Functional Assessment of Cognitive Transit Skills

FACTS

DEVELOPMENT AND VALIDATION OF A FUNCTIONAL COGNITIVE TEST

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Introduction

ADA eligibility criteria require that applicants who qualify for paratransit service must be functionally unable to use fixed route transit services by virtue of their disability. In the case of individuals with cognitive disabilities, this implies that they must be unable to use fixed route services because their disability affects the cognitive skills required to do so. However, although the orientation and mobility literature provides some information about what skills are required for mobility in the community, neither a review of the literature nor the survey of best practices carried out as part of this project revealed an appropriate method by which transit authorities might determine with a reasonable degree of certainty which applicants for paratransit services possessed the relevant mobility skills. No functional test was discovered that was at once practical for use by transit authorities, known to be a valid predictor of functional ability, likely to be acceptable to individuals with disabilities and capable of universal application.

Several possible methods were considered but rejected as unsuitable or impractical. A full mobility evaluation, taking several hours in a natural environment would clearly be too expensive, probably too burdensome to applicants and might expose transit authorities to potential liability because of the risks of injury to applicants during the evaluation process. Formal neuropsychological assessment of cognitive function requires the services of professionals who are unlikely to be available to many transit authorities. In any case, neuropsychological test results are not typically easy to translate into statements about functional capacity in everyday life and, currently, there is no evidence that neuropsychological testing can be used to determine whether an individual has the

ability to use fixed route transit. Similarly, neither professional certification (e.g. by a physician, psychologist or occupational therapist) nor self-certification by the individual have been shown to be valid measures of functional mobility skill and it is unlikely that the same standards are applied by different individuals when making eligibility recommendations. This creates the potential for the introduction of unfairness and personal bias into an eligibility determination procedure that should be equitable and objective. There is also considerable pressure on professionals to serve their own clients by arranging paratransit services for them in the same way that they prescribe medications and other mobility aids.

A key part of this project, therefore, was the development of a cognitive functional assessment protocol designed to fill this gap and enable us to determine whether applicants either possessed the cognitive skills required to use fixed route transit services or could be trained to use such services. In consultation with paratransit staff and consumers, it was decided that any cognitive assessment tool that forms part of an eligibility determination process must meet the following criteria:

- It must be practical for transit systems in that it must be capable of being administered by appropriately trained transit staff without a professional background in medicine or behavioral science.
- It must be brief, taking an average of no longer than 30 minutes to administer.
- It must have a high degree of community and individual acceptance and be respectful of people with disabilities. To this end, it must be seen to assess relevant functional skills in a face-valid manner which is non-medical, non-academic and does not infringe on the dignity of applicants or cause them undue distress, discomfort or other burden.
- It must be reliable and adequately standardized so that it can be administered in a consistent manner and yield an objective measure of an applicant's functional ability.

- The results must be a true reflection of the individual applicant's real-life skills such that the results can be used to determine with reasonable certainty whether applicants possess the functional ability to use fixed route transit services and, if so, in what circumstances.

- It must be adaptable for use by other transit systems which differ in detail from the system in which it was developed.

- In addition, it would be desirable if the assessment provided some guidance on what particular skills, if any, needed to be developed so that applicants could be given feedback and scarce training resources could be allocated efficiently.

- Development and validation of the functional assessment device proceeded in 5 stages.

- First, the general principle of an evaluation based on an assessment of the applicant's ability to learn to take a simulated bus trip involving key mobility skills was articulated and the basic experimental design was set out.

- Then, a list of essential mobility skills was prepared under the auspices of a steering committee composed of consumers, mobility experts and paratransit staff. This was accomplished by conducting a task analysis of a bus trip and refined by reference to the literature and thorough discussion with a number of O & M Specialists.

- Third, the test format was worked out, stimuli were prepared and selected, appropriate responses were agreed and the prototype assessment device, known as the Functional Assessment of Cognitive Transit Skills (FACTS), was reviewed and modified with the guidance of the steering committee.

- The fourth stage was a field test of the prototype in which 85 potential applicants for paratransit services, all with developmental disabilities, were tested with the prototype functional test. Each person's mobility skills were independently evaluated in the community by a trained O & M Specialist whose ratings constituted the "gold standard" against which the results of the functional test were evaluated. The project staff who administered FACTS were unaware of the individuals actual mobility status as rated by the O & M Specialist, and she was blind to the results of the functional test.

- Finally, the data were examined to determine how far the functional test scores corresponded with the O & M Specialist's decision.

Description of FACTS

The resulting assessment device meets the first three criteria for a functional test that were set out above - it is practical, reasonably brief and acceptable to the community for whom it was designed. Our data also suggest that it meets the fourth and fifth criteria (reliable and valid prediction of functional mobility skills) in that FACTS score correctly predicted potential mobility status in 85% of our experimental population in the pilot study. Plans have been made to confirm this with an independent sample. The results also provide some information about which functional skills need further development in individuals whose cognitive disabilities prevent them from achieving full mobility although further studies are required in order to help us determine just how useful FACTS may be in this connection.

The key features of FACTS are that it is an individually administered, one-on-one functional test of the cognitive skills required for independent travel. It can be administered in any reasonably large space which does not have to be exclusively reserved for this purpose. There should also be access to some other definable space (e.g. a separate corner of a large room or another room) that can serve as a waiting area. During standardization, for example, the FACTS prototype was administered in large Therapeutic Activities Centers and workshops where other activities were going on in other parts of the large common space, in a conference room, a classroom and in a large office. FACTS takes about 30 minutes to administer although additional time is required for scoring. It was administered by two trained paratransit staff members who were shown to be able to administer and score the test reliably.

Most of the test stimuli are clear, professional-level colored photographs shown in a large booklet or back projected as slides on a table top unit. For one subtest (route finding) ten colored posters of environmental scenes are laid out in a pre-arranged order to serve as landmarks. FACTS emphasizes functional responses (e.g., verbal or non-verbal responses are acceptable provided the respondent's intention is clear) and it is hierarchically organized, proceeding from easy to harder items such that the test can be discontinued when individuals' competence is exceeded to avoid causing them distress. FACTS assesses ability to learn as well as current competence and it is modeled on existing criterion referenced assessment devices such as the Vineland Social Maturity Scale and ecologically valid psychological tests such as the Rivermead Behavioral Memory Test. Particular attention was devoted to the development of a clear, unambiguous script to ensure standard, objective presentation of the stimuli and scoring of responses.

FACTS is organized into four main scoreable sections reflecting (i) General Orientation, (ii) Community Skills and Safety, (iii) the ability to learn a simulated Simple Trip involving one bus, and (iv) a more Complex Trip involving two buses with distinct destinations. The Complex Trip is attempted only by those individuals who have demonstrated the ability to master the Simple Trip. The two bus trip sections use a "train and test" format in which applicants are first trained in each component of the task separately (e.g. selecting the correct bus) and then tested to see whether they have mastered it. If not, the task is re-trained and they are re-tested. Up to three training trials are provided for each individual component of the task.

When each component has been trained individually, applicants are asked to link them together and "travel" the whole simulated trip including selecting the right bus, identifying and showing their bus

pass to the driver, selecting the right exit stop, signaling the bus to stop and travelling the appropriate route through the simulated neighborhood to their eventual destination at McDonalds. Scores are assigned for each component of the task and total scores for each section (General Orientation, Simple Trip, Community Skills and Safety, Complex Trip) as well as an overall grand total score are automatically calculated by a scoring program. In addition, provision is made for observation and recording of behaviors which might interfere with community mobility (e.g. repeated stereotypical behavior; inappropriate touching of the examiner; need for frequent redirection to task).

The following specific behaviors were assessed based on task analysis of the bus trip and the functional skills list prepared by the steering committee.

General Orientation

Response to greeting

The ability to provide personally identifying information

Following directions

Time monitoring

The ability to reverse a route and incidental learning (finding the way back to the waiting room at the end of the test)

Simple Trip

The ability to identify a bus stop

Selection of the correct bus

Identification of the driver

Showing a bus pass appropriately

Identification of the exit stop

Signalling exit

Learning a route

Community Skills and Safety

The ability to select a seat on the bus, appropriate on bus behavior

The ability to deal with an unsolicited approach from a stranger

Selecting appropriate clothes for the weather

Appropriate waiting at the bus stop

The ability to cross the street in a variety of situations

Strategies to deal with becoming lost

The ability to seek assistance and knowledge of where to get it

Complex Trip

The ability to distinguish between buses and bus stops appropriate for different journeys

The ability to sequence elements of a complex trip

In addition, test items were configured in such a way as to require some of the more abstract abilities required for community mobility including:

memory

judgement

self-initiation

resistance to distraction

impulse control

communicative ability

Validation Study: Methods

Reliability and validity of FACTS was determined by administering the test to 85 individuals with developmental disabilities whose mobility status was independently determined by a professional O & M Specialist on the basis of a full mobility evaluation conducted in the community specifically for the purpose of this project.

Subjects

Subjects were 85 individuals with developmental disabilities recruited through Therapeutic Activities Centers, workshops, employment centers, schools and other community based agencies in the area. Some were already consumers of paratransit services but their eligibility status was

kept hidden from project staff including those who administered FACTS and, particularly, the O & M Specialist. An attempt was made to stratify the sample by probable eligibility status such that about 50% would be potentially fully eligible for paratransit services, about 25% would be conditionally eligible and the remaining 25% would be ineligible by virtue of the fact that they were fully mobile in the community. The proportions were chosen because they approximate the certification rate for eligibility in Pittsburgh (unconditional or transitional eligibility = 61%; conditional eligibility = 21%; refusals = 18%) with some oversampling of the conditional and ineligible categories to increase statistical power. Subjects ranged in age from 16 to 76 years (mean age = 37.2 years); 46 (54%) were male and 39 (46%) female. In all cases, the evaluation procedures and purpose of the study were described to the subjects and their responsible caregivers before informed consent to participate was obtained.

Procedure

Mobility Evaluation: The O & M Specialist interviewed each subject, either at home or at the agency, in order to obtain a preliminary assessment of their orientation skills. Where necessary, she also observed them on an actual trip through the community involving a bus trip, street crossing, route finding and other representative situations typically encountered in community travel. Fifty-two individuals (70%) were determined to require this level of evaluation in the community and no subject was assigned to one of the categories limiting their eligibility (conditional or ineligible) without having actually demonstrated their skills in a naturalistic setting. The O & M Specialist rated each person's mobility skills both as they were currently developed and, separately, the level

they could be expected to reach with appropriate training. In each case, she assigned the subject to one of three groups based on their actual or potential skill level.

- INDEPENDENT: Travelers with the cognitive skills required for full community mobility defined as the ability to travel on multiple complex routes involving transfers (or having the potential to develop such skills with appropriate training). Such individuals would not be eligible for paratransit services on the grounds of cognitive disability.

- CONDITIONALLY Independent: defined as the ability to travel independently only on a single complex route involving a transfer, only on simple routes or in some other restricted set of circumstances (or having the potential to do so with appropriate training). Such individuals would be eligible for paratransit services under appropriate conditions.

- DEPENDENT on others for assistance: defined as being unable to travel consistently independently under any circumstances (or being unable todevelop the skills to do so). Such individuals would be unconditionally eligible for paratransit.

In addition, each of the individual skills assessed in FACTS was independently rated for each subject.

Twelve subjects, including at least one from each of the mobility categories, were independently evaluated by a second professional O & M Specialist to investigate the reliability of the mobility evaluation. The two evaluators were in complete agreement on the mobility category to which they assigned each of the twelve subjects, both with respect to their current level of ability and their potential following training. Satisfactory inter-rater reliability (kappa intraclass correlations of 0.8 or above) was also established for most of the individual skill ratings after a consensus conference at which points of initial disagreement were discussed. The two evaluators generally agreed more closely on their ratings of individuals' potential to benefit from training where they met the above criterion of agreement with respect to 19 of the 24 behaviors rated.

In the great majority of cases, the mobility evaluation was carried out and the results documented before FACTS was administered. Great care was taken to ensure that neither the investigators nor the staff administering FACTS were aware of these results. In the few cases where FACTS was administered before the mobility evaluation, the O & M Specialist was kept blind to the test results.

Functional Test: Two members of the paratransit broker's staff were trained to administer FACTS and they carried out the great majority of the evaluations. The evaluators were not considered fully trained until they had each practiced administration on several other staff members and until they had been observed successfully administering the functional test to at least one individual with a developmental disability whose data was not included in the subsequent analyses. Following training, they were observed during testing of twelve further subjects by one of the investigators (Susan Chase) to ensure adequate inter-rater reliability of FACTS. Their scores never differed by more than 5.5 points from those of the test designer (Susan Chase) who independently rated 12

evaluations and the average difference was 2.4 points. As the mean FACTS score for the whole sample was 73.24 with a standard deviation of 41.1, this is equivalent to a difference of z = 0.06 if scores are converted to z scores, representing reasonable inter-rater agreement. FACTS also exhibits good internal consistency (Cronbach's ALPHA = 0.89) and split - half reliability between odd and even numbered test items was 0.94.

Responses were recorded on a test form during the administration of FACTS and scored after the evaluation was completed on a separate score sheet. These scores were then entered into a database maintained in Paradox on a PC and summary scores were automatically calculated by a scoring program.

Validation Study: Results

Mobility Evaluation

The results of the independent mobility evaluation are shown in Table 1. The O & M evaluation indicated that 60 individuals did not currently posses the skills for any independent travel, 13 individuals were functionally capable of travel under some but not all conditions, and a further 12 were capable of independent mobility in the system. However, the O & M Specialist also noted that 25 individuals' skills could be improved with training such that 21 had the potential to become fully, independently mobile, a further 23 could be trained to take some trips such that they would be conditionally eligible for paratransit services while only 41 were judged incapable of developing sufficient skills to be community mobile under any circumstances. Independent, Conditional and Dependent groups did not differ significantly in terms of age or gender distribution.

Table 1: Actual Community Mobility Level of 85 subjects as determined by the Orientation and Mobility Specialist

	Current Status	Potential with Training
Independent	12	21
Conditional	13	23
Dependent	60	41

Functional Test

FACTS scores were analyzed in two general ways.

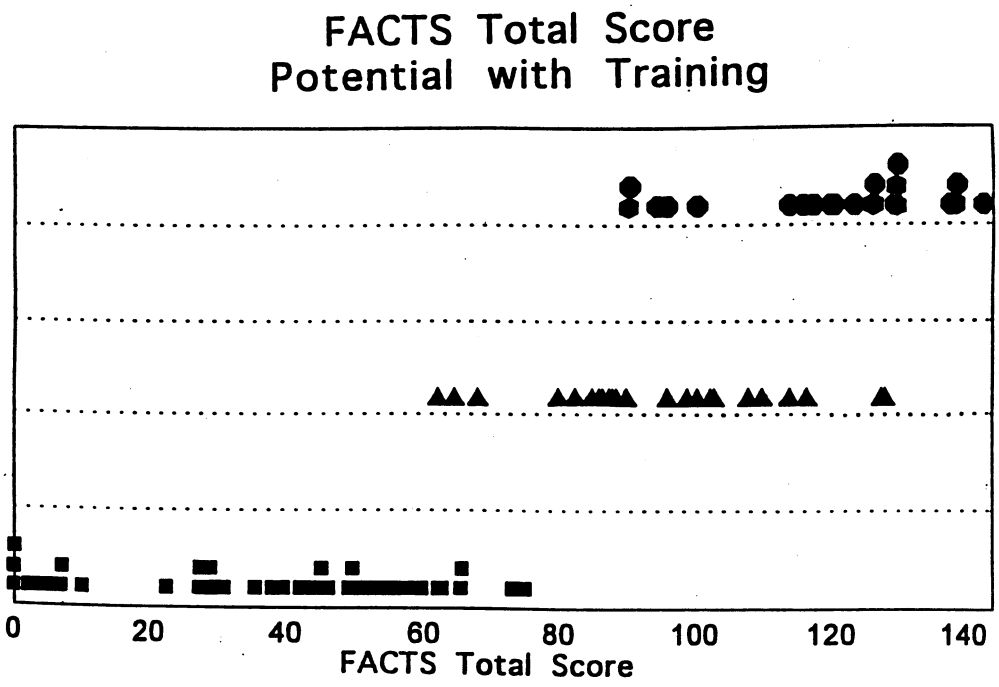
Group Differences: First, the overall scores of subjects in the three skill groups defined by the O & M Evaluation were compared to determine whether independent, conditional and dependent individuals differed in terms of FACTS performance. These analyses were carried out separately for the groups defined by the mobility level they could potentially achieve with training and, subsequently, for groups defined by their current level of mobility skill using separate, one-way analysis of variance in each case.

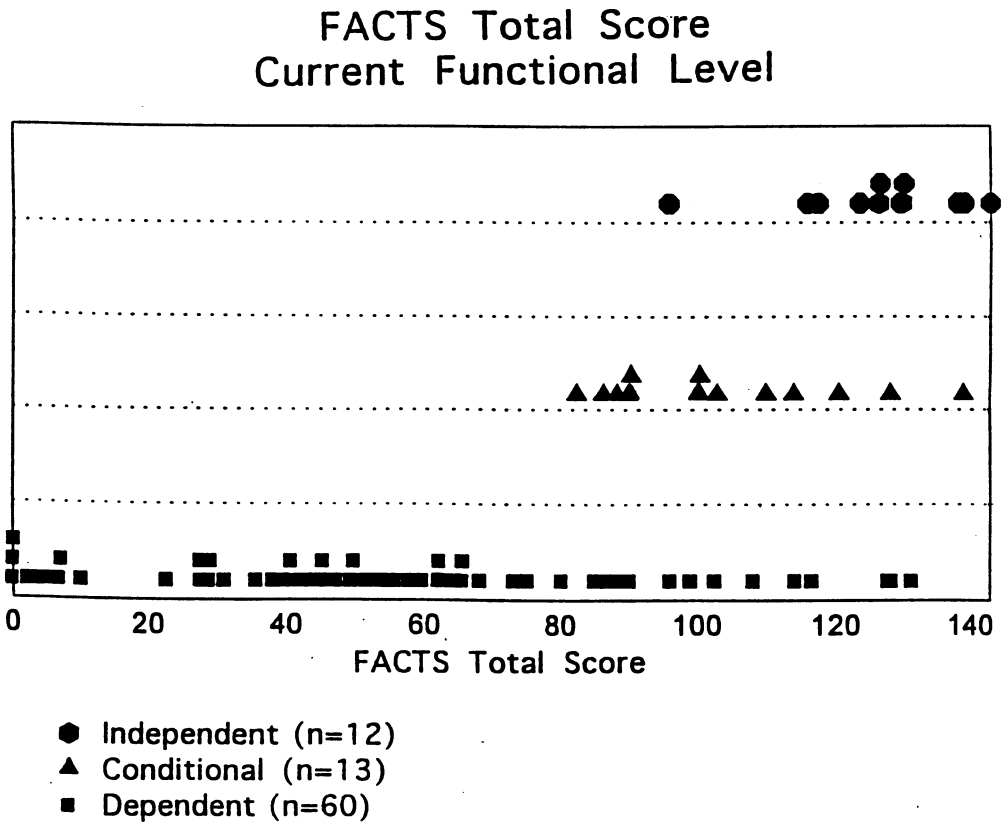
Considering potential after training was complete, there was a main effect of mobility category ($F_{2,81}=131.77$, $p<0.0001$). Potentially independent subjects' FACTS scores were significantly higher than those of potentially conditionally eligible subjects and both of these groups achieved significantly higher scores than individuals determined to be incapable of learning to travel independently in any circumstances (both $p<0.05$).

Considering current mobility status, there was again a significant main effect of mobility level ($F_{2,81}=33.83$, $p<0.0001$) but while currently independent and conditionally eligible subjects again achieved significantly higher scores than did individuals incapable of any independent travel ($p<0.05$), the difference between the two former groups was not statistically significant in this case.

Prediction Of Eligibility: Second, FACTS scores were analysed to determine how accurately actual eligibility status could be predicted from performance on the functional test. Several approaches to this issue were tried including CART analyses based on individual test items and a discriminant function based on scores on the four FACTS subscales. However, predictions based simply on total FACTS score were ultimately found to be as accurate as those derived by the more sophisticated statistical methods and have the virtue of being considerably simpler and easier to apply.

The total FACTS scores on which the following predictions were based are shown in Figures 1 and 2. Scores achieved by individuals in each skill group are plotted separately, Figure 1 showing the scores broken down by potential skill group while Figure 2 shows them broken down by current mobility status. As can be seen from the figures, FACTS scores are strongly related to applicants' potential skill level after training while current status can also be predicted substantially better than chance. The resulting distributions were examined to identify cut points that would maximize the accuracy with which eligibility class could be retrospectively predicted from FACTS scores.


FACTS Total Score
Potential with Training
0
20
40
60
80
100
120
140
FACTS Total Score
Independent (n=21)
Conditional (n=23)
Dependent (n=41)



Note that FACTS' purpose is to provide information about applicants' functional skill level. Thus, it is only intended to form a part of an eligibility determination procedure in which other sources of information will also be considered. However, for the purpose of the following discussion it has been assumed that eligibility is determined by FACTS score alone, an assumption which is not warranted and a purpose for which FACTS is not intended. With this proviso, independent travelers (as determined by the O & M evaluation) have been categorized as "ineligible" in the following tables, conditionally dependent individuals have been labeled "conditional", and those unable to travel independently have been described as "eligible".

Tables 2a and 2b show examples of the accuracy with which potential eligibility status after training could be predicted using FACTS score cut points chosen with different goals in mind: (a) to maximize overall accuracy of classification and (b) to minimize the number of individuals assigned to lower levels of paratransit service than their needs required.

Table 2a shows the eligibility status predicted by FACTS score compared with the "actual" potential as determined by the O & M Specialist when the cut points were simply chosen to yield the best overall correct classification rate. As can be seen, 72 individuals or 85% of the total sample were correctly classified and only two subjects (less than 3% of the sample) would have been assigned to a lower level of eligibility for services than their functional skills dictated. These were the two subjects who were actually only eligible under some conditions but were predicted to be fully community mobile, and thus ineligible on the basis of their FACTS score. On the other hand, 11 subjects would have been assigned to a higher level of paratransit service than that to which they were entitled on the basis of their functional skills. Thus, FACTS predicted that 8 subjects were eligible for paratransit services under some conditions when they were in fact fully mobile and 3 subjects who were capable of independent travel in some conditions would have been given unconditional eligibility. Nevertheless, the great majority (72 of 85) subjects would have been assigned to the appropriate eligibility category.

Table 2a: Potential Eligibility Status After Training: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to maximize overall classification accuracy.

ACTUAL STATUS	STATUS PREDICTED BY FACTS		
	Ineligible	Conditional	Eligible
Ineligible	13	8	0
Conditional	2	18	3
Eligible	0	0	41

Overall correct classification 85%

Table 2b shows the accuracy with which eligibility status was predicted by FACTS score when cut-off scores were adjusted to maximize sensitivity, i.e., to ensure that no eligible applicant would have been denied at least the level of eligibility appropriate to their actual skill level. In this case, 81% of subjects would still have been assigned to the correct eligibility category. However, the increased sensitivity is achieved at the cost of lower specificity and 19% of subjects would have been assigned to a higher level of paratransit services than their actual needs dictated, the majority of them being individuals who would have been given conditional eligibility when, in fact, they were independently mobile in the community. This reflects the difficulty in distinguishing between partially and fully mobile applicants.

Table 2b: Potential Eligibility Status After Training: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to ensure that no applicant is denied at least the level of eligibility appropriate to their potential functional skill level.

ACTUAL STATUS	STATUS PREDICTED BY FACTS		
	Ineligible	Conditional	Eligible
Ineligible	8	13	0
Conditional	-	20	3
Eligible	-	-	41

Overall correct classification 81%

Similar data regarding subject's current mobility status (as opposed to their potential status following training) are shown in Tables 3a and 3b. In these cases, the overall correct classification rate based on cut points designed to maximize overall accuracy of classification is almost as high (80% correct) as the figures for potential eligibility status, but specificity declines more rapidly as sensitivity is maximized. Thus, table 3a shows that the 16 subjects who would have been misclassified with respect to current mobility status using the cut-points yielding maximum overall accuracy were almost equally divided between individuals assigned to higher levels of paratransit service than their actual skill level dictated and those assigned to a lower level than that to which they were entitled. Consequently, in this case, if the cut-points used to classify subjects are moved downwards so that no individual is underserved, a somewhat larger number (23 individuals) would be incorrectly assigned to lower levels of service than were mandated by their skill level.

Table 3a: Current Eligibility Status: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to maximize overall classification accuracy.

ACTUAL STATUS	**STATUS PREDICTED BY FACTS**		
	Ineligible	Conditional	Eligible
Ineligible	9	2	1
Conditional	2	6	5
Eligible	2	5	53

Overall correct classification 80%

Table 3b: Current Eligibility Status: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to ensure that no applicant is denied at least the level of eligibility appropriate to his/her current functional skill level.

ACTUAL STATUS	**STATUS PREDICTED BY FACTS**		
	Ineligible	Conditional	Eligible
Ineligible	1	2	9
Conditional	-	1	12
Eligible	-	-	60

Overall correct classification 73%

Sources Of Error: The data were also examined qualitatively to determine the source of error in the minority of cases when FACTS scores, if considered in isolation, would have led to an individual being assigned to the incorrect eligibility category. Three important factors have so far been

identified: a history of mobility training, experience of community transit, and presence or absence of inappropriate behaviors.

First, several of the subjects whose FACTS scores were lower than might have been expected on the basis of their actual functional skills (and who would therefore have been assigned a higher level of paratransit service than they needed if a decision were based on FACTS score alone) were graduates of a particularly thorough, high quality mobility training program. These individuals had been able to develop their skills to their full potential, thereby maximizing their independence compared with other individuals in the sample who had not been exposed to an equivalent quality of training.

By contrast, some individuals whose FACTS scores suggested that they should be capable of more independent travel than the mobility evaluation indicated came from backgrounds in which they had not been exposed to public transportation and had virtually no experience of, or training in, independent travel. In both cases, as might be expected, FACTS scores were a much better reflection of these individual's potential than of their current skill level and this largely accounts for the fact that FACTS scores reflect potential more accurately than current status. When these factors are taken into account in conjunction with FACTS scores, as would be the case in any actual eligibility determining procedure, classification accuracy would be improved over that achieved by FACTS alone.

Finally, in the case of a few individuals, the actual mobility evaluation revealed behaviors which had not been evident during FACTS testing and which contraindicated independent mobility. Thus,

one individual who achieved a high FACTS score and sailed through most of the mobility evaluation without problem is apparently a collector of popsicle sticks. Towards the end of the community mobility evaluation she noticed a popsicle stick on the sidewalk and could not be dissuaded from the search for further collectibles or re-directed back to the task at hand. No such behavior was noted during FACTS although in several other instances behaviors which would have precluded independent travel were picked up in the behavioral observations section of the functional test.

For example, 9 individuals were noted to touch the examiner repeatedly and inappropriately during administration of FACTS, 6 (including some of the same individuals) repeatedly interrupted the examiner during the assessment and 5 exhibited inappropriate vocalization that might have caused a problem if directed at members of the public in the community. All of these individuals were found to be unable to travel independently under any circumstances by the O & M Specialist and the problem behaviors were quite evident during FACTS. By contrast, unintelligible speech during FACTS did not constitute a barrier to mobility; 5 of the 15 individuals whose speech was unintelligible during FACTS were found to be capable of independent travel under at least some circumstances (a success rate not significantly different from that found among intelligible individuals) and another individual with unintelligible speech was judged to have the potential for fully independent travel after training.

Selection Of Potential Trainees: FACTS score can also be used as a guide in selecting individuals who may benefit from mobility training. As mentioned previously, the O & M Specialist determined that 25 of the 85 subjects in this study could improve their mobility with appropriate

training sufficiently to change their eligibility category. Not suprisingly these individuals tended to achieve FACTS scores in the upper part of the range for their current mobility category. Thus, 19 of the 26 subjects whose current dependence on assistance for community mobility would render them unconditionally eligible for paratransit but who scored relatively highly (total score of 62 or higher) on FACTS were judged capable of moving to conditional or, in 3 cases, complete independence. Similarly, the O & M evaluation suggested that 6 of the 10 currently conditional individuals who scored above 90 on FACTS could become fully independent with training. Focusing training efforts on individuals with FACTS scores in these ranges may therefore be a cost effective use of resources.

Limitations of FACTS: It should be noted that the results discussed here were obtained from a post-hoc analysis of the data from an empirical study including only individuals with developmental cognitive disabilities and that only the overall FACTS score was analyzed. On the one hand, this indicates a need for caution in interpreting FACTS scores because it is unlikely that the cut-off levels based on optimal classification rates for the current experimental sample would yield quite such high classification rates as those observed here if they were applied to other samples. Nor have we yet shown that FACTS scores would accurately reflect functional skill in individuals whose cognitive disabilities are not of developmental origin (such as individuals with head injury or elderly individuals) although we expect that it will be useful in these groups also. On the other hand, FACTS is not intended to be the sole basis on which eligibility for paratransit services is determined and we anticipate that it can form part of a very effective, valid and accurate eligibility determination procedure.

The Place of FACTS In An Eligibility Determination Procedure

As has been repeatedly emphasized, FACTS is not, by itself, intended to determine eligibility for paratransit services. Rather, it is intended to be a cost-effective, face valid, acceptable and reasonably accurate way of determining whether individuals with developmental disabilities have (or are capable of acquiring) the functional skills required for community mobility. As such it will form an important part of an eligibility determination procedure which also takes account of other information about the applicant.

We do not propose a single fixed cut-off score that should be used to determine an individuals functional status. Rather, our data can be used to generate a range of cut-off scores, each of which is associated with a known sensitivity and specificity (i.e., the proportion of individuals who need a given level of paratransit service who can be expected to be identified as needing that level of service by a given FACTS score and the proportion of individuals whose disabilities do not mandate that level of service but who would appear to need it based on their FACTS score). Individual transit authorities could adjust sensitivity and specificity to meet their needs and in the light of other aspects of their eligibility determination procedure. In Pittsburgh where FACTS was developed, it is helpful to be able to determine applicants' potential mobility level after training both for purposes of eligibility determination and in order to allocate training resources effectively.

In the validation study, FACTS scores of 129 or greater are always associated with potential independence, with scores in the 78-128.5 range reliably indicating potential conditional independence and scores below 78 achieved only by permanently eligible individuals. These score

ranges (129 or greater indicating independence, 78-119.5 = conditional, less than 78 = incapable of independent travel) have been provisionally adopted as guidelines for the eligibility determination process in Pittsburgh with individuals in the 100-129 range being referred for mobility training.

In contrast, where current functional status rather than potential is key, the cut off scores yielding the maximum correct classification rate for the study sample based on current status would have been as follows: 123 or greater = independent; 100-122.5 = conditional; 99.5 and below currently incapable of independent travel. However, as pointed out earlier, these cut off scores would lead to the misclassification of about 20% of the study sample, including just over 10% who would have been denied a level of service to which they were entitled.

In general, we would recommend the use of cut-off scores close to those which yield the greatest overall correct classification rates but suggest that they are weighted in the direction of maximizing sensitivity in order to keep to a minimum the number of individuals who might be denied a needed level of service if their FACTS score were the only criterion on which eligibility was determined.

FACTS is appropriate for administration by transit staff without a background in medical, rehabilitation or behavioral science. However, we recommend that staff who are to administer it be trained in an intensive two to three day workshop by the test designers and that they pass a test of competency in administration, scoring and interpretation of the results before being certified as fit to administer it to applicants.

Further FACTS Research

Based on the above considerations, we propose three extensions to our current work involving FACTS. First, we think it important to confirm the validity of FACTS as a predictor of eligibility status by conducting a prospective study of a second sample of individuals with developmental disabilities in order to test the cut-off scores derived from the current study. This will enable us to define cut-off scores with greater confidence and to provide more specific guidelines for the interpretation of FACTS data. Second, we recommend a study of older individuals and individuals with acquired cognitive disabilities, such as those resulting from head trauma or stroke, in order to explore the validity of FACTS as a measure of functional skills in these groups also. Finally, we recommend a study of the utility of FACTS as an indicator of the training needs of individuals with cognitive disabilities. We suggest that this be accomplished by administering FACTS to a group of individuals who will subsequently undergo mobility training with a view to determining not only whether or not FACTS score before training predicts whether training will be successful but also whether the pattern of skill weaknesses revealed by difficulty with individual FACTS items accurately reflects the training needs of these individuals. Informal analysis of our current data suggests that FACTS may have some potential along these lines and, if so, it would be extremely useful with a view to effective utilization of scarce and expensive mobility training resources.

Table 1: Actual Community Mobility Level of 85 subjects as Determined by the Orientation and Mobility Specialist.

Table 2a: Potential Eligibility Status After Training: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to maximize overall classification accuracy.

Table 2b: Potential Eligibility Status After Training: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen

to ensure that no applicant is denied at least the level of eligibility appropriate to their potential functional skill.

Table 3a: Current Eligibility Status: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to maximize overall classification accuracy.

Table 3b: Current Eligibility Status: actual status as determined by mobility evaluation versus status predicted by FACTS using cut-points chosen to ensure that no applicant is denied at least the level of eligibility appropriate to their current functional skill.

FACTS RESPONSE SHEET

NAME: DATE:

EXAMINER:

	Approp. Verbal	Approp. Non Verb.	Inapprop. Verbal	Inapprop. Non Verb.	No Response
1. Responds to Greeting	____	_____	_____	_____	_____

		Wrong or		From
2. Provides I.D.	Appropriate	Unintell.	N.R.	Informant
Name:	_____	_____	_____	_____
Address:	_____	_____	_____	_____
Phone Number:	_____	_____	_____	_____
Contact Name:	_____	_____	_____	_____
Contact Number:	_____	_____	_____	_____

			With Cue
3a. Follows Simple Directions	Independent	Repetition	Physical Prompt
Come with me:	_____	_____	_____
Follows arrows:	_____	_____	_____
Please sit there:	_____	_____	_____

4. Monitors Time	Independent	With Cue	Inappropriate
Checks time:	_____	___	_____
Judges lateness:	_____	___	_____

5. Selects Bus Stop Sign — ***Let's be sure you know where to get on the bus....***

	Stop Sign	Watch Children	Real Estate	Bus Stop	Wrong Way
Initial	____	_____	____	_____	_____
Retrain	____	_____	____	_____	_____

Today I will try to teach you what you would have to do if you wanted to take a bus to get to McDonald's....

6. I.D. First Bus (91A)	77G	1A	91A	67A	71B
Initial	____	_____	____	_____	_____
Retrain	____	_____	____	_____	_____

	Male Passenger	Driver	Instructor	Female Passenger	Female Passenger
7a. I.D. Driver					
Initial	Y N	Y N	Y N	Y N	Y N
Retrain	Y N	Y N	Y N	Y N	Y N
7b. Show Pass					
Initial	Y N	Y N	Y N	Y N	Y N
Retrain	Y N	Y N	Y N	Y N	Y N

	King's	Car Wash	Power Plant	Sheetz	Church
8a. Select First DeBoard					
Initial	____	_____	____	_____	_____
Retrain	____	_____	____	_____	_____

b. Ring Bell

Initial	Y N	Y N	Y N	Y N	Y N
Retrain	Y N	Y N	Y N	Y N	Y N

9. Route	Church	Gas Station	Playground	Grocery	McDonald's
Initial	___	_____	___	_____	_____
Retrain	___	_____	___	_____	_____

You have been doing a good job... Now I would like to see if you can do all the things you need to remember to take that bus trip to McDonalds that we have been practicing. I would like you to....

AUDIO TAPE: Repeat Entire Sequence

		77G	1A	91A	67A	71B
10.	Repeat 1st Bus I.D.	___	_____	_____	_____	_____

		Male Passenger	Driver	Instructor	Female Passenger	Female Passenger
11.	Repeat Driver I.D.	___	_____	_____	_____	_____
	Cue	___	_____	_____	_____	_____
	Present Pass	Y N	Y N	Y N	Y N	Y N
	Cue	___	_____	_____	_____	_____

		King's	Car Wash	Power Plant	Sheetz	Church
12.	Repeats 1st deboard	___	_____	_____	_____	_____
	Cue	___	_____	_____	_____	_____

	Repeat Ring Bell	Y N	Y N	Y N	Y N	Y N
13.	Repeats Route	Church	Gas Station	Playground	Grocery	McDonald's
		___	____	____	____	____

REMOVE TAPE

14. Seat Selection	Correct	Cued	Incorrect	N.R.
Empty Bench	____	____	____	____
Bench with Passenger	____	____	____	____
Passenger with Coats	____	____	____	____

What to do:_____

Empty Window	____	____	____	____

What to do:_____

15. Sitting Correctly *Which picture shows the right way to sit?*

	Correct	Cued	Incorrect	N.R.
a. Awake/Asleep	___	____	____	____
b. Stand/Sit	___	____	____	____
c. Smoking/Not	____	____	____	____
d. Feet Up/Down	____	____	____	____

16. Approached by Stranger	Correct	Cued	Incorrect	N.R.
	___	____	____	____

17. Dressed Correctly: *Which clothes should they wear on a day like today?*

Best, Worst, Adequate	Winter	Summer	Rain	Spring/Fall
Woman	B.W.A.	B.W.A.	B.W.A.	B.W.A.
Cue	___	____	____	_____
Man	B.W.A.	B.W.A.	B.W.A.	B.W.A.
Cue	___	____	____	_____

18. Wait at Bus Stop	Too Far	Wrong Sign	Correct	N.R.
	___	____	____	_____
Repeat/Cue	___	____	____	_____

19. Crossing: *Which picture shows the safe time to cross?*

	Correct	Cued	Incorrect	N.R.
a. Uncontrolled No traffic/light	___	____	____	_____
b. Pedes. green/red	___	____	____	_____
c. No pedes. green/red	___	____	____	_____
d. No pedes. green/yellow	___	____	____	_____
e. Stop Sign traffic/no traf.	___	____	____	_____
f. Walk/Don't	___	____	____	_____

20. Lost on Bus

a. *Let's say you are taking the bus to go to the McDonald's. You are ready to get off the bus at the church. But when you ring the bell and go to the front of the bus you see this..... What should you do?*

Verbal Response:

Non Verbal:

b. *When you look out the window by the driver you see that you don't know where you are. If you get off here you will be lost. What should you do?*

How could you ask for help?

21. Lost off bus: *Which is the best place to go for help*?

	Correct	Cued	Incorrect	N.R.
a. Grocery/Water Plant	____	____	____	_____
b. Drug Store/House____		____	____	____
c. Alley/Hotel	____	____	____	_____
d. Taco Bell/Closed Bldg.	____	____	____	_____
e. Alley/People at Stop	____	____	____	_____
f. Police Officer/Driver	____	____	____	_____

22. Asking for help: *If you were not sure where to go, how would you let the officer know you needed help*?

Cue: *What if the officer said: "Is there a problem?"*

Cue: *"How can I help you?"*
Cue: *"Can you show me something with your name and address on it?"*

NB: If applicant failed 2 or more key parts of 1st sequenced trip (pick bus, deboard, routes) or failed on sequence one part that was never learned after retraining, skip to Item 31 CHECKING TIME.

Intro - Transfer trip

Sometimes you might need to take two buses to get where you want to go. Let's say that after you took your first bus, the 91A to get to McDonalds, you want to go to the movies. So now you will have to take a different bus. I'll show you how to take this second bus trip.

23. I.D. Transfer Bus Stop	McDonalds Restaurant	w/ Shrubs	Crowd	Bank
Initial	____	____	____	____
Retrain	____	____	____	____
	93A	5C	1C	91A

3C

24. I.D. Transfer Bus (3-C)				
Initial	____	____	____	____

If 91A is chosen, provide explanation

Retrain	____	____	____	____

25. I.D. Transfer Deboard	George Aiken's Restaurant	Church	Movies	Bank
Initial	____	____	____	____
Retrain	____	____	____	____

If applicant failed, after retraining, to I.D. transfer bus stop, transfer bus, or transfer deboard, do not attempt sequence. Proceed to ITEM 31 CHECKING TIME..... Otherwise, continue with sequence.

Now I want to see if you can do all the things you would need to do if you took a bus to the church, walked to McDonalds and then took a second bus to go to the movies.

INSERT AUDIO TAPE:

77G	1A	91A	67A	71B

26.	Final I.D. 1st Bus	_____	_____	_____	_____	_____

Now you are on the first bus. Watch for where you need to get off.

		King's	Car Wash	Power Plant	Sheetz	Church
27.	Final 1st DeBoard	___	_____	____	_____	_____
	Ring Bell	Y N	Y N	Y N	Y N	Y N

Now you are off the bus, and you need to walk to McDonalds.

		Church	Gas Station	Playground	Grocery	McDonalds
28.	Final Route	___	_____	_____	_____	_____

		McDonalds	Sidewalk w/ Shrubs	Downtown Crowd	Bank	Restaurant
29.	Final I.D. 2nd Bus Stop	_____	_____	____	___	_____

Now show me the bus that will take you to the movies.

		93A	5C	1C	91A	3C
30.	Final I.D. Transfer Bus	___	_____	____	_____	_____

Now you are on the second bus. Ring the bell when you see where you want to get off.

		George Aiken's	Church	Movies	Bank	Restaurant
31.	Final Transfer Deboard	_____	_____	____	_____	_____

ITEM 32. Checking Time

	Approp.	Early	Late	Persev.	N.R.
Self initiate time check	____	_____	____	_____	_____

	Correct	Incorrect	N.R.
Cued time check			
Did we finish on time?	_____	_____	_____
are we late?	_____	_____	_____

ITEM 33.

	Verbal Independent	Physical Cue	Prompt
Find a Way Back to the elevator	_____	_____	_____

BEHAVIORAL CHECKLIST

Easily Agitated:	Y	N	Frequent Redirection:	Y	N
Unresponsive:	Y	N	Distractible:	Y	N
Nonverbal:	Y	N	Interrupts repeatedly:	Y	N
Inappropriate Behavior:	Y	N	Inappropriate Vocalization:	Y	N
Stereotypical Behaviors:	Y	N	Stereotypical Vocalization:	Y	N
Unintelligible Speech:	Y	N	Other: specify _____		

_____

_____

COMMENTS:

FACTS SCORE SHEET

NAME: **I.D.:** **DATE:**

LOCATION: **EXAMINER:** **CHECKED?**

BEHAVIORAL CHECKLIST

Easily Agitated:	Y	N	Frequent Redirection:	Y	N
Unresponsive:	Y	N	Distractible:	Y	N
Nonverbal:	Y	N	Interrupts repeatedly:	Y	N
Inappropriate Touching:	Y	N	Inappropriate Vocalization:	Y	N
Stereotypical Behaviors:	Y	N	Stereotypical Vocalization:	Y	N
			Unintelligible Speech:	Y	N

A. Orientation				Total
1. Response to Greeting	Appropriate 2	Inappropriate/None 0		☐
2. Provides I.D.	Full/Independ.	Partial/Cued	Wrong or N/R	
Name	2	1	0	
Address	2	1	0	
Phone Number	2	1	0	
Contact Name	2	1	0	
Contact Number	2	1	0	
Total				☐
3. Follows Direction	Independent	Cued/Repeated	Physical Prompt	
Come with	2	1	0	
arrows	2	1	0	
sit	2	1	0	
Total				☐
4/32. Monitors time (ignore 1 early response)	Independ./Accur. 4	Cued Correct or Indep./Delay. 2	Perseverates or Incorrect 0	☐
33. Back to Waiting Room	Independ./Accur. 4	Cued 2	> 1 Prompt 0	☐
COUNT A	☐	☐	☐	☐

B. Simple Trip	Initial	Retrain	Fail	Total
5. Bus Stop	4	2	0	
6. Bus	4	2	0	
7a. I.D. Drive	4	2	0	
7b. Show Pass	4	2	0	
8a. I.D. Stop	4	2	0	
8b. Ring Bell	4	2	0	
9. Learns Route	4	2	0	
Chain	Pass		Fail	
10. Bus	2		0	
11a. I.D. Drive	2		0	
11b. Show Pass	2		0	
12a. I.D. Stop	2		0	
12b. Ring Bell	2		0	
13. Learns Route	2		0	
	0	0	0	
COUNT B				

C. Travel Skills	Spontaneous Corr.		Incorrect/None	
14. Seat Selection				
a	1		0	
b	1		0	
c	1		0	
d	1		0	
				Total ☐
15. Sitting				
a	1		0	
b	1		0	
c	1		0	
d	1		0	
				Total ☐
16. Stranger	4		0	
				Total ☐
17. Clothes	Best		Inadequate	
a	2		0	
b	2		0	
				Total ☐
18. Wait at Stop	Spontaneous		Incorrect/Name	
	2		0	
				Total ☐
19. Crossing				
a	2		0	
b	2		0	
c	2		0	
d	2		0	
e	2		0	
f	2		0	Total ☐
20. Lost on bus	Adequate/Spont	Cued	Inadequate	
a	2		0	Total
b	2		0	☐
21. Where to get help				
a	2		0	
b	2		0	
c	2		0	
d	2		0	
e	2		0	
f	2		0	Total ☐
22. Ask for help	Spontaneous	1 Cue >1 Cue	Inadequate	Total ☐ 0
	4	2 1	0	
COUNT C	☐	☐	☐	Total C ☐

TOTAL COUNT	A+B+C			A+B+C Total

D. Complex Trip	Initial	Retrain	
23. Transfer Stop	2	1	
24. Transfer Bus	2	1	
25. Transfer Deboard	2	1	
Transfer Chain			Chain
26. 1st bus			4
27. 1st deboard			4
28. Route			4
29. Transfer Stop			4
30. Transfer Bus			4
31. Transfer Deboard			4

COUNT D				Total D

Grand Total