, their group rated as having questionable or non-functional communication skills did significantly worse on the driving simulator task than did either the normals or the functional aphasic subjects. Bardach (1969a, 1969b, 1971) has written extensively on driving in relation to physical, psychological and perceptual dysfunction. In her writings she has emphasized the relative advantages in driving related tasks that left brain damaged persons have over those with right hemisphere lesions. She reports many fewer visual perceptual problems in persons with left hemisphere lesions, and in a retrospective study carried out at the New York Institute of Rehabilitation (1971), found that not one left hemisphere damaged patient who had been through their driver re-education program had been rated as "difficult to teach" to drive again.

Sullivan and his associates (1975), who looked at the performance of right and left brain damaged subjects on a pre-driving screening evaluation found that right hemiplegic patients achieved a greater number of passing scores and provisional passes than did left hemiplegics. They did find, however, that right hemiplegics had some failures on every category of their test battery.

With regard to the available information on the driving task itself and on various factors related to driving competency, we reviewed many sources, including AMA committee reports, government sponsored research projects, publications on traffic safety, and writings on rehabilitation and brain damage. Our review of these data supported the following conclusions in establishing an assessment protocol: (1) central nervous system damage resulting in motor and language deficits does not necessarily preclude driving; (2) while they are at a disadvantage on driving examinations which depend upon verbal skills, right hemiplegics (or left brain injured patients) may have some relative advantages in perceptual areas related to driving; (3) visual impairments are among the most serious detriments to driving and must be carefully explored; (4) various medical and attitudinal factors which may negatively influence safe driving must be evaluated on an individual basis; (5) language assessment of aphasic individuals who wish to return to driving should be functionally related to the pre-driving screening examination and to the driving task itself.

On the basis of the above information, we developed a model team assessment and counseling protocol. The team members at our hospital, in addition to the patient and his or her family, included a psychiatrist, speech pathologist, occupational therapist, driver education instructor (a corrective therapist), and, when indicated, a psychologist. Input from the entire professional team was sought before finalizing the general format of the protocol, and the wording of each section reflected the desires of the particular team member concerned. A copy of the complete protocol is included in Appendix A.

Two sections of the protocol warrant further explanation. In setting up the section on Communication Status (Section III of the protocol) we attempted to relate descriptions of levels of auditory comprehension, reading and sign recognition, verbal expression, and gestural/written communication as much as possible to the driving task itself or to behaviors which would be essential to successful participation in a driver retraining program. Ratings were based upon current test information available on each of the subjects,

including results of testing with the Porch Index of Communicative Ability (Porch, 1967) and the Minnesota Test for Differential Diagnosis of Aphasia (Schuell, 1965), as well as behavioral observations by the Speech Pathology staff.

Section IV of the protocol refers to screening with a portable psychophysical testing apparatus called the Instructo-Clinic (BumpaTel. Inc., Cape Girardeau, Mo.) This device enables the examiner to test visual acuity at twenty feet, peripheral vision, distance depth perception, color vision, and simple and complex reaction times.

In order to assess the practicality and utility of this team evaluation tool, we undertook a pilot study in which we used our assessment protocol to test retrospectively a sample of aphasic patients who had returned to driving and a group who had not.

Subjects in the pilot study were twenty aphasic patients, seventeen men and three women. Etiology of the lesion resulting in aphasia in all subjects was cerebral vascular accident (16 thrombo-embolic and four hemorrhagic). Subjects were divided into two groups of ten, based upon driving history since their stroke. Group I consisted of nine men and one woman who had resumed driving, while Group II consisted of eight men and two women who had not driven since their cerebral vascular accident. Table 1 summarizes the data with regard to age, etiology, and months-post-onset of our subjects.

Table 1. Ages, Etiologies And Months - Post - Onset For Subjects In the Two Groups

Group	Age In Years	Etiology	MPO
Drivers			
DA	51	thrombosis	65
DF	70	thrombosis	173
MH	47	thrombosis	100
SH	67	thrombosis	28
AJ	46	thrombosis	79
RJ	58	thrombosis	7
AHM	46	hemorrhage	24
ASM	46	thrombosis	6
TM	58	thrombosis	13
JW	75	thrombosis	25
	$\bar{x} = 56.4$		$\bar{x} = 52$
Non-Drivers			
BB	49	thrombosis	24
JC	57	thrombosis	30
BE	52	thrombosis	3
RG	51	hemorrhage	61
VL	62	thrombosis	87
NL	59	thrombosis	81
RM	62	thrombosis	28
AM	50	hemorrhage	24
DR	58	thrombosis	67
DS	44	hemorrhage	86
	$\bar{x} = 54.4$		$\bar{x} = 49.1$

In terms of possible contaminating factors, Mann-Whitney U Tests (Siegel, 1956) revealed that the two groups were not significantly different with regard to age or months post onset.

We were also interested in whether the two groups were different in communicative efficiency as measured by overall scores on the Porch Index of Communicative Ability. A Mann-Whitney U test indicated that the drivers and non-drivers were not significantly different in terms of overall PICA scores.

Subjects were individually scheduled for testing at the Portland V.A. Hospital and were evaluated and rated independently by each of the team members. Medical charts were reviewed for pertinent neurological and medical information.

The next section briefly summarizes the results of the pilot study in terms of language evaluation ratings, ratings by the occupational therapist, Instructo Clinic performance scores, overall ratings of performance, and recommendations.

In examining the language skill ratings of the drivers and the non-drivers (Fig. 1), we found that out of a total of 40 ratings for each group, the drivers achieved 25 functional scores and 15 non-functional scores. The non-drivers

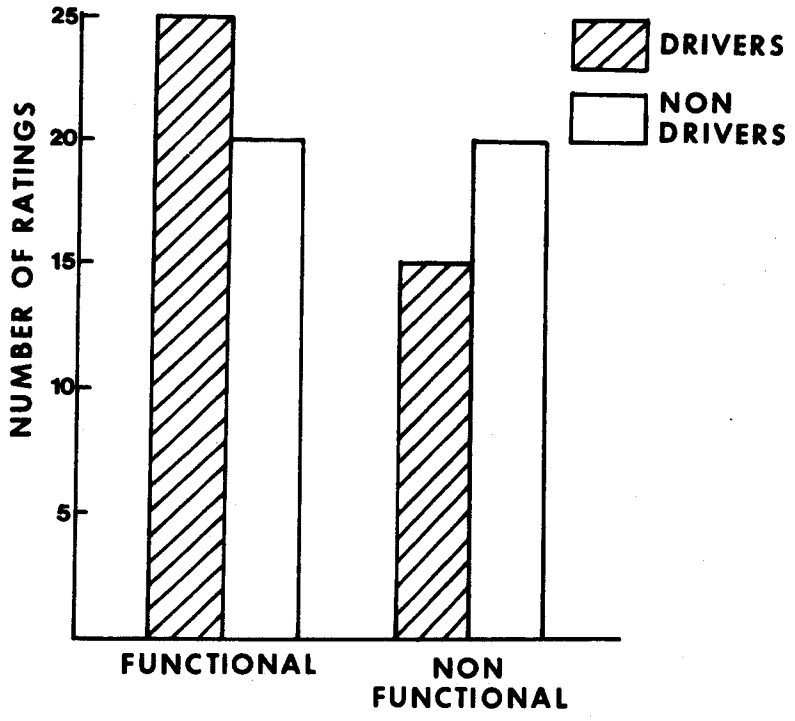

Figure 1. Language skill ratings of drivers and non-drivers in terms of number of functional scores and nonfunctional scores on the protocol. Not significantly different at .05.

received 19 functional ratings and 21 non-functional ratings. When we looked at the language evaluation ratings of those who were rated as acceptable driver training candidates (a total of 14 of our subjects) and of those who were rated as not being driving candidates (a total of six subjects), we found that the group rated as driving candidates received 34 functional ratings and 22 non-functional ratings. Of the six not accepted for the driver training program, a total of 10 functional ratings and 14 non-functional ratings were given. These data are displayed in Figure 2. Fisher Exact Probability Tests (Seigel, 1956) revealed that none of these differences were significant at the $p = 0.5$ level. Likewise, comparing overall mean PICA scores of the group rated as driving candidates ($\bar{x} = 12.74$) with the overall mean PICA scores of the group considered not acceptable driving candidates ($\bar{x} = 12.05$), a Mann-Whitney U Test revealed that the two groups were not significantly different at the $p = .05$ level.

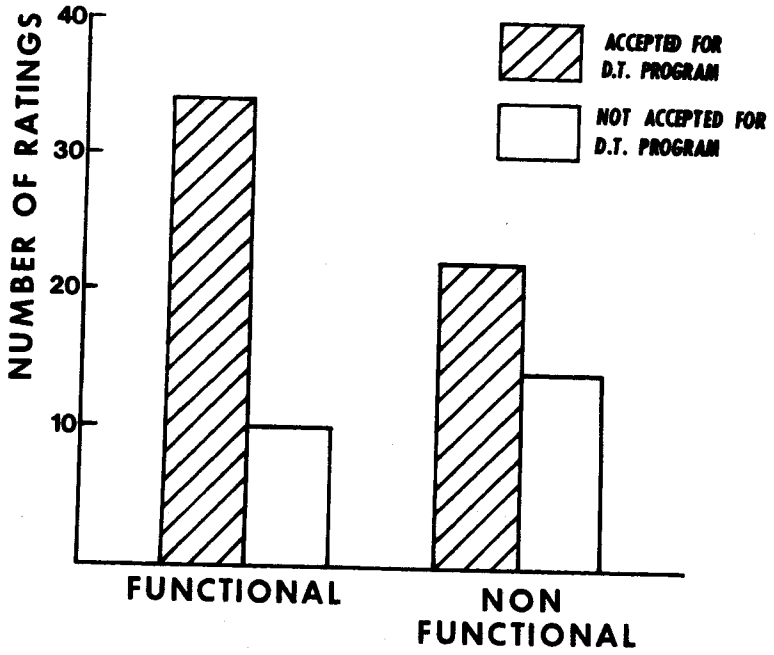

Figure 2. Language skill ratings of those accepted for driver training program and those not accepted in terms of number of functional scores and nonfunctional scores on the protocol. Not significantly different at .05.

Table 2 summarizes the occupational therapist's ratings of the drivers and non-drivers on a battery of visual perceptual tasks. Seven drivers and just two non-drivers were given an overall rating of "Good" on visual perceptual tasks. It is interesting to note that no drivers were rated as "Poor".

Table 2. Occupational Therapist's Ratings Of Drivers and Non-Drivers On a Battery Of Visual Perceptual Tasks.

Driving Status	Good	Questionable	Poor
Drivers	7	3	0
Non-Drivers	2	3	5

The middle group, or those who received a "Questionable" rating contained three drivers and three non-drivers. These results may reflect that aphasics who have serious perceptual deficits make a reasonable decision on their own, or with the help of their families not to drive. The overlap in the "Questionable" category suggests, however, that there are a number of aphasic patients who need assistance and retraining if they are to drive safely again. In looking at this data another way, Figure 3 illustrates the functional ratings of

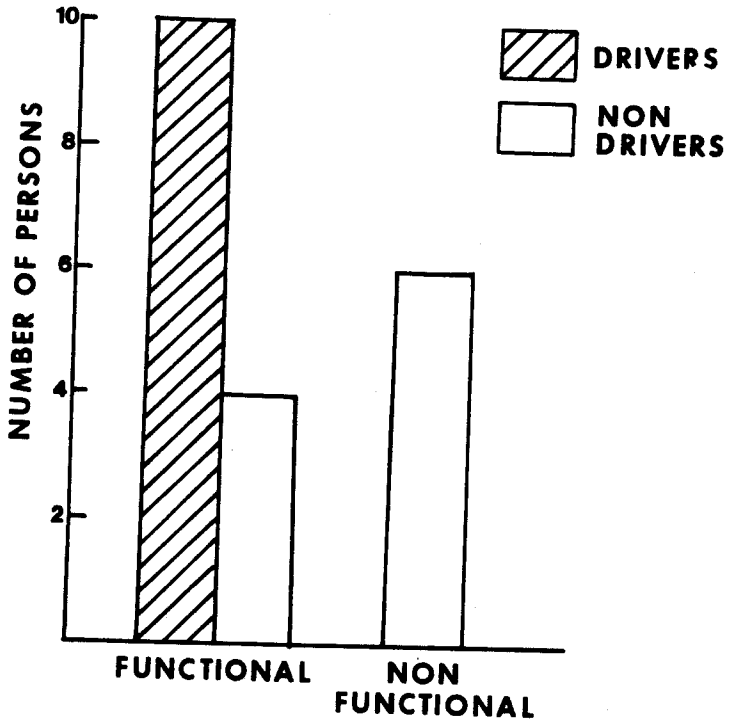

Figure 3. Functional ratings of drivers and non-drivers on visual perceptual tasks. Significant at .01.

the two groups on visual perceptual tasks. A Fisher Exact Probability Test applied to this data showed that the two groups were significantly different on visual perceptual performance at $p = <.01$.

In examining the scores of both groups on the Instructo Clinic tasks (Table 3), we found that all subjects passed the visual acuity screening. There was little difference in the two groups in terms of peripheral vision ratings. On depth perception, the drivers did slightly better than the non-drivers. Looking at reaction time, which is considered to be one of the most important psychomotor variables in driving safely, the drivers did much better than the non-drivers, with this difference just failing to reach significance at the $p = .05$ level (Fisher Exact Probability Test, $p = .08$).

Table 3. Instructo Clinic Data On The Two Groups.

Test	Passed	Failed
Visual Acuity		
Drivers	10	0
Non-Drivers	10	0
Peripheral Vision		
Drivers	7	3
Non-Drivers	6	4
Depth Perception		
Drivers	8	2
Non-Drivers	6	4
Color Vision		
Drivers	7	3
Non-Drivers	9	1
Reaction Time		
Drivers	8	2
Non-Drivers	4	6

Next we looked at the total functional performance ratings for both groups (Section V of the protocol). The drivers achieved a total of 72 functional ratings and 18 non-functional ratings, while the non-drivers received 55 functional ratings and 35 non-functional ratings (See Fig. 4). Applying the Fisher Exact Probability Test to this data, we determined that this was a significant difference between the two groups at $p = <.01$.

Finally, summarizing the recommendations of the rehabilitation team for the two groups (Sections VI and VII of the protocol) we found that all ten who had been driving rated as candidates to be referred to the driving training program, while of the non-drivers, four were recommended for the driver training program and six were not (See Fig. 5). Again using the Fisher Exact Probability Test, this was a significant difference at $p = <.01$.

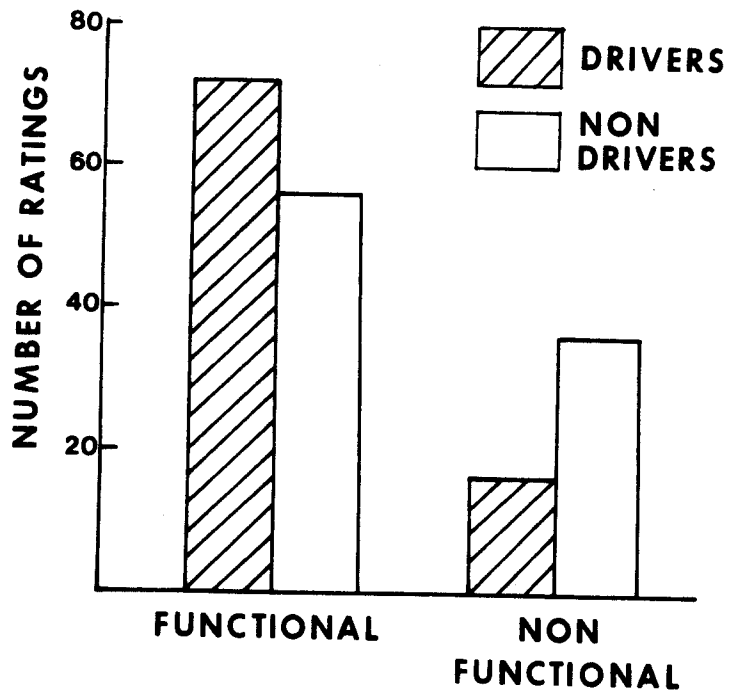

Figure 4. Total number of functional performance ratings of drivers and non-drivers. Significant at .01.

In summary, this assessment protocol appears to have the potential to allow us to identify the aphasic population that we might encourage and assist in their attempts to drive again, and to aid us in counseling patients and their families about potential driving risks. It does not appear, on the basis of our results, that language performance alone is the best indicator of driving potential, but rather that visual perceptual and psychomotor factors such as reaction time are more important variables. We intend to continue to use this protocol and to examine it relative to the subsequent driving success of our patients and our counseling success in discouraging high risk patients.

At this time we feel that a team assessment procedure offers the most beneficial approach to driving rehabilitation for staff and for aphasic patients. As clinicians, we recognize that brain injury and aphasia are handicaps measured by the competitive disadvantages imposed and that the degree to which we reduce these disadvantages is the essence of rehabilitation.

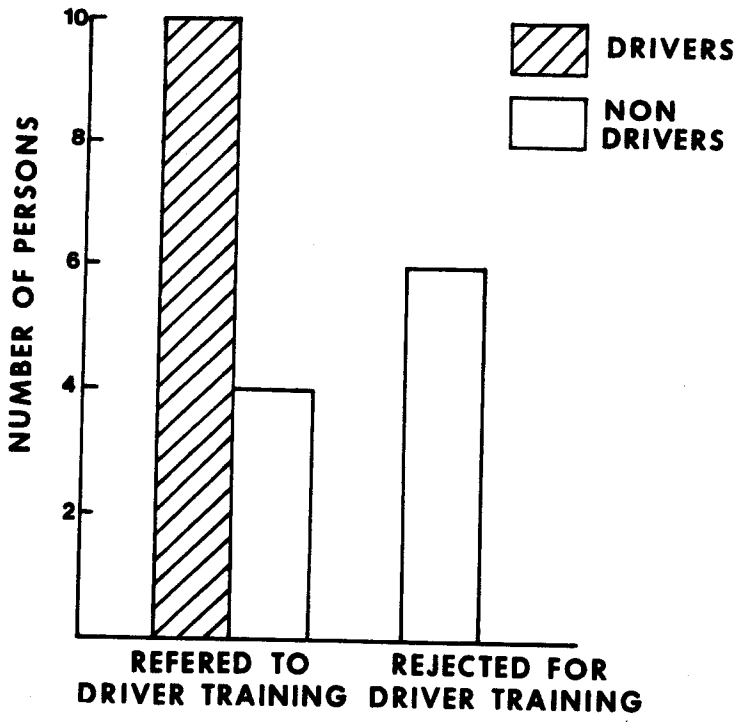

Figure 5. Recommendations of the rehabilitation team for drivers and non-drivers. Significant at .01.

Discussion

Q. How was reaction time measured in the study?

A. Simple reaction time was measured by the Instructo-Clinic unit. A green light is activated, and the subject is instructed to "step on the brakes", (a simulated brake pedal attached to the unit), "as soon as the red light goes on".

Q. How did the patient-subjects react when the results of testing were interpreted to them, and how did their families react to them participating in the study?

A. As far as the patients themselves were concerned, their responses confirmed my feeling that generally, left-hemisphere damaged persons are reasonable people. For example, our "freshest" subject, BE, who was only three months post onset, when told that the team felt that he should be re-evaluated in three months before being considered for the program said, "I agree with that. I don't feel ready to drive".

Q. What about obtaining insurance?

A. I do not know too much about this area. It is my understanding that these folks go into a high risk group, and that their insurance is very expensive. In Oregon, the Motor Vehicle Department requires evidence of insurance coverage before a license is issued, and I know that several of our patients who have gone into the driver retraining program have obtained high risk insurance.

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Appendix A
Driver Training Counseling Form

Portland V.A. Hospital
Speech Pathology Section

Performance Deficits Affecting Driving Skills

Checklist for Counseling Aphasic Adults

I. Identifying information: Name, D.O.B., SSN, Etiology, Date of Onset, and Driver's License Status.

II. Medical Status:

A. Pertinent Medical History (Type and extent of lesion, surgeries, diseases, etc.):

B. Current Physical Status (General physical condition, stamina, medications, etc.):

C. Neurologic Status:

1. Visual Deficits (diplopia, strabismus, nystagmus, occular pursuits, hemianopsia):

2. Sensory-Motor Functions (sensation, strength, range, coordination):
   a. trunk (sitting balance, stability):

   b. upper extremities:

   c. lower extremities:

3. Perceptual/Motor Factors:

   spatial relationships, unilateral denial, figure/ground perception, right-left confusion, reversals, limb apraxia, body image, eye-hand coordination
   Comments:

D. Psychological Status (Judgment, attitudes, psychiatric history, etc):

III. Communication Status:

A. Auditory Comprehension:
   Cannot follow simple verbal instructions; needs gestural augmentation
   Comprehends single words & short phrases, simplified instructions
   Follows two part instructions
   Follows most verbal instructions; may need repetition
   Follows verbal instructions with little apparent difficulty

B. Reading and Road Sign Recognition:
   No functional reading ability; can recognize pictorial signs
   Recognizes common road signs
   Recognizes content words in short phrases & sentences
   Reads simple material with good comprehension
   Can read & comprehend substance of driver's manual
   Could answer typical printed (written)Driver's Examination questions

C. Verbal Expression:
   No functional verbal expression
   Has difficulty naming single letters or numbers
   Can name common road signs & driving related items
   Expresses meaning of road signs in single words or short phrases
   Can paraphrase regulations in driver's manual
D. Gestural and Written Communication:
   Has a reliable yes/no response
   Appropriately gestures right and left
   Profits from supplemental gestures to aid his comprehension
   Uses gestures to supplement verbal expression
   Uses writing to supplement verbal expression
E. Hearing Status:

IV. Driver Education Instructor's Pre-Driving Screening (Instructo-Clinic):
A. Visual acuity at 20' right, left
B. Peripheral vision right, left
C. Depth Perception
D. Color Vision
E. Reaction Time
Comments:

V. Summary.

Performance Area	Functional	Questionable	Poor
Language and Speech Functions			
Auditory comprehension			
Reading Comprehension			
Verbal Expression			
Gestural and Written Exp.			
Visual Perception			
Hearing Acuity			
Motoric Functions			
Reaction Time			
Attitude/Judgment			

VI. Recommendations:
1. Physician's recommendation and concerns:
2. O.T./P.T. recommendations and concerns:
3. Driver Education Instructor's recommendations and concerns:
4. Speech Pathologist's recommendations and concerns:

VII. Disposition:
A. Pursue reinstatement of driving privileges with these precautions (Specify).
B. Referred to driver retraining program.
C. Discouraged return to driving
D. Re-evaluation in months.
E. Other recommendations (Specify).